TÜRK-ALMAN ÜNİVERSİTESİ
TÜRKISCH-DEUTSCHE UNIVERSITÄT

AUGUST 2022

# TURKISH-GERMAN UNIVERSITY

## FACULTY OF ENGINEERING

# COURSE HANDBOOK

## B.Sc. Computer Science

İSTANBUL
BEYKOZ

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# About Us

Computer Engineering has become the locomotive of innovation in almost every technical field all over the world in recent years and offers its graduates an excellent future perspective thanks to the diversity in its fields of use.

**General Structure**
In today's information society, industry, economy, society and numerous fields of science have become dependent on the development and use of information technologies. Our graduates will be equipped with a comprehensive and holistic education that will prepare them for this dynamic and changing business world in a motivating environment. The envisaged teaching period of the undergraduate program is four years.

**Content of the Program**
The Computer Engineering Undergraduate Program combines research and industry-focused learning through well-established theory-based practice courses and internships. The primary contents of the program are the implementation of problem analysis and computer aided solution strategies, the development of algorithms for distributed network environments, and the analysis and processing of large data stacks. Another point that makes the program special is the weight it gives to the Industry 4.0 vision. In addition, importance is given to gaining the social and creative competencies that our graduates will need in order to gain a permanent position in the business world.

**Gains**
Our students will be able to gain experience abroad with the opportunities offered by our partner university, Otto von Guericke University Magdeburg. Students will be able to benefit from the opportunities to take part in education, internship, and education-supporting industry projects abroad within the scope of the undergraduate program. The aim of the program is to train students as graduates who can learn three languages by learning English as well as German.

**Partner University**
Otto von Guericke University Magdeburg has a deep-rooted scientific tradition in Computer Engineering and guarantees a well-founded and at the same time innovative learning, distinguished by both its research-oriented and practical orientation. This experience also shows itself in the subjects that we have created together as two universities and that our highly up-to-date undergraduate program focuses on Industry 4.0.

# Courses of Study for Computer Science

1. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| MAT103 | Calculus I | | DE | 3 | 2 | | 6 |
| INF101 | Introduction to Computer Science and Programming | | DE | 2 | | 2 | 6 |
| INF103 | Logic | | DE | 2 | 2 | | 6 |
| INF107 | Computer Organisation | | DE | 2 | | 2 | 6 |
| DEU121 | Technical German I | | DE | 2 | | | 2 |
| ENG101 | English I | | EN | 3 | | | 2 |
| TUR001 | Turkish I | | TR | 2 | | | 2 |
| | | | **SUM** | **16** | **4** | **4** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

2. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| MAT106 | Linear Algebra | | DE | 2 | 2 | 1 | 6 |
| INF102 | Object Oriented Programming | INF101 | DE | 2 | | 2 | 6 |
| INF104 | Automata and Formal Languages | INF103 | DE | 2 | 2 | | 6 |
| INF110 | Operating Systems | | DE | 2 | | 2 | 6 |
| DEU122 | Technical German II | | DE | 2 | | | 2 |
| ENG102 | English II | | EN | 3 | | | 2 |
| TUR002 | Turkish II | | TR | 2 | | | 2 |
| | | | **SUM** | **15** | **4** | **5** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

3. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| INF201 | Discrete Structures | | DE | 2 | 2 | 1 | 6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| INF203 | Algorithms and Data Structures I | | DE | 2 | | 2 | 6 |
| INF205 | Database Systems | | DE | 2 | | 2 | 6 |
| INF209 | Computer Networks | | DE | 2 | 2 | | 6 |
| INF211 | Seminar in Computer Science and Society | | DE | 1 | | | 2 |
| ENG201 | English III | | EN | 3 | | | 2 |
| AIT001 | Atatürk's Principles and History of Revolution I | | TR | 2 | | | 2 |
| | | | **SUM** | **14** | **4** | **5** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

4. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| MAT204 | Statistical Methods for Data Analysis | | DE | 2 | 2 | 1 | 6 |
| INF202 | Software Engineering | | DE | 1 | | 3 | 6 |
| INF204 | Algorithms and Data Structures II | | DE | 2 | | 2 | 6 |
| INF208 | Embedded Systems | | DE | 2 | | 2 | 6 |
| INF210 | Seminar in Ethics for Computer Scientists | | DE | 1 | | | 2 |
| ENG202 | English IV | | EN | 3 | | | 2 |
| AIT002 | Atatürk's Principles and History of Revolution II | | TR | 2 | | | 2 |
| | | | **SUM** | **13** | **2** | **8** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

5. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| SDP | Elective Courses - Project | | DE | | | | 6 |
| SDIa | Elective Courses I - Practical Computer Science | | DE/EN | | | | 6 |
| SDIb | Elective Courses I - Computer Engineering | | DE/EN | | | | 6 |
| SDIc | Elective Courses I - Theoretical Computer Science and Mathematics | | DE/EN | | | | 6 |
| ÜSD001 | University Elective Pool I | | DE/EN | | | | 2 |
| ISG001 | Occupational Safety and Health I | | DE/TR | 2 | | | 2 |
| ENG301 | Advanced English I | | EN | 3 | | | 2 |

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|---|---|---|---|---|---|---|---|
| | | | **SUM** | **5** | **0** | **0** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

See below for a list of courses in each of the elective areas (SDIx).

## 6. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| SDIIa | Elective Courses II - Practical Computer Science | | DE/EN | | | | 12 |
| SDIIb | Elective Courses II - Computer Engineering | | DE/EN | | | | 6 |
| SDIIc | Elective Courses II - Theoretical Computer Science and Mathematics | | DE/EN | | | | 6 |
| ÜSD002 | University Elective Pool II | | DE/EN | | | | 2 |
| ISG002 | Occupational Safety and Health II | | DE/TR | 2 | | | 2 |
| ENG302 | Advanced English II | | EN | 3 | | | 2 |
| | | | **SUM** | **5** | **0** | **0** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

See below for a list of courses in each of the elective areas (SDIIx).

## 7. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| INF499 | Vocational Internship | | DE/EN/TR | | | | 6 |
| INF401 | Scientific Study Methods | | DE | 2 | | | 6 |
| SDIII | Elective Courses III | | DE/EN | | | | 18 |
| | | | **SUM** | **2** | **0** | **0** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

See below for a list of courses in each of the elective areas (SDIIIx).

## 8. SEMESTER

| CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|
| INF492 | Bachelor Thesis | | DE | | | | 12 |
| SDIV | Elective Courses IV | | DE/EN | | | | 18 |
| | | | **SUM** | **0** | **0** | **0** | **30** |

LANG: Language, T: Theory , A: Übung, L: Laboratory

See below for a list of courses in each of the elective areas (SDIVx).

*** Students must complete courses for a total of 84 ECTS. Of these, at least 12 ECTS must be from the elective area Practical Computer Science (SDI-SDIVa), at least 12 ECTS from the elective area Computer Engineering (SDI-IVb), at least 12 ECTS from the elective area Theoretical Computer Science and Mathematics (SDI-IVc). You may complete the remaining 48 ECTS with courses from the elective areas listed below, with Free Electives (SDIe-SDIVe) not to to exceed a total of 18 ECTS. The area of "Free Electives" includes the courses listed below and all German language courses offered in the Bachelor's programs of the Turkish-German University.**

Elective Field – Project (SDP)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|
| 1 | WIN311 | Project I: Innovation and Technology Management | | DE | 1 | | 4 | 6 |
| 2 | MEC319 | Mechatronics Project | | DE | 1 | | 4 | 6 |
| 3 | INF303 | Software Engineering Project | | DE | 1 | | 3 | 6 |
| 4 | ETE491 | Electrical and Electronics Engineering Project | | DE | 1 | | 4 | 6 |
| | | | | **SUM** | **4** | **0** | **15** | **24** |

Electives - Applied Computer Engineering (SDIa, SDIIa, SDIII, SDIV)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|
| 1 | INF501 | Intelligent Systems | | DE/EN | 2 | | 2 | 6 |
| 2 | INF502 | Machine Learning | | DE/EN | 2 | | 2 | 6 |
| 3 | INF503 | Neural Networks | | DE/EN | 2 | | 2 | 6 |
| 4 | INF504 | Natural Language Processing | | DE/EN | 2 | | 2 | 6 |
| 5 | INF505 | Data Mining | | DE/EN | 2 | | 2 | 6 |
| 6 | INF506 | Methods for Data Analysis | | DE/EN | 2 | | 2 | 6 |
| 7 | INF507 | Information Retrieval and Extraction | | DE/EN | 2 | | 2 | 6 |
| 8 | INF508 | Recommender Systems | | DE/EN | 2 | | 2 | 6 |
| 9 | INF509 | Deep Generative Models | | DE/EN | 2 | | 2 | 6 |
| 10 | INF510 | IT Security | | DE/EN | 2 | | 2 | 6 |
| 11 | INF511 | Distributed Systems | | DE/EN | 2 | | 2 | 6 |
| 12 | INF512 | Software Validation and Verification | | DE/EN | 2 | | 2 | 6 |
| 13 | INF513 | Deep Learning | | DE/EN | 2 | | 2 | 6 |
| 14 | INF514 | Computer Graphics I | | DE/EN | 2 | | 2 | 6 |
| 15 | INF515 | Computer Graphics II | | DE/EN | 2 | | 2 | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 16 | INF516 | Reinforcement Learning | | DE/EN | 2 | | 2 | 6 |
| 17 | INF517 | Medical Image Processing | | DE/EN | 2 | | 2 | 6 |
| 18 | INF518 | Foundations of Computer Vision | | DE/EN | 2 | | 2 | 6 |
| 19 | INF519 | Game Design | | DE/EN | 2 | | 2 | 6 |
| 20 | INF520 | Game Engine Architecture | | DE/EN | 2 | | 2 | 6 |
| 21 | INF521 | Information Visualisation | | DE/EN | 2 | | 2 | 6 |
| 22 | INF522 | Web Engineering | | DE/EN | 2 | | 2 | 6 |
| 23 | INF523 | Human-Machine Interaction | | DE/EN | 2 | | 2 | 6 |
| 24 | INF524 | Applied Computer Science: Selected Topics I | | DE/EN | 2 | | 2 | 6 |
| 25 | INF525 | Applied Computer Science: Selected Topics II | | DE/EN | 2 | | 2 | 6 |
| 26 | INF526 | Applied Computer Science: Selected Topics III | | DE/EN | 2 | 2 | | 6 |
| 27 | INF527 | Applied Computer Science: Selected Topics IV | | DE/EN | 2 | 2 | | 6 |
| 28 | INF528 | Applied Computer Sciences: Selected Topics V | | DE/EN | 1 | | 2 | 4 |
| 29 | INF529 | Applied Computer Sciences: Selected Topics VI | | DE/EN | 1 | | 2 | 4 |
| 30 | INF530 | Programming Project I | | DE/EN | | | 4 | 6 |
| 31 | INF531 | Programming Project II | | DE/EN | | | 4 | 6 |
| 32 | INF532 | Programming Project III | | DE/EN | | | 4 | 6 |
| 33 | INF533 | AI in Medicine | | DE/EN | 2 | | 2 | 6 |
| 34 | INF534 | Introduction to Bioinformatics | | DE/EN | 2 | | 2 | 6 |
| | | | | **SUM** | **60** | **4** | **70** | **200** |

Elective Courses - Computer Hardware (SDIb, SDIIb, SDIII, SDIV)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|
| 1 | INF601 | Real Time Systems | | DE/EN | 2 | | 2 | 6 |
| 2 | INF602 | Compiler Construction | | DE/EN | 2 | | 2 | 6 |
| 3 | INF603 | Mobile Communication | | DE/EN | 2 | | 2 | 6 |
| 4 | INF604 | GPU Programming | | DE/EN | 2 | | 2 | 6 |
| 5 | INF605 | Foundations of Image Processing | | DE/EN | 2 | | 2 | 6 |
| 6 | INF606 | Computer Engineering: Selected Topics I | | DE/EN | 2 | | 2 | 6 |
| 7 | INF607 | Computer Engineering: Selected Topics II | | DE/EN | 2 | | 2 | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | INF608 | Computer Engineering: Selected Topics III | | DE/EN | 2 | 2 | | 6 |
| 9 | INF609 | Computer Engineering: Selected Topics IV | | DE/EN | 2 | 2 | | 6 |
| 10 | INF610 | Computer Engineering: Selected Topics V | | DE/EN | 1 | | 2 | 3 |
| 11 | INF611 | Computer Engineering: Selected Topics VI | | DE/EN | 1 | 2 | | 3 |
| 12 | INF612 | Computer Engineering Project I | | DE/EN | | | 4 | 6 |
| 13 | INF613 | Computer Engineering Project II | | DE/EN | | | 4 | 6 |
| 14 | INF614 | Computer Engineering Project III | | DE/EN | | | 4 | 6 |
| 15 | ETE101 | Digital Design | | DE/EN | 2 | 1 | 1 | 6 |
| 16 | PHY102 | Electricity and Magnetism | | DE/EN | 3 | 1 | 1 | 6 |
| 17 | ETE201 | Electrical Circuits I | | DE/EN | 3 | 2 | | 6 |
| 18 | ETE202 | Electrical Circuits II | | DE/EN | 3 | 2 | | 6 |
| 19 | ETE303 | Signals and Systems | | DE/EN | 3 | 1 | 1 | 6 |
| 20 | ETE311 | Electronics I: Semiconductor Components | | DE/EN | 2 | 2 | 1 | 6 |
| 21 | ETE372 | Telecommunications | | DE/EN | 3 | 2 | | 6 |
| 22 | ETE442 | Embedded Systems | | DE/EN | 2 | 2 | 1 | 6 |
| 23 | ETE448 | Introduction to the VLSI Design | | DE/EN | 3 | 1 | 1 | 6 |
| 24 | ETE471 | Communication Networks | | DE/EN | 3 | 1 | 1 | 6 |
| 25 | ETE474 | Digital Image Processing | | DE/EN | 2 | 1 | 2 | 6 |
| 26 | ETE475 | Digital Signal Processing | | DE/EN | 2 | 1 | 2 | 6 |
| 27 | MAB107 | Technical Drawing and CAD | | DE/EN | 2 | 0 | 4 | 6 |
| 28 | MAB207 | Material Technology I | | DE/EN | 3 | 2 | | 6 |
| 29 | MAB310 | Material Technology II | | DE/EN | 3 | 1 | | 6 |
| 30 | MEC107 | Design I: Technical Drawing and CAD | | DE/EN | 1 | 2 | 1 | 6 |
| 31 | MEC208 | Metrology | | DE/EN | 2 | 1 | 2 | 6 |
| 32 | MEC313 | Industrial Automation Technology | | DE/EN | 3 | 1 | 1 | 6 |
| 33 | MEC308 | Industrial Robotics I | | DE/EN | 3 | 1 | 1 | 6 |
| 34 | MEC321 | Image-Based Automation I | | DE/EN | 3 | 1 | 1 | 6 |
| 35 | MEC324 | Image-Based Automation II | MEC321 | DE/EN | 3 | 1 | 1 | 6 |
| | | | | **SUM** | **74** | **33** | **50** | **204** |

Elective Courses - Computer Engineering Theoretical Theories and Mathematics (SDIc, SDIIc, SDIII, SDIV)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | INF701 | Artificial Intelligence | | DE/EN | 2 | | 2 | 6 |
| 2 | INF702 | Knowledge Representation and Inferencing | | DE/EN | 2 | 2 | | 6 |
| 3 | INF703 | Code Theory and Cryptology | | DE/EN | 2 | 2 | | 6 |
| 4 | INF704 | Principles of Algorithmic Geometry | | DE/EN | 3 | 1 | | 6 |
| 5 | INF705 | Algorithm Engineering | | DE/EN | 2 | 2 | | 6 |
| 6 | INF706 | Theoretical Computer Science: Selected Topics I | | DE/EN | 2 | | 2 | 6 |
| 7 | INF707 | Theoretical Computer Science: Selected Topics II | | DE/EN | 2 | | 2 | 6 |
| 8 | INF708 | Theoretical Computer Science: Selected Topics III | | DE/EN | 2 | 2 | | 6 |
| 9 | INF709 | Theoretical Computer Science: Selected Topics IV | | DE/EN | 2 | 2 | | 6 |
| 10 | INF710 | Theoretical Computer Science: Selected Topics V | | DE/EN | 1 | | 2 | 3 |
| 11 | INF711 | Theoretical Computer Science: Selected Topics VI | | DE/EN | 1 | | 2 | 3 |
| 12 | INF712 | Computer-aided Statistics | | DE/EN | 2 | | 2 | 6 |
| 13 | INF713 | Differential Equations and Numerics | | DE/EN | 2 | 1 | 1 | 6 |
| 14 | INF714 | Advanced Topics in Mathematics for Computer Scientists | | DE/EN | 2 | 2 | | 6 |
| 15 | INF715 | Algorithmics and Complexity Theory | | DE/EN | 2 | 2 | | 6 |
| 16 | INF716 | Programming Paradigms | | DE/EN | 2 | | 2 | 6 |
| 17 | MAT108 | Calculus II | | DE/EN | 3 | 2 | | 6 |
| 18 | MAT201 | Differential Equations | | DE/EN | 2 | 2 | 1 | 6 |
| 19 | MAT302 | Computer Numerics | | DE/EN | 3 | 1 | 1 | 6 |
| 20 | WIN209 | Operations Research I: Linear Model | | DE/EN | 2 | 2 | | 6 |
| 21 | WIN316 | Operations Research II: Stochastic Models | | DE/EN | 2 | 2 | | 6 |
| | | | | **SUM** | **43** | **25** | **17** | **120** |

Electives - Business Informatics (SDIII, SDIV)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|
| 1 | INF801 | Business Informatics: Selected Topics I | | DE/EN | 2 | | 2 | 6 |
| 2 | INF 802 | Business Informatics: Selected Topics II | | DE/EN | 2 | | 2 | 6 |
| 3 | INF803 | Business Informatics: Selected Topics III | | DE/EN | 2 | 2 | | 6 |
| 4 | INF804 | Business Informatics: Selected Topics IV | | DE/EN | 2 | 2 | | 6 |
| 5 | INF805 | Business Informatics: Selected Topics V | | DE/EN | 1 | | 2 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | INF806 | Business Informatics: Selected Topics VI | | DE/EN | 1 | 2 | | 4 |
| 7 | BWL007 | Digital Marketing | | DE/EN | 2 | 2 | | 6 |
| 8 | BWL017 | Decision Theory | | DE/EN | 2 | 2 | | 6 |
| 9 | BWL030 | Organizational Behavior | | DE/EN | 2 | 2 | | 6 |
| 10 | BWL033 | Human Resources Management | | DE/EN | 2 | 2 | | 6 |
| 11 | BWL037 | Business Data Analysis | | DE/EN | 2 | 2 | | 6 |
| 12 | BWL101 | Introduction to Business Administration | | DE/EN | 2 | 2 | | 6 |
| 13 | BWL201 | Fundamentals of Marketing | | DE/EN | 2 | 2 | | 6 |
| 14 | BWL211 | Fundamentals of Business Informatics | | DE/EN | 2 | | | 3 |
| 15 | BWL214 | Operations Management | | DE/EN | 2 | 2 | | 5 |
| 16 | BWL216 | E-Business | | DE/EN | 2 | | | 3 |
| 17 | BWL415 | Operations Research | | DE/EN | 2 | 2 | | 6 |
| 18 | VWL182 | Introduction to Economics | | DE/EN | 2 | 2 | | 6 |
| 19 | VWL204 | Game Theory | | DE/EN | 2 | 2 | | 5 |
| 20 | VWL301 | International Economics 1 | | DE/EN | 3 | 1 | | 6 |
| 21 | WIN204 | Accounting and Balancing | | DE/EN | 2 | 2 | 1 | 6 |
| 22 | WIN306 | Information Systems for Production and Logistics | | DE/EN | 1 | | 2 | 6 |
| 23 | WIN309 | Marketing | | DE/EN | 2 | 2 | | 6 |
| 24 | WIN313 | Logistics Management and Technologies | | DE/EN | 2 | 1 | 1 | 6 |
| 25 | WIN314 | Quality Management | | DE/EN | 3 | 1 | 1 | 6 |
| 26 | WIN351 | Digital Transformation Management | | DE/EN | 2 | 2 | | 6 |
| | | | | **SUM** | **51** | **37** | **11** | **144** |

General Electives (SDIe, SDIIe, SDIIIe, SDIVe)

| NO | CODE | COURSE NAME | PREREQUISITE | LANG | T | A | L | ECTS |
|---|---|---|---|---|---|---|---|---|
| 27 | ING406 | Law for Engineers | | DE/EN | 2 | 1 | | 6 |
| 28 | ING404 | Entrepreneurship | | DE/EN | 2 | | | 2 |
| 29 | INF901 | Soft Skills I | | DE/EN | 1 | | | 2 |
| 30 | INF902 | Soft Skills II | | DE/EN | 2 | | | 3 |
| 31 | INF903 | Soft Skills III | | DE/EN | 2 | | | 4 |
| 32 | INF904 | Soft Skills IV | | DE/EN | 2 | 1 | | 5 |
| 33 | INF905 | Soft Skills V | | DE/EN | 2 | 2 | | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 34 | INF906 | Soft Skills VI | | DE/EN | 1 | | | 2 |
| 35 | INF907 | Soft Skills VII | | DE/EN | 2 | | | 3 |
| 36 | INF908 | Soft Skills VIII | | DE/EN | 2 | | | 4 |
| 37 | INF909 | Soft Skills IX | | DE/EN | 2 | 1 | | 5 |
| 38 | INF910 | Soft Skills X | | DE/EN | 2 | 2 | | 6 |
| 39 | INF911 | Computer Science Seminar I | | DE/EN | 2 | | | 4 |
| 40 | INF912 | Computer Science Seminar II | | DE/EN | 2 | | | 4 |
| 41 | PHY101 | Fundamentals of Mechanics | | DE/EN | 3 | 1 | 1 | 6 |
| 42 | PHY103 | Modern Physics | | DE/EN | 3 | 1 | 1 | 6 |
| 43 | BIO111 | Biology | | DE/EN | 2 | 1 | 2 | 6 |
| 44 | CHE111 | Chemistry I | | DE/EN | 2 | 1 | 2 | 6 |
| 45 | CHE112 | Chemistry II | | DE/EN | 2 | 1 | 2 | 6 |
| 46 | NWI107 | Introduction to Natural Sciences | | DE/EN | 2 | | | 2 |
| 47 | PHY111 | Physics I | | DE/EN | 2 | 1 | 2 | 6 |
| 48 | PHY112 | Physics II | | DE/EN | 2 | 1 | 2 | 6 |
| 49 | MBT211 | Biochemistry I | | DE/EN | 2 | 1 | 2 | 6 |
| 50 | NWI201 | Physical Chemistry I | | DE/EN | 3 | 1 | 1 | 6 |
| 51 | MBT204 | Microbiology I | | DE/EN | 2 | 1 | 2 | 6 |
| 52 | MBT222 | Molecular Biotechnology I | | DE/EN | 2 | 1 | 2 | 6 |
| | | | | **SUM** | **53** | **18** | **19** | **124** |

*** The courses taken by the students from the "General Elective Courses" group listed as 27-52 in Elective Courses III and Elective Courses IV pool should not exceed 14 ECTS in total.**

# Course Syllabi

The information forms given below are listed according to their code numbers, with priority given to INF (Computer Science) coded courses. The order of the Course Syllabi does not represent the order of lectures.

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF101 | | 1 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Introduction to Computer Science and Programming | | 2 | 0 | 2 | 6 |

| | |
|---|---|
| **Language** | German |
| **Level** | **Undergraduate** X **Graduate** **Postgraduate** |
| **Department / Program** | Computer Science |
| **Forms of Teaching and Learning** | Lecture, Individual Study. |
| **Course Type** | **Compulsory** X **Elective** |
| **Objectives** | After successfully completing this module, students are able to describe elementary concepts and methods of computer science. You have knowledge of imperative programming and basic knowledge of basic data structures. They are able to algorithmically convert problems into programs and use the programming languages C and C ++. |
| **Content** | **Introduction to Computer Science**<br>- data representation in computers<br>- coding theory<br><br>**Introduction to Programming**<br>- algorithm, specification, program<br>- data types, variables, operators<br>- logical expressions, flow control, loops<br>- functions, areas of validity<br>- pointers<br>- enumerations, structures, fields<br>- microprocessor programming with Arduino (optional for interested students)<br><br>Students deal with these concepts by independently solving, programming and handing in predetermined, relevant programming tasks. |
| **Prerequisites** | None |
| **Coordinator** | Dipl.-Ing. Dr. Burcu Yıldız |
| **Lecturer(s)** | Dipl.-Ing. Dr. Burcu Yıldız |
| **Assistant(s)** | - |
| **Work Placement** | None |
| **Recommended or Required Reading** | |
| **Books / Lecture Notes** | - Hartmut Ernst, Jochen Schmidt, Gerd Beneken. Grundkurs Informatik. Springer Viewek, 2016 |
| **Other Sources** | - Helmut Erlenkötter. C: Programmieren von Anfang an. Rowohlt Taschenbuch Verlag, 1999. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Additional Course Material** | | |
|---|---|---|
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 6 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 3 | 28 |
| **Self-Study** | 1 | 60 | 60 |
| **Assignments** | 6 | 9 | 54 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 10 | 10 |
| | | **Total Work Load** | **155** |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Know how different types of data are displayed in computers. |
| **2** | Knowledge of number arithmetic in computers. |
| **3** | Knowledge of fault-tolerant, compressing and encrypting coding methods |
| **4** | Independent development of algorithms in pseudo code and implementation in the programming language C. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to computer science, history, data display in computers |
| **2** | Number systems and binary arithmetic |
| **3** | Programming in C (basic terms: algorithm, flow chart) |
| **4** | Programming in C (data types, variables) |
| **5** | Programming in C (mathematical and logical operators) |
| **6** | Programming in C (if statements, flow control) |
| **7** | Programming in C (goto loop construction) |
| **8** | Programming in C (loops) |
| **9** | Midterm exams |
| **10** | Coding and encryption |
| **11** | Programming in C (arrays and structures) |
| **12** | Programming in C (functions and scope of variables) |
| **13** | Programming in C (recursive functions) |
| **14** | Programming in C (functions, call-by-value, call-by-reference) |
| **15** | Programming in C (pointer) |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF102 | 1 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Object Oriented Programming | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Individual Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After completing this module, the students have knowledge of object-oriented programming and basic knowledge of basic data structures. They can name and apply elementary structuring and processing mechanisms (object orientation, modularization, recursion). | | | | | |
| **Content** | The following concepts are introduced using an object-oriented programming language (Java):<br>- Object-oriented data modeling with UML<br>- encapsulation<br>- inheritance and polymorphism<br>- abstract classes and interfaces<br>- exception handling<br>- genericity<br><br>Students deal with these concepts by independently solving, programming and handing in predetermined, relevant programming tasks. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dipl.-Ing. Dr. Burcu Yıldız | | | | | |
| **Lecturer(s)** | Dipl.-Ing. Dr. Burcu Yıldız | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Ullenboom C. Java ist auch eine Insel. Galileo Computing, 2014.<br>- Grundkurs Programmieren in Java. D. Ratz, J. Scheffelt, D. Seele, J. Wiesenberber. Hanser Verlag, 2006. |
| **Other Sources** | - Concepts of Programming Languages, Robert W. Sebesta, Pearson Education, 2012. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

| | | | |
|---|---|---|---|
| **Exams** | - | | |
| **Digital Applications and Materials** | | | |
| **Learning platform** | Google Classroom, Google Meet | | |
| **Digital applications** | Programming tasks - Submission via Google Classroom | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | | | % |
| **Engineering** | 40 | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 60 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 6 | | 0 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 60 | 60 |
| **Assignments** | 6 | 10 | 60 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 10 | 10 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **Total Work Load** | **159** |
| **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Ability to analyze problems, taking into account the required and generated data. |
| **2** | Ability to perform object-oriented modeling with UML elements. |
| **3** | Knowledge of principles of object-oriented programming. |
| **4** | Ability to perform object-oriented programming in Java. |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction to object-oriented programming (explanation of the advantages in terms of quality and reusability) |
| **2** | Introduction to object-oriented data modeling, class diagrams in UML |
| **3** | Introduction to object-oriented data modeling, class diagrams in UML |
| **4** | Creation of classes and objects, constructor methods |
| **5** | Inheritance and polymorphism |
| **6** | Method overloading |
| **7** | Type queries and conversions |
| **8** | Repetition |
| **9** | Mid term exams |
| **10** | Genericity |
| **11** | Abstract classes and interfaces |
| **12** | Interface programming |
| **13** | Exception handling |
| **14** | Introduction to GUI programming with Java (Java Swing, JavaFX) |
| **15** | Repetition |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | | | 3 | 1 |
| **2** | 5 | 5 | 5 | | | 3 | 1 |
| **3** | 5 | 5 | 5 | | | 3 | 1 |
| **4** | 5 | 5 | 5 | | | 3 | 1 |

**Contribution Level :** 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

http://bm.tau.edu.tr/learning-objectives-of-the-program

| | |
|---|---|
| **Compiled by:** | RA Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF103 | 1 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Logic | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The focus is on the following learning objectives:<br>- Understand the interplay between syntax and semantics of logic<br>- understanding of theories, their formal and their practical meaning<br>- Ability to choose between alternative algorithms and methods for logical questions (satisfiability, refutability, general validity, ...) and to apply them correctly<br>- Ability to provide evidence or verify evidence presented<br>- Ability to use dedicated logic beyond classic logic to open up special areas of application | | | | | |
| **Content** | - mathematische Grundlagen: Mengen, Sprachen, Induktion, Rekursion<br>- Syntax und Semantik der Aussagenlogik<br>- Algorithmen und Deduktionssysteme für aussagenlogische Probleme<br>- Syntax und Semantik der Prädikatenlogik 1. Stufe<br>- Algorithmen und Deduktionssysteme für prädikatenlogische Probleme<br>- wichtige mathematische Sätze zur Aussagen- und Prädikatenlogik<br>- andere Logiken (modale Logik, temporale Logik) | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof. Dr. Faruk Bağcı | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | Schöning, U.: Logik für Informatiker. 5. Aufl. Spektrum. 2000.<br>- |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Other Sources** | Kreuzer, M., Kühling, S.: Logik für Informatiker. Pearson Studium. 2006.<br>- Dassow, J.: Logik für Informatiker. Teubner. 2005. | | |
| **Additional Course Material** | | | |
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 50 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Identify areas of application for logical languages |
| **2** | Use logical languages for formal modeling |
| **3** | Define logical terms, compare them with each other and in terms of |
| **4** | interpret practical meaning |
| **5** | Highlight the algorithmic quintessence of basic logic systems |

| **Weekly Content** | |
|---|---|
| **1** | Organizational matters |
| **2** | Introduction and motivation |
| **3** | Basic Evidence Strategies 1 |
| **4** | Basic Evidence Strategies 2 |
| **5** | Statement logic 1 |
| **6** | Statement logic 2 |
| **7** | Statement logic 3 |
| **8** | Statement logic 4 |
| **9** | Midterm |
| **10** | Predicate logic 1 |
| **11** | Predicate logic 2 |
| **12** | Predicate logic 3 |
| **13** | Predicate logic 4 |
| **14** | Applications and extensions |
| **15** | Organizational matters |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF104 | | 2 | | | Spring |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Automata and Formal Languages | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Course should provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (and less magical) view towards algorithmic design and in general computation itself. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part of CS. | | | | | |
| **Content** | The course deals with the concept of computability and mathematical models, such as finite automata, grammars and Turing machines, and the relations between these models. The following topics are treated: Automata: finite automata, stack automata and Turing machines. Determinism and non-determinism. Regular expressions, transformation from regular expressions to finite automata and conversely, minimisation of deterministic finite automata.<br>Formal languages: grammars, Chomsky's hierarchy, in particular context-free grammars and regular grammars, closure properties. The relation between grammars and variants of automata. The pumping lemmas for regular and context-free languages, respectively. The universal machine, the halting problem and other undecidable problems, Rice's theorem. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof. Dr. Faruk Bağcı | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Introduction to Automata Theory, Languages and Computation, Hopcroft, Motwani, and Ullman, Pearson Publishers, Third Edition, 2006. |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Digital Applications and Materials** | | |
|---|---|---|
| **Learning Platform** | Google Classroom, Google Meet | |
| **Digital Applications** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | To describe how finite automata, stacking machines, context-free grammars and Turing machines work |
| **2** | To use finite automata, stacking machines, context-free grammars and Turing machines to solve problems |
| **3** | To use algorithms specified in the course for i. e. the following purposes: conversion of a non-deterministic finite automaton to a deterministic one, conversion of a finite automaton into a regular expression and vice versa, and minimization of a deterministic finite automaton |
| **4** | To describe and use Chomsky's language hierarchy including the terms regular language, context-free language, Turing decidable language and Turing acceptable language |
| **5** | To determine whether a language belongs to a particular language family (in Chomsky's language hierarchy) or not |

| **Weekly Content** | |
|---|---|
| **1** | Math review — sets, recursive definitions, proof by induction |
| **2** | Languages; regular sets |
| **3** | Context-free grammars; language generation |
| **4** | Context-free grammars; examples; regular grammars |
| **5** | Parsing — top-down, bottom-up |
| **6** | Normal forms; Chomsky normal form |
| **7** | Deterministic and nondeterministic finite automata |
| **8** | Regular languages |
| **9** | Regular languages; Pumping Lemma; state minimization |
| **10** | Pushdown automata; Pumping Lemma; closure properties |
| **11** | Deterministic parsing — LL(k) grammars |
| **12** | Turing machines; accepting languages |
| **13** | Turing machines; variations; nondeterministic |
| **14** | Chomsky hierarchy |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | RA Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF107 | 1 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Organization | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successful completion of this module<br>- participants will be able to understand the fundamental structure of the computer<br>- architecture<br>- participants will get familiar with computer organization and architecture<br>- - participants will be able to understand how a computer system operates | | | | | |
| **Content** | - Computer arithmetics: data types and formats (binary, octal and hexadecimal representation, fixed- and floating point numbers)<br>- Fundamentals of digital design<br>- Structure and operations of arithmetic logic unit (ALU)<br>- Basic components of a simple computer architecture<br>- Assembly programming (MIPS): assembly language, control flow, addressing<br>- RISC and CISC architectures<br>- Structure and operation of single- and multi-cycle datapath (MIPS)<br>- Measuring and evaluating performance (SPEC benchmarks, Amdahl's law)<br>- Introduction to pipelining: concepts, hazards, forwarding<br>- Memory hierarchy and memory management<br>- Introduction to caches: structure, multi-way implementations, eviction policies, cache<br>- hierarchies | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof.Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof.Dr. Faruk Bağcı<br>Prof Dr. Mesut Güneş | | | | | |
| **Assistant(s)** | MSc. Ayşe Betül Yüce | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Books / Lecture Notes** | - A. S. Tanenbaum, J. Goodman: Structured Computer Organization, 5. edition, Prentice Hall, 2009<br>- D. A. Patterson, J L. Hennessy: Computer Organization and Design, 4. edition, Morgan Kaufmann, 2008 | |
| **Other Sources** | - W. Stallings: Computer Organization and Architecture, 5. ed., Prentice Hall, 2001 | |
| **Additional Course Material** | | |
| **Documents** | - Otto Spaniol, Mesut Günes, Ralf Wienzek: Rechnerstrukturen, Skript RWTH Aachen, 2006 | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | The components of a computer or a computational unit will be known. |
| **2** | The internal operations and processes of computers will be more easily understood. |
| **3** | The mechanism how the data (e.g. text, video and audio ) is stored, where it is located and how it is managed will be known. |
| **4** | The operation of computer programs will be understood. |
| **5** | The familiarity with assembly programming language will be achieved. |
| **6** | The programming experience will be increased |
| **7** | It will be understood how high-level programming languages are translated to low-level programming languages |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction to Computer Organization |
| **2** | Data types and computer arithmetics |
| **3** | Fundamentals of digital switches |
| **4** | Multiplexers, Demultiplexers and other microoperators |
| **5** | Asynchronous and synchronous logic, latches and flip flops |
| **6** | Asynchronous and synchronous logic, latches and flip flops |
| **7** | Microarchitecture |
| **8** | Microarchitecture |
| **9** | Instruction Set Architecture and Assembler |
| **10** | Instruction Set Architecture and Assembler |
| **11** | Memory Logic and Units |
| **12** | Computer systems |
| **13** | Computer systems |
| **14** | Microprocessing systems |
| **15** | Microprocessing systems |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | | |
|---|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | | |
| INF110 | 2 | | | Fall | | |
| **Title** | **T** | **A** | **L** | **ECTS** | | |
| Operating Systems | 2 | 2 | 0 | 6 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successful completion of this module<br>- participants will be able to understand the basics of classification.<br>- participants will become capable of designing architecture.<br>- participants will understand system software components from the fields of operating systems, communication systems and network architectures. | | | | | |
| **Content** | - Ability to evaluate and practically implement concepts, components and structures from the above-mentioned areas on a software layer close to the system.<br>- Design principles and abstractions.<br>- Communication and synchronization.<br>- Examples of resource management and protocols from the field of operational and network architecture. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Volkan Gezer | | | | | |
| **Lecturer(s)** | Dr. Volkan Gezer | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |

| | | | |
|---|---|---|---|
| **Books / Lecture Notes** | -[ Stallings ] William Stallings , Operating Systems: Internals and Design Principles , Prentice Hall<br><br>-[Tanenbaum] Andrew S. Tanenbaum, Modern Operating Systems, Prentice Hall | | |
| **Other Sources** | -Silberschatz] Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts,<br>John Wiley & Sons | | |
| **Additional Course Material** | | | |
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Digital Applications and Materials** | | | |
| **Teaching platforms** | Google Meet, Google Classroom | | |
| **Digital Applications** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 50 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Describe and explain the fundamental components of a computer operating system. |
| **2** | Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems. |
| **3** | Describe and extrapolate the interactions among the various components of computing systems. |
| **4** | Design and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems. |
| **5** | Illustrate, construct, compose and design solutions via C/C++ programs |
| **6** | Measure, evaluate, and compare OS components through instrumentation for performance analysis. |
| **7** | Discuss with fellow students about designing new components of OS. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to operating systems |
| **2** | Processes and threads |
| **3** | Processes and threads |
| **4** | Synchronisation |
| **5** | Synchronisation |
| **6** | Memory management |
| **7** | Deadlocks |
| **8** | Deadlocks |
| **9** | Scheduling |
| **10** | I/O and file system |
| **11** | Booting, Services and Security |

| | |
|---|---|
| **12** | Booting, Services and Security |
| **13** | Networked computers & Internet |
| **14** | Internetworking |
| **15** | Internetworking |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF201 | | 2 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Discrete Struktures | | 2 | 2 | 1 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successfully completing this course, participants<br>- master the basic terms and the basics of dealing with logical, algebraic and algorithmic calculations,<br>- can solve combinatorial problems,<br>- can model and solve problems with methods of graph theory,<br>- are able to quantitatively examine the efficiency of solutions and algorithms,<br>- can apply the knowledge acquired to practical applications of discrete mathematics such as graphs, codes and combinatorial design. | | | | | |
| **Content** | - Algebra,<br>- Number Theory,<br>- Graph Theory,<br>- Combinatorics, Counting. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Teschl, Gerald; Teschl, Susanne, Mathematik für Informatiker, Band 1: Diskrete Mathematik und Lineare Algebra. Springer-Verlag Berlin Heidelberg 2006, 2007. |
| **Other Sources** | - Lehman,Eric et.al; **Mathematics for Computer Science [Online]**. MIT, 2015. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-spring-2015/readings/MIT6_042JS15_textbook.pdf<br>- Mathematics for Computer Science [Online Kurs]. MIT OpenCourseWare, 2010. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-042j-mathematics-for-computer-science-fall-2010/index.htm |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 50 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |
| **Learning Outcomes** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Recognize the method of proof used in a given proof. Determine the most appropriate method of proof for a given problem. [Analysis] |
| **2** | Explain the basic structure of the individual methods of proof (direct proof, proof of contradiction and induction) and apply them in the construction of a solid proof. [Apply] |
| **3** | Explain the similarities between mathematical induction and recursion. Explain the relationship between weak and strong induction and provide examples of how to use these methods of proof correctly. [Analysis] |
| **4** | State the well ordering principle and its relationship to strong induction. [Knowledge] |
| **5** | Apply counting rules, sum rule, product rule, inclusion-exclusion principle, arithmetic and geometric sequences. [Apply] |
| **6** | Use the pigeonhole principle in the context of formal evidence. [Apply] |
| **7** | Calculate permutations and combinations of a set and explain their meaning in the context of a given application. [Apply] |
| **8** | Determine suitable counting formalisms for real application problems, for example the number of possible arrangement of people around a table. [Apply] |
| **9** | Determine the underlying recursion equations for a given problem, solve simple recursion equations. [Apply] |
| **10** | Illustrate the basic terminology of graph theory, properties and special cases of certain graph types. [Knowledge] |
| **11** | Demonstrate different traversal methods for graphs and trees, including pre-, post- and inorder traversal. [Apply] |
| **12** | Model a variety of problems using suitable graph and tree structures. Explain the construction of a spanning tree of a graph. Determine whether two graphs are isomorphic. [Apply] |

| **Weekly Content** | |
|---|---|
| **1** | Introduction, methods of proof, direct proof, proof of contradiction. |
| **2** | Proof by induction. |
| **3** | Sets, relations, binary relations and graphs. |
| **4** | Relational product, order relations, equivalence relations, functions. |
| **5** | Graphs, directed and undirected graphs, adjacency matrix, scheduling. |
| **6** | Cycles, acyclic graphs (DAGs), trees, minimal spanning trees, rooted trees. |
| **7** | Euler and Hamilton circles, planar graphs, node coloring. |
| **8** | Matchings, The Stable Marriage Problem, Induction Evidence on Graphs. |
| **9** | Midterm Exams |
| **10** | Combinatorics introduction, counting rules, asymptotic notation. |
| **11** | The urn model, counting with / without repetition and with / without replacement. |
| **12** | Distribution problems, Stirling numbers of the second kind, inclusion-exclusion principle (sieve formula). |
| **13** | Algebra introduction, group, ring, body, ggT, Euclid's algorithm (EA). |
| **14** | Extended Euclidean Algorithm (EEA), group theory. |
| **15** | Multiplicative inverse, remainder arithmetic, theorem by Euler, RSA. |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |
| **10** | 5 | 5 | 3 | | | 3 | 1 |
| **11** | 5 | 5 | 3 | | | 3 | 1 |
| **12** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF202 | 2 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Software Engineering | 1 | 0 | 3 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Individual Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successfully completing this module, students have the ability to plan and implement small and medium-sized software projects. They can differentiate between process models and select the right model for their projects. They are aware of the importance of requirements engineering and can use different methods to determine requirements and document them according to standard specifications. They can use modeling tools such as UML to analyze and document requirements.<br>Through independent project work, they are trained in the implementation of a project and can use GUI programming technologies such as Java Swing and / or JavaFX. | | | | | |
| **Content** | The following concepts are introduced:<br>- Software engineering challenges<br>- Process models for software projects<br>- Requirements engineering<br>- System planning: architectural patterns and design patterns<br>- Static and dynamic tests<br>- Clean code guidelines | | | | | |
| **Prerequisites** | Desirable: INF102 Object Oriented Programming | | | | | |
| **Coordinator** | Dipl.-Ing. Dr. Burcu Yıldız | | | | | |
| **Lecturer(s)** | Dipl.-Ing. Babür Somer | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Ian Sommerville. Software Engineering. Pearson, 2015.<br>- Helmut Balzert. Sofware Entwicklung: Basiskonzepte. Spektrum Verlag, 2009. |
| **Other Sources** | - Erhan Sarıdoğan. Yazılım Mühendisliği Temelleri. Papatya Yayıncılık, 2011. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Digital Applications and Materials** | |
|---|---|
| **Learning platform** | Google Classroom, Google Meet |
| **Digital applications** | Project tasks - Submission via Google Classroom |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 30 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 60 |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 150 | 150 |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **166** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| | **ECTS Points** (Total Work Load / 28) | **6** |

| | |
|---|---|
| **Learning Outcomes** | |
| **1** | Comprehensive understanding of software engineering challenges and ability to address them |
| **2** | Ability to analyze an application problem, to plan and implement a software project as a solution |
| **3** | Ability to determine and document requirements |
| **4** | Competence to carry out extensive tests |
| **Weekly Content** | |
| **1** | History of software engineering as an engineering discipline |
| **2** | Challenges of Software engineering and project management |
| **3** | Process models: phase models and growth models |
| **4** | Agile process models |
| **5** | Requirements engineering: determination of requirements |
| **6** | Requirements engineering: documentation of requirements |
| **7** | Unified Modeling Language |
| **8** | Clean code guidelines |
| **9** | Mid term exams |
| **10** | System planning: architectural patterns |
| **11** | System planning: design patterns |
| **12** | Test procedures: static tests, component tests |
| **13** | Test procedures: Dynamic test procedures, integration tests |
| **14** | Quality assurance |
| **15** | Repetition |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **2** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **3** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **4** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Dipl.-Ing. Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF203 | 2 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Algorithms and Data Structures 1 | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study, programming. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The students have in-depth knowledge of the basic data structures (arrays, lists, trees, ...) and the basic algorithms (sorting, searching, shortest path algorithms, ...). In addition, they can estimate the correctness and runtime complexity of algorithms.<br><br>By working on real world problems, they will learn to use algorithms in different areas to solve complex problems. | | | | | |
| **Content** | - Complexity analysis (loop invariants, asymptotic notation, runtime estimation, worst and average-case analysis), P / NP complete problems<br>- Basics of the design and analysis of algorithms<br>- Iterative, recursive and dynamic algorithms<br>- Basic data structures (arrays, lists, stacks, queues, search trees, hash tables, ...)<br>- Search and sort algorithms<br>- Graphs, data structures for graphs, algorithms on graphs<br>- shortest path problem (Dijkstra, Bellman-Ford algorithm)<br>- Practice techniques for creating and testing programs and algorithms<br>- Realization of algorithms on the computer | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Burcu Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Burcu Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | - Robert Sedgewick and Kevin Wayne. 2011. *Algorithms* (4th. ed.). Addison-Wesley Professional.<br>- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. 2009. *Introduction to Algorithms, Third Edition* (3rd. ed.). The MIT Press.<br>- Goodrich M.T, Tamassia R. Data Structures and Algorithms in Java. Wiley, 2006. | | | | | |
| **Other Sources** | - Rıfat Çölkesen. Veri Yapıları ve Algoritmalar. Papatya Yayıncılık, 2014.<br>- Markus von Rimscha. Algorithmen kompakt und verständlich. Vieweg+Teubner, 2008. | | | | | |
| **Additional Course Material** | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 20 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 80 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 30 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Learning Outcomes | |
|---|---|
| **1** | Understand data structures and their impact on complexity |
| **2** | Understand search and sort algorithms |
| **3** | Understand runtime and storage complexity |
| **4** | Independent implementation of recursion and dynamic programming |
| **5** | Basic understanding of graphs |
| **6** | Understanding and application of shortest path algorithms |

| Weekly Content | |
|---|---|
| **1** | Overview, motivation & application examples |
| **2** | Complexity analysis, runtime analysis |
| **3** | Arrays, lists, stacks and queues as data structures. Operations on these data structures (insert, search, delete) |
| **4** | Trees as data structures, operations on trees (insert, search, delete, tree traversal) |
| **5** | Types of algorithms: recursive algorithms |
| **6** | Types of algorithms: greedy, divide-and-conquer |
| **7** | Sort in arrays (InsertionSort, BubbleSort) runtime analysis |
| **8** | Sort in arrays (MergeSort, QuickSort) runtime analysis |
| **9** | Midterm Exams |
| **10** | Types of algorithms: backtracking, dynamic programming |
| **11** | Graphs, implementation of graphs, graph traversing |
| **12** | Algorithms on graphs (shortest paths, Dijkstra, ...) |
| **13** | Algorithms on graphs (shortest paths, Dijkstra, ...) |
| **14** | Sets, maps, tries as data structures |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF204 | 2 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Algorithms and Data Structures 2 | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study, programming. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The students have in-depth knowledge of advanced data structures (maps, hash tables, tries, balanced search trees) and advanced algorithms (advanced design, randomized algorithms, string matching, minimum spanning trees, ...). In addition, they can perform correctness proofs and runtime analysis for algorithms.<br><br>By working on real world problems, they will learn to use algorithms in different areas to solve complex problems. | | | | | |
| **Content** | - Maps, hash tables<br>- Balanced search trees (red-black, AVL, 2-3)<br>- Design of advanced algorithms<br>- Randomized algorithms<br>- NP completeness<br>- String algorithms, tries, string matching, text similarity<br>- Linear programming<br>- Advanced graph algorithms, min-cost flow, minimum spanning trees, max-flow | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Burcu Yıldız | | | | | |
| **Assistant(s)** | BSc. Mehmet Emin Çeşitli | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Robert Sedgewick and Kevin Wayne. 2011. *Algorithms* (4th. ed.). Addison-Wesley Professional.<br>- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. 2009. *Introduction to Algorithms, Third Edition* (3rd. ed.). The MIT Press.<br>- Goodrich M.T, Tamassia R. Data Structures and Algorithms in Java. Wiley, 2006. |
| **Other Sources** | - Rıfat Çölkesen. Veri Yapıları ve Algoritmalar. Papatya Yayıncılık, 2014.<br>- Markus von Rimscha. Algorithmen kompakt und verständlich. Vieweg+Teubner, 2008. |
| **Additional Course Material** | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Digital Applications and Materials** | | |
| **Learning Platform** | Google Classroom, Google Meet, Google Sheets | |
| **Digital Applications** | Algorithm Programming with Google Colaboratory, Hackerrank, Codility | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | - | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 80 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | - | - |
| **Assignments** | 1 | 10 |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | - | - | - |
| **Laboratory** | 14 | 2 | 28 |

| | | | |
|---|---|---|---|
| **Projects** | - | - | - |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Argue the correctness of algorithms using inductive proofs and invariants. |
| **2** | Analyze the worst-case runtimes of algorithms using asymptotic analysis. |
| **3** | Describe the divide-and-conquer paradigm and explain when an algorithmic design situation requires it. Name algorithms that use this paradigm. Design divide-and-conquer algorithms. Set up and solve recursion equations that describe the performance of divide-and-conquer algorithms. |
| **4** | Describe the paradigm of dynamic programming and explain when an algorithmic design situation requires it. Name algorithms that use this paradigm. Design and analyze dynamic programming algorithms. |
| **5** | Describe the greedy paradigm and explain when an algorithmic design situation requires it. Name algorithms that use this paradigm. Design and analyze greedy algorithms. |
| **6** | Explain the most important graph algorithms and their analyzes. If necessary, use diagrams to model technical problems. Design and analyze new graph algorithms and algorithms that use graph calculations as key components. |
| **7** | Explain the various options for analyzing randomized algorithms (expected runtime, probability of error). Name algorithms that use randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs. |
| **8** | Analyze randomized algorithms. Use indicator random variables and linearity of expectation to perform the analyzes. Name analyzes of algorithms that use this analysis method. |
| **9** | Compare between different data structures. Choose a suitable data structure for a design situation. |
| **10** | Explain what an approximation algorithm is and the benefits of using approximation algorithms. Familiarize yourself with some approximation algorithms, including PTAS or FPTAS algorithms. Analyze the approximation factor of an algorithm. |

**Weekly Content**

| | |
|---|---|
| **1** | Overview, maps, hash tables |
| **2** | Balanced search trees (AVL, 2-3, red-black) |
| **3** | Balanced search trees (AVL, 2-3, red-black) |
| **4** | String matching |
| **5** | String matching |
| **6** | NP Completeness |
| **7** | Advanced design, randomized algorithms |
| **8** | Tries |
| **9** | Midterm exams |
| **10** | Text Similarity |
| **11** | Linear programming |
| **12** | Linear programming |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **13** | Network flow algorithms, maximum flow, minimum cut, Ford-Fulkerson algorithm |
| **14** | Network flow algorithms, maximum flow, minimum cut, Ford-Fulkerson algorithm |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | - | - | 3 | 1 |
| **2** | 5 | 5 | 4 | - | - | 3 | 1 |
| **3** | 5 | 5 | 4 | - | - | 3 | 1 |
| **4** | 5 | 5 | 4 | - | - | 3 | 1 |
| **5** | 5 | 5 | 3 | - | - | 3 | 1 |
| **6** | 5 | 5 | 3 | - | - | 3 | 1 |
| **7** | 5 | 5 | 3 | - | - | 3 | 1 |
| **8** | 5 | 5 | 3 | - | - | 3 | 1 |
| **9** | 5 | 5 | 3 | - | - | 3 | 1 |
| **10** | 5 | 5 | 3 | - | - | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | **Semester** |
| INF205 | | | | 2 | Fall |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Database Systems | 2 | 0 | 2 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Individual Study, Peer Assessment | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | In today's data-centric computing world, understanding data and being able to process them is very important. Students will learn the branch proficiency to use the most important database technologies. On the other hand, they will learn basic methods that will allow them to improve themselves and adapt to new technologies that are constantly changing. | | | | | |
| **Content** | -Theoretical bases and modeling of relational databases.<br><br>-SQL is the most common database language.<br><br>-Special usage areas of databases. Current developments and the future of databases. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Ahmet Yıldız | | | | | |
| **Lecturer(s)** | Dr. Ahmet Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Meier A., Kaufmann M., SQL- & NoSQL-Datenbanken, SpringerVieweg |
| **Other Sources** | - Meier A., Relationale und postrelationale Datenbanken, SpringerVieweg Sosna D., Lese- und Übungsbuch Datenbanken: E/R- und Relationenmodell, Universität Leipzig,<br><br>- Sosna D., Lese- und Übungsbuch Datenbanken: Relationalalgebra, Universität Leipzig |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

| | | | |
|---|---|---|---|
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | | | % |
| **Engineering** | 30 | | % |
| **Engineering Design** | 30 | | % |
| **Social Sciences** | 10 | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 30 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | | | |
| **Quiz** | | | |
| **Assignments** | | | |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | 4 | | 60 |
| **Final Exam** | 1 | | 40 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 56 | 56 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | 1 | 46 | 46 |
| **Final Exam** | 1 | 14 | 14 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |
| **Learning Outcomes** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Data Models and Relational Models |
| **2** | SQL and Database Programming |
| **3** | Data Security and Data Reliability |
| **4** | General Information about Nonrelated Databases |
| **5** | Big Data and Application Areas of NoSQL |
| **Weekly Content** | |
| **1** | Data, Data Management, Data Modeling |
| **2** | Entity-Relationship Model |
| **3** | Data Architecture, Database Design |
| **4** | Relational Algebra, Relational Database Languages |
| **5** | Introduction to SQL |
| **6** | SQL,SQL and more SQL |
| **7** | Procedures, Embedded Functions and Interfaces to Programming Languages |
| **8** | System Architecture and Security |
| **9** | Scattered Data, Scattered Databases |
| **10** | Temporal and Spatial Data |
| **11** | OLAP / Business Intelligence |
| **12** | Non-relational Databases |
| **13** | Big Data and NoSQL Databases |
| **14** | The Future of Database Systems |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF208 | 2 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Embedded Systems | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | - To make students familiar with the basic concepts and terminology of the target area, the embedded systems design flow.<br>- To give students an understanding of the embedded system architecture.<br>- To acquaint students with methods of executive device control and to give them opportunity to apply and test those methods in practice.<br>- To teach students to make measurements with the specified accuracy. | | | | | |
| **Content** | A First Look at Embedded Systems. Characteristics and Quality of Embedded Systems. Hardware Fundamentals. Embedded Software Development Tools. PIC, AVR and ARM Overview. Standard Single-purpose Processor Peripherals. Interrupts and Survey of Software Architectures. Interacting with the Real World: Sensors. Interacting with the Real World: Actuators, Serial Interfaces. Introduction to Real-time Operating Systems. Operating System Services. Basic Design Using a Real-time Operating System. Linear Feedback Systems. Wireless Sensor Networks, Internet-of-Things and Cyberphysical Systems. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof. Dr. Faruk Bağcı<br>Dr. Basher Shehan | | | | | |
| **Assistant(s)** | Res. Asst. Ferit Tiryaki<br>Res. Asst. Onur Akgün<br>Res. Asst. Ebru Subutay | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - An embedded software primer, D. E. Simon, 1999, Addison Wesley |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition |
|---|

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | 1 | 10 |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Able to apply knowledge and skills learned in school to real-world problems |
| **2** | Able to design and conduct system level experiments and analyze the results. |
| **3** | Able to design and implement a hardware component and/or system to meet desired needs |

| | |
|---|---|
| **4** | Able to design and implement a software system to meet desired needs |
| **5** | Able to work with teammates from other disciplines |
| **6** | Able to identify requirements of systems and applications |
| **7** | Able to prepare reports with high standards in terms of content, organization, style and language |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction Week, Design considerations, Hardware Fundamentals |
| **2** | Microcontroller technologies, Basic concepts, Standard Peripherals |
| **3** | Survey of software architectures/structures of embedded code |
| **4** | Scheduling, RTOS concept, resource access control |
| **5** | Interacting with real world; inputs 1: Overview of sensors technologies |
| **6** | Interacting with real world; inputs 2: ADCs and Sensory Signal processing |
| **7** | Interacting with real world; outputs 1: Overview of actuators, DACs |
| **8** | Interacting with real world; outputs 1: PWM, Motor control basics |
| **9** | Real-time concepts and operating systems |
| **10** | RTOS Introduction & mbedOS/FreeRTOS tutorial |
| **11** | Basic design using a real-time OS |
| **12** | RTOS recap & Interprocessor communication tools |
| **13** | Basic concepts in control software. Feedback, PID control, stability |
| **14** | WSNs, IoT, Cyberphysical Systems |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | 3 | 1 | 2 | 1 |
| **2** | 5 | 5 | 4 | 3 | 1 | 2 | 1 |
| **3** | 5 | 5 | 4 | 3 | 1 | 2 | 1 |
| **4** | 5 | 5 | 4 | 3 | 1 | 2 | 1 |
| **5** | 5 | 5 | 3 | 3 | 1 | 2 | 1 |
| **6** | 5 | 5 | 3 | 3 | 1 | 2 | 1 |
| **7** | 5 | 5 | 3 | 3 | 1 | 2 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF209 | 2 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Networks | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Individual Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successfully completing this module, students have the ability to understand and classify the basic layer architecture and to use the essential protocols of the Internet. They are able to analyze basic security aspects and implement them accordingly in communication services. | | | | | |
| **Content** | The following concepts are introduced:<br>- Basic protocols and approaches from the physical layer to the application layer<br>- ISO / OSI architecture vs TCP / IP architecture<br>- data transfer<br>- media access control<br>- error handling<br>- Reliable message transmission<br>- communication security<br>- Basic services at the application level | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof. Dr. Faruk Bağcı<br>Prof. Dr. Mesut Güneş | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - A.S. Tanenbaum. Computer Networks. Pearson Education International. |
| **Other Sources** | - J.F. Kurose, K.W. Ross. *Computer Networks – A Top Down Approach*. Addison Wesley.<br>- W. Stalling. *Data and Computer Communications*. Prentice Hall. |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 30 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 6 | 0 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

| | | | |
|---|---|---|---|
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 60 | 60 |
| **Assignments** | 6 | 10 | 60 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 10 | 10 |
| | | **Total Work Load** | **159** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| | |
|---|---|
| **Learning Outcomes** | |
| **1** | Comprehensive understanding of the basics of computer networks. |

| | |
|---|---|
| **2** | Ability to understand and classify the basic layer architecture. |
| **3** | Understand the essential protocols of the Internet. |
| **4** | Competence to analyze the basic security aspects and to implement them accordingly in communication services. |
| **Weekly Content** | |
| **1** | Motivation, History of Communication and Computer Networks and the Internet |
| **2** | Data Communication, Networking Principles, Communication Protocols |
| **3** | The ISO/OSI Reference Model and the TCP/IP Reference Model |
| **4** | OSI vs. TCP/IP, Standardization, Classfication of Computer Networks |
| **5** | Physical Layer: Analog and Digital Signals, Data Encoding |
| **6** | Physical Layer: Transmission Media, Wireless Transmission, The Last Mile Problem |
| **7** | Physical Layer: Multiplexing, ISDN, DSL |
| **8** | Repetition |
| **9** | Mid term exams |
| **10** | Data Link Layer: Design Issues, Error Detection and Correction |
| **11** | Data Link Layer: Data Link Protocols, HDLC, PPP, Protocol Verification |
| **12** | Medium Access Control Sublayer: Design Issues, Network Topologies |
| **13** | Medium Access Control Sublayer: Multiple Access Protocols, Ethernet |
| **14** | Medium Access Control Sublayer: IEEE 802.2 - Logical Link Control, Network Infrastructure |
| **15** | Repetition |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | | | 3 | 1 |
| **2** | 5 | 5 | 5 | | | 3 | 1 |
| **3** | 5 | 5 | 5 | | | 3 | 1 |
| **4** | 5 | 5 | 5 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF210 | 1 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Seminar in Ethics for Computer Scientists | 1 | 0 | 0 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | - Identify some of the basic content in the field of Computers, Information Systems, Ethics, Society and Human Values; a. vocabulary b. concepts c. theories<br>- Identify traditional and current Issues related to Computers, Information Systems, Ethics, Society and Human Values;<br>- Communicate awareness of and understanding of philosophical issues.<br>- Demonstrate familiarity with the main issues in the discourse related to Computers, Information Systems, Ethics, Society and Human Values and be able to state what major schools of thought there are that have contributed to the ongoing discussion of these issues<br>- Develop skills of critical analysis and applying ethical principles to situations and dialectical thinking | | | | | |
| **Content** | This course is intended to give students a chance to reflect on the humanitarian, social, and professional impact of computer technology by focusing on ethical issues faced by and brought about by computing professionals, including those related to networking and the internet, intellectual property, privacy, security, reliability, and liability. We will also focus on issues raised by the possible emergence in the future of highly intelligent machines. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | Prof. Dr. Faruk Bağcı<br>PD.Dr.habil. Emre IŞIK<br>DI Dr. Canan Yıldız<br>DI Dr. Ahmet Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Ethics for the Information Age, 7th edition, by M. J. Quinn |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | - | - | - |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Communicate effectively through writing, speaking, and interpersonal and group interactions |
| **2** | Apply humanistic methods of inquiry and interpretation to the product/processes of human thought and culture |
| **3** | Recognize milestones in computing, networking, and information storage and retrieval |
| **4** | Be familiar with the language and content of ethical discourse |
| **5** | Understand modern debates surrounding intellectual property |
| **6** | Appreciate the threats to privacy posed by modern information gathering techniques |
| **7** | Be familiar with a range of other ethical issues raised by modern information technology and relevant to computer professionals |

**Weekly Content**

| | |
|---|---|
| **1** | Catalysts for Change |
| **2** | Introduction to Ethics I |
| **3** | Introduction to Ethics II |
| **4** | Networked Communications |
| **5** | Privacy |
| **6** | Security |
| **7** | Cybercrime |
| **8** | Intellectual Property |
| **9** | Commerce and Free Speech |
| **10** | The Digital Divide |
| **11** | Digital Identity |
| **12** | Digital Communities |
| **13** | Our Dependence on Cybertechnology |
| **14** | Class Presentation I |
| **15** | Class Presentation II |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | - | - | 3 | 1 |
| **2** | 5 | 5 | 4 | - | - | 3 | 1 |
| **3** | 5 | 5 | 4 | - | - | 3 | 1 |
| **4** | 5 | 5 | 4 | - | - | 3 | 1 |
| **5** | 5 | 5 | 3 | - | - | 3 | 1 |
| **6** | 5 | 5 | 3 | - | - | 3 | 1 |
| **7** | 5 | 5 | 3 | - | - | 3 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF211 | | 2 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Seminar in Computer Science and Society | | 1 | 0 | 0 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | - Identify some of the basic content in the field of Computers, Information Systems, Ethics, Society and Human Values; a. vocabulary b. concepts c. theories<br>- Identify traditional and current Issues related to Computers, Information Systems, Ethics, Society and Human Values;<br>- Communicate awareness of and understanding of philosophical issues.<br>- Demonstrate familiarity with the main issues in the discourse related to Computers, Information Systems, Ethics, Society and Human Values and be able to state what major schools of thought there are that have contributed to the ongoing discussion of these issues<br>- Develop skills of critical analysis and applying ethical principles to situations and dialectical thinking | | | | | |
| **Content** | This course is intended to give students a chance to reflect on the humanitarian, social, and professional impact of computer technology by focusing on ethical issues faced by and brought about by computing professionals, including those related to networking and the internet, intellectual property, privacy, security, reliability, and liability. We will also focus on issues raised by the possible emergence in the future of highly intelligent machines. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Lecturer(s)** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Ethics for the Information Age, 7th edition, by M. J. Quinn |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 10 | % |
| **Engineering Design** | | % |
| **Social Sciences** | 40 | % |
| **Educational Sciences** | 10 | % |
| **Natural Sciences** | | % |
| **Health Sciences** | 10 | % |
| **Expert Knowledge** | 20 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

| | | | |
|---|---|---|---|
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

| | |
|---|---|
| **Learning Outcomes** | |
| **1** | Communicate effectively through writing, speaking, and interpersonal and group interactions |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **2** | Apply humanistic methods of inquiry and interpretation to the product/processes of human thought and culture |
| **3** | Recognize milestones in computing, networking, and information storage and retrieval |
| **4** | Be familiar with the language and content of ethical discourse |
| **5** | Understand modern debates surrounding intellectual property |
| **6** | Appreciate the threats to privacy posed by modern information gathering techniques |
| **7** | Be familiar with a range of other ethical issues raised by modern information technology and relevant to computer professionals |
| **Weekly Content** | |
| **1** | Catalysts for Change |
| **2** | Computer Errors |
| **3** | Software Reliability |
| **4** | Networked Communications |
| **5** | Privacy |
| **6** | Digitalization in Education |
| **7** | Cybercrime |
| **8** | Intellectual Property |
| **9** | Commerce and Free Speech |
| **10** | The Digital Divide |
| **11** | Digital Identity |
| **12** | Digital Communities |
| **13** | Our Dependence on Cybertechnology |
| **14** | Class Presentation I |
| **15** | Class Presentation II |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **2** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **3** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **4** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **5** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **6** | 2 | | 1 | 5 | 1 | 4 | 5 |
| **7** | 2 | | 1 | 5 | 1 | 4 | 5 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF303 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Software Engineering Project | | 1 | 0 | 3 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Group Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successfully completing this module, students have the ability to plan and execute small and medium-sized software projects as a group. They can differentiate between process models and select the right model for their projects. They can use modeling tools such as UML to analyze and document their system architecture.<br>Through project work in groups, they are trained in the implementation of a project as a team and to develop mobile applications. | | | | | |
| **Content** | The following concepts are introduced:<br>- Challenges of software engineering in groups<br>- Advanced topics in requirements engineering<br>- Advanced topics of automatic testing | | | | | |
| **Prerequisites** | Desirable: INF102 Object Oriented Programming | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Dipl.-Ing. Ömer Karacan | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | Yok | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Ian Sommerville. Software Engineering. Pearson, 2015.<br>- Helmut Balzert. Sofware Entwicklung: Basiskonzepte. Spektrum Verlag, 2009. |
| **Other Sources** | - Erhan Sarıdoğan. Yazılım Mühendisliği Temelleri. Papatya Yayıncılık, 2011. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 30 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 40 |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 150 | 150 |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **166** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Comprehensive understanding of software engineering challenges and ability to address them |
| **2** | Ability to analyze an application problem, to plan and implement a software project as a solution |
| **3** | Ability to determine and document requirements |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **4** | Ability to implement mobile applications for IOS or Android |
| **5** | Competence to carry out extensive tests |
| **Weekly Content** | |
| **1** | Challenges of software engineering and project management in teams |
| **2** | Unified Modeling Language: structural diagrams |
| **3** | Unified Modeling Language: behavioral diagrams |
| **4** | System planning: architecture patterns |
| **5** | System planning: architecture patterns |
| **6** | System planning: design patterns - production patterns |
| **7** | System planning: design patterns - structural patterns |
| **8** | System planning: design patterns - behavioral patterns |
| **9** | Mid term exams |
| **10** | Advanced topics in testing |
| **11** | Advanced topics in testing |
| **12** | Advanced topics in quality assurance |
| **13** | Model-driven software development |
| **14** | Model-driven software development |
| **15** | Repetition |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **2** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **3** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **4** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |
| **5** | 5 | 5 | 5 | 3 | 3 | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF401 | 4 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Seminar in Scientific Work | 2 | 0 | 0 | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | To enable students to conduct research in accordance with scientific research methods | | | | | |
| **Content** | By introducing graduate students to the basic concepts related to scientific research methods and experiencing the process of preparing scientific research proposal, applying appropriate research methods and techniques and finding the results and results obtained with statistical data, a written report in accordance with scientific writing rules and ethical rules. aims to present them as. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Prof. Dr. A. Gökhan Yavuz<br>Prof. Dr. Faruk Bağcı<br>Doç. Dr. Emre Işık<br>Dr. Öğr. Üyesi Ahmet Yıldız<br>Dr. Öğr. Üyesi Canan Yıldız<br>Dr. Öğr. Üyesi Burcu Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | **-** |
| **Other Sources** | **-** |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | To explain scientific research and its features |
| **2** | To prepare scientific research proposal |
| **3** | To be able to apply research methods and techniques suitable for the studies |
| **4** | To be able to scan and cite literature |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **5** | To learn data collection and analysis techniques |
| **6** | Being able to apply information on ethical standards, software and legal restrictions |
| **7** | To be able to write reports in accordance with scientific writing rules |
| **Weekly Content** | |
| **1** | Login |
| **2** | Science, research, scientific research concepts |
| **3** | Science and science ethics |
| **4** | Research ethics and research ethics violations, basic principles of research ethics |
| **5** | Scientific misconceptions, violations of publication ethics, problems of authorship rights |
| **6** | Types of scientific research, Problem statement, hypothesis, theory |
| **7** | Scientific research report content, the formal structure of the research report and the use of language in scientific text |
| **8** | Interpretation and report writing |
| **9** | Midterm |
| **10** | Scientific publication ethics principles Scientific works and their types |
| **11** | How to use the internet, library and documentation centers |
| **12** | Ethical standards, legal limitations and software |
| **13** | TÜBİTAK research and publishing board regulations YÖK scientific research and publication ethics directive |
| **14** | Term paper presentations |
| **15** | Evaluation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF492 | | | 4 | | Spring |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Bachelor Thesis | | | | | 12 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face to face | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After completing their Bachelor's thesis, students will be able to<br>• work scientifically on a problem from the field of computer science in a planned, goal-oriented and independent manner,<br>• familiarize themselves with the relevant scientific literature and critically engage with it,<br>• develop solutions and implement them independently in the light of their theoretical and practical knowledge,<br>• compare their approaches and results with the state of the art in research and evaluate them,<br>• communicate their results appropriately in written and oral form. | | | | | |
| **Content** | Depends on Project theme | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Prof. Dr. A. Gökhan Yavuz<br>Prof. Dr. Faruk Bağcı<br>Doç. Dr. Emre Işık<br>Dr. Öğr. Üyesi Ahmet Yıldız<br>Dr. Öğr. Üyesi Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Guidelines for Preperation of Bachelor Thesis, Template for Bachelor Thesis |
| **Other Sources** | |

| Additional Course Material | |
|---|---|
| **Documents** | Guidelines for Preperation of Bachelor Thesis, Template for Bachelor Thesis are shared digitally |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 30 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | 30 | % |
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 20 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | 14 | 25 | 350 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | 1 | 8 | 8 |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 2 | 2 |
| **Final Exam** | | | |
| | | **Total Work Load** | **360** |
| | | **ECTS Points** (Total Work Load / Hour) | **12** |

**Learning Outcomes**

| | |
|---|---|
| **1** | To prepare scientific research proposal |
| **2** | To be able to apply research methods and techniques suitable for the studies |
| **3** | To be able to scan and cite literature |
| **4** | To learn data collection and analysis techniques |
| **5** | Being able to apply information on ethical standards, software and legal restrictions |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **6** | To be able to write reports in accordance with scientific writing rules |
| **7** | To be able to orally defend the thesis |
| **Weekly Content** | |
| **1** | Selection of Project theme |
| **2** | Problem Formulation & Purpose of Project |
| **3** | Literature Research |
| **4** | Literature Research |
| **5** | Selection of suitable research approach& methods |
| **6** | Selection of suitable research approach& methods |
| **7** | Data collection |
| **8** | Data collection |
| **9** | Analysis |
| **10** | Analysis |
| **11** | Discussion of Results |
| **12** | Discussion of Results |
| **13** | Preparation of the Report |
| **14** | Preparation of the Report |
| **15** | Preparation of Presentation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** | **P8** | **P9** | **P10** |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 |
| **2** | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 |
| **3** | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 |
| **4** | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 |
| **5** | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| **6** | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 |
| **7** | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 |

| | |
|---|---|
| **Contribution Level** | **1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High** |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 09.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF499 | 4 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Vocational Internship | 2 | 0 | 0 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The internship includes applied activities in private or state companies or research institutes in all areas of computer science. | | | | | |
| **Content** | Undergraduate students are required to experience real working conditions in their respective fields in an acceptable private/public institution by adhering to the scientific research methods they learned during their undergraduate education, to achieve minimum success in this institution, and to present this experience as a written report in accordance with scientific writing rules and ethical rules. Students are expected to work on at least one of the following subjects or acceptable subjects that they will present themselves during the internship in the vocational field.<br>• Software development<br>• Test and maintenance<br>• Database applications<br>• Mobile applications<br>• Game development<br>• Web applications<br>• Desktop applications<br>• Driver development<br>• Script programming<br>• Network setup and management<br>• System setup<br>• Hardware operations<br>• Web design<br>• Human-computer interaction<br>• Program software<br>• Network and information security etc. | | | | | |
| **Prerequisites** | After Finishing the 4th Semester of Engineering | | | | | |
| **Coordinator** | Prof. Dr. Faruk Bağcı | | | | | |
| **Lecturer(s)** | - | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Assistant(s)** | - | |
| **Work Placement** | It covers an internship of 60 working days. | |
| **Recommended or Required Reading** | | |
| **Books / Lecture Notes** | **-** | |
| **Other Sources** | **-** | |
| **Additional Course Material** | | |
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 100 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | | | |
| | | **Total Work Load** | |
| | | **ECTS Points** (Total Work Load / Hour) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Working experience in all application areas of Computer Science in private and public industry organizations and research institutes. |

| **Weekly Content** | |
|---|---|
| **1** | |
| **2** | |
| **3** | |
| **4** | |
| **5** | |
| **6** | |
| **7** | |
| **8** | |
| **9** | |
| **10** | |
| **11** | |
| **12** | |
| **13** | |
| **14** | |
| **15** | Evaluation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | | | | | | | |
| **2** | | | | | | | |
| **3** | | | | | | | |
| **4** | | | | | | | |
| **5** | | | | | | | |
| **6** | | | | | | | |
| **7** | | | | | | | |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 09.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF501 | 4 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Intelligent Systems | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Flipped Classroom, Lecture, Personal Study, Programming Assignments | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | The course will give the student the basic ideas and intuition behind a wide range of modern AI systems as well as a formal understanding of how, why, and when they work. The student will gain the ability to use this knowledge in the development of various intelligent systems in the areas of vision, sequence and natural language processing and robotics. | | | | | |
| **Content** | Artificial Neural Networks, Deep Learning, Recurrent Neural Netowrks (RNNs), Natural Language Processing, Autoencoders, GANs, Reinforcement Learning | | | | | |
| **Prerequisites** | Solid Understanding of the Neural Network Fundamentals<br>(through one or more of the courses INF701 Artificial Intelligence, INF502 Machine Learning and INF503 Neural Networks) | | | | | |
| **Coordinator** | Dr. techn. Canan Yıldız | | | | | |
| **Lecturer(s)** | Dr. techn. Canan Yıldız | | | | | |
| **Assistant(s)** | MSc. Ayşe Betül Yüce | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019.<br>- Deep Learning for NLP and Speech Recognition, Uday Kamath, John Liu, James Whitaker, Springer, 2019.<br>- Deep Reinforcement Learning Hands-On , Maxim Lapan, Packt Publishing, 2020.<br>- Reinforcement Learning, an Introduction, Richard S Sutton, Andrew G. Barto, MIT Press, 2014. |
| **Other Sources** | - Artificial Intelligence: A Modern Approach, S. Russel und P. Norvig, Prentice Hall, Englewood Cliffs, 2003.<br>- Maschine Learning, Tom Mitchell, McGraw-Hill, 1997. |

| | |
|---|---|
| | - Deep Learning with TensorFlow 2 and Keras: Regression, ConvNets, GANs, RNNs, NLP, and more with TensorFlow 2 and the Keras API, Antonio Gulli, Amita Kapoor, Sujit Pal, Packt Publishing, 2019.<br>- https://www.davidsilver.uk/teaching/ |

**Additional Course Material**

| | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | |
| **Social Sciences** | | |
| **Educational Sciences** | | |
| **Natural Sciences** | | |
| **Health Sciences** | | |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 108 | 108 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 2 | 2 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | |
|---|---|---|---|
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 2 | 2 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Understand the complexity of Deep Learning algorithms and their limitations. |
| **2** | Select the appropriate algorithms for real-life applications. |
| **3** | Be capable of confidently applying common techniques and algorithms in building intelligent systems. |
| **4** | Be capable of performing experiments in Deep Learning using real-world data. |
| **5** | Assess the model quality in terms of relevant performance/error metrics for each application. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction |
| **2** | Processing Sequences Using RNNs and CNNs |
| **3** | |
| **4** | |
| **5** | Neural Language Processing with RNNs and Attention |
| **6** | |
| **7** | |
| **8** | |
| **9** | Midterms |
| **10** | Generative Learning Using Autoencoders and GANs |
| **11** | |
| **12** | |
| **13** | Reinforcement Learning – Introduction |
| **14** | |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF502 | 3 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Machine Learning | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study, programming. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The course will give the student the basic ideas and intuition behind modern machine learning methods as well as a formal understanding of how, why, and when they work; and gain the ability to use this knowledge in the development of various learning models. | | | | | |
| **Content** | - Regression techniques<br>- Classification<br>- Training models<br>- Support vector machines (SVM)<br>- Decision trees<br>- Ensemble learning and random forests<br>- Dimensionality reduction, principal component analysis<br>- Model selection<br>- Unsupervised learning techniques | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Lecturer(s)** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Assistant(s)** | Ayşe Betül Yüce, Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019. |
| **Other Sources** | - Machine learning, Ethem Alpaydın, MIT Press, 3rd Ed., 2020<br>- The hundred-page machine learning book, Andriy Burkov, 2019 |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 20 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 80 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | | | |
| **Quiz** | | | |
| **Assignments** | | | |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | 1 | | 40 |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | 1 | 3 | 3 |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |
| **Learning Outcomes** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Understand the complexity of Machine Learning algorithms ( regression, classification, clustering, and dimensionality reduction) and their limitations. |
| **2** | Select the appropriate machine learning algorithms for real-life applications. |
| **3** | Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own. |
| **4** | Be capable of performing experiments in Machine Learning using real-world data. |
| **5** | Assess the model quality in terms of relevant performance/error metrics for each application. |
| **Weekly Content** | |
| **1** | Introduction, machine learning methods, challenges, testing and validating |
| **2** | End-to-end machine learning project: data collection, cost function, data visualization |
| **3** | End-to-end machine learning project: data preparation, model selection, training, optimization |
| **4** | Classification (using MNIST database) |
| **5** | Training models I |
| **6** | Training models II |
| **7** | Support Vector Machines |
| **8** | Decision trees |
| **9** | Midterm Exams |
| **10** | Ensemble Learning und Random Forests |
| **11** | Dimensionality reduction |
| **12** | Unsupervised learning techniques I - clustering |
| **13** | Unsupervised learning techniques I – Gaussian mixtures (density estimation) |
| **14** | Hackathon |
| **15** | Presentations and discussions |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF503 | | 3 | | | Spring |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Neural Networks | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study, programming. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | In this course, students will learn the foundations of Deep Learning, understand how to build neural networks, and learn how to lead successful deep learning projects. They will learn about Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Long-Short Term Memory (LSTM), Adam, Dropout, BatchNorm, Xavier/He initialization, and more. | | | | | |
| **Content** | - Neural Network Basics<br>- Shallow and deep neural networks<br>- Optimization algorithms<br>- Hyperparameter tuning, batch normalization<br>- Convolutional neural networks, ConvNets<br>- Sequence models, Recurrent Neural Networks, LSTM, Attention Mechanism<br>- Natural Language Processing, Word Embeddings | | | | | |
| **Prerequisites** | Preferrably: INF101, INF102, Linear lgebra (MAT106) and Probability Theory (MAT204). | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019.<br>- Artificial Intelligence: A Modern Approach, S. Russel und P. Norvig, Prentice Hall, Englewood Cliffs, 2003. |
| **Other Sources** | - Maschine Learning, Tom Mitchell, McGraw-Hill, 1997. |

## Additional Course Material

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 80 | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Learning Outcomes** | |
|---|---|
| **1** | Understand the complexity of Deep Learning algorithms, their strengths and limitations. |
| **2** | Select the appropriate deep learning algorithms for real-life applications. |
| **3** | Be capable of confidently applying common Deep Learning algorithms in practice and implementing their own. |
| **4** | Be capable of performing experiments in Deep Learning using real-world data. |
| **5** | Assess the model quality in terms of relevant performance/error metrics for each application. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction, Neural Network basics |
| **2** | Shallow neural networks, deep neural networks |
| **3** | Practical aspects of deep learning, optimization algorithms |
| **4** | Hyperparameter tuning, batch normalization |
| **5** | Convolutional Neural Networks (CNNs); foundations, deep models |
| **6** | Convolutional Neural Networks (CNNs); foundations, deep models |
| **7** | ConvNets applications, Face Recognition, Style Transfer |
| **8** | Recurrent Neural Networks (RNNs), LSTM |
| **9** | Midterm Exams |
| **10** | Recurrent Neural Networks (RNNs), LSTM |
| **11** | Sequence-to-Sequence Models, Natural Language Processing, Word Embeddings |
| **12** | Sequence-to-Sequence Models, Natural Language Processing, Word Embeddings |
| **13** | Generative Adversarial Networks (GANs) |
| **14** | Deep Reinforcement Learning |
| **15** | Summary, Recitation |

**Contribution of Learning Outcomes to Program Objectives* (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **Program Objectives** | https://obs.tau.edu.tr/oibs/bologna/index.aspx?lang=en&curOp=showPac&curUnit=05&curSunit=208# |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | **Semester** |
| INF504 | | | | 4 | Spring |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Natural Language Processing | 2 | 2 | 0 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Upon successful completion of this course;<br>- Students are going to be familiar with natural language processing concepts<br>- Students are going to be able to apply basic methods to common natural language processing problems<br>- Students are going to be able to make sense of textual data | | | | | |
| **Content** | - Language Models<br>- Dependency Parsing<br>- Translation<br>- Summarization | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Manning, Christopher; Schütze, Hinrich, Foundations of Statistical Natural Language Processing. MIT Press, 1999. |
| **Other Sources** | - |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 25 | % |
| **Engineering** | 25 | % |
| **Engineering Design** | 50 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 2 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 90 | 90 |
| **Assignments** | 2 | 8 | 16 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | to have a profound knowledge of natural language processing |
| **2** | to understand the basics of word embeddings |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **3** | to be able to create recurrent neural networks for NLP tasks | | | | | | |
| **4** | to understand the state of the art methods in summarization and question answering | | | | | | |
| **5** | to be able to use language models in multimodal settings | | | | | | |
| **Weekly Content** | | | | | | | |
| **1** | Introduction to Natural Language Processing | | | | | | |
| **2** | Regular Expressions | | | | | | |
| **3** | Language Modeling with N-Grams | | | | | | |
| **4** | Introduction to Deep Learning | | | | | | |
| **5** | Word Embeddings | | | | | | |
| **6** | Recurrent Neural Networks | | | | | | |
| **7** | Machine Translation, Text Summarization | | | | | | |
| **8** | Part-of-Speech Tagging | | | | | | |
| **9** | Midterm Exam | | | | | | |
| **10** | Dependency Parsing | | | | | | |
| **11** | Coreference Resolution | | | | | | |
| **12** | Question Answering | | | | | | |
| **13** | Dialog Systems | | | | | | |
| **14** | Speech Processing | | | | | | |
| **15** | Multimodal Learning Models | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Ali Osman İSKENDERLİ | | | | | | |
| **Date of Compilation:** | 01.06.2022 | | | | | | |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF505 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Data Mining | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Introduction to various data mining techniques and information about application scenarios (cross selling, image recognition, credit assessment, returns forecast in online trading). Presentation and discussion of the data bases (IT architectures) for data mining, taking into account the big data challenges (velocity, volume, variety, etc.). Presentation and discussion of different process models for data mining as well as learning algorithms from the field of unsupervised and supervised learning.<br>The discussed learning algorithms will then be implemented based on Python.<br>The lecture is accompanied by discussions of general challenges of data mining and specific implementation challenges.<br><br>Knowledge & Understanding: 60%<br>Analysis & Method: 40% | | | | | |
| **Content** | Introduction to Data Mining,<br>Data Mining Definitions,<br>Data Mining Background,<br>Data Mining Techniques,<br>Operations and Algorithms,<br>Data Mining Applications,<br>Data Mining Problems,<br>Text Mining,<br>Web Mining,<br>Example applications. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | Prof. Dr. Adem Alparslan | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Frochte, J.: Maschinelles Lernen: Grundlagen und Algorithmen in Python, 2., aktualisierte Auflage, München 2019 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | |
|---|---|---|---|
| | Meier, A.; Kaufmann, M.: SQL- & NoSQL-Datenbanken, 8., überarbeitete und erweiterte Auflage, Berlin/ Heidelberg 2016<br>Müller, R.M.; Lenz, H.-J.: Business Intelligence, Heidelberg 2013<br>Steven, M,; Klünder, T. (Hrsg.): Big Data: Anwendung und Nutzungspotenziale in der Produktion, Stuttgart 2020<br>Tan, P.-N. et al. : Introduction to Data Mining, 2. Auflage, Harwlow 2019<br>v.d. Hude, M.: Predictive Analytics und Data Mining: Eine Einführung mit R, Wiesbaden 2020 | | |
| **Other Sources** | | | |
| **Additional Course Material** | | | |
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 50 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. |
| **2** | Ability to identify, define, formulate, and solve complex engineering problems; ability to select and apply appropriate analysis and modeling methods for this purpose. |
| **3** | Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively. |
| **4** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; ability to apply modern design methods for this purpose. |
| **5** | Ability to design and conduct experiments, collect data, analyze and interpret results for studying complex engineering problems or discipline-specific research topics. |
| **6** | To have knowledge and awareness about the management, control, development and security / reliability of Information Technologies, |
| **7** | Ability to work effectively in disciplinary and multidisciplinary teams; ability to work individually. |
| **8** | Ability to communicate effectively in Turkish, both orally and in writing; at least one foreign language knowledge; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions. |
| **9** | Awareness of the necessity of lifelong learning; the ability to access information, to follow developments in science and technology, and to constantly renew itself. |
| **10** | Acting in accordance with ethical principles, awareness of professional and ethical responsibility; information about the standards used in engineering applications. |
| **11** | Information about business life practices such as project management, risk management and change management; awareness of entrepreneurship, innovation; information on sustainable development. |
| **12** | Information about the effects of engineering applications on universal and social health, environment and safety and the problems reflected in the engineering field of the era; awareness of the legal consequences of engineering solutions. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to Data Mining |
| **2** | Information technology aspects: Data Warehouse and OLAP |
| **3** | Information technology aspects: Modern big-data architectures and frameworks |
| **4** | Information technology aspects: Modern big-data architectures and frameworks |
| **5** | Learning methods and learning tasks |
| **6** | Data Mining Process |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **7** | Data Mining Process |
| **8** | Selected learning algorithms: Association analysis |
| **9** | Selected learning algorithms: Association analysis |
| **10** | Selected learning algorithms: Clustering |
| **11** | Selected learning algorithms: Clustering |
| **12** | Selected learning algorithms: Decision Tree |
| **13** | Selected learning algorithms: Decision Tree |
| **14** | Selected learning algorithms: Ensemble Algorithms |
| **15** | Selected learning algorithms: Ensemble Algorithms |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |
| **10** | 5 | 5 | 3 | | | 3 | 1 |
| **11** | 5 | 5 | 3 | | | 3 | 1 |
| **12** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF506 | | | 3 | | Fall |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Methods for Data Analysis | 2 | 0 | 2 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Master** | | **PhD** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Establish a good foundation of data science with Python, to prepare the student for high-performance data analysis and machine learning tasks | | | | | |
| **Content** | Exploratory data analysis; hypothesis testing and inference; regression; clustering | | | | | |
| **Prerequisites** | MAT106, MAT204 (recommended) | | | | | |
| **Coordinator** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Lecturer(s)** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Grus, J., 2019, Einführung in Data Science – Grundprinzipien der Datenanalyse mit Python, O'Reilly Media |
| **Other Sources** | Bruce, P., Bruce, T., Gedeck, P., 2021, Praktische Statistik für Data Scientists, O'Reilly Media |

| Additional Course Material | |
|---|---|
| **Documents** | https://github.com/joelgrus/data-science-from-scratch |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 20 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | 20 |
| **Projects** | 1 | 20 |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 51 | 51 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | 1 | 15 | 15 |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points (Total Work Load / 28)** | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Up-to-date practical knowledge for the analysis of different types of data |
| **2** | Ability to code basic data analysis procedures from scratch, using Python |
| **3** | Experiencing basic data visualisation methods |
| **4** | Ability to analyse data by applying basic statistical methods |
| **5** | Can use of statistical hypothesis testing using frequentist and Bayesian approaches |
| **6** | Learns how to collect, clean, and explore data |
| **7** | Learns how to apply clustering and multiple regression to data |
| **8** | Acquaintance with the fundamentals of network analysis |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Weekly Content** | |
|---|---|
| **1** | What is data science? An overview of data analysis methods. |
| **2** | Data visualization and linear algebra with Python |
| **3** | Statistics and probability with Python |
| **4** | Hypotheses and inference |
| **5** | Collecting data |
| **6** | Working with data |
| **7** | Introduction to machine learning |
| **8** | k-nearest neighbours |
| **9** | Mid-term exam |
| **10** | Naive Bayes classifiers |
| **11** | Simple and multiple linear regression |
| **12** | Clustering |
| **13** | Network analysis |
| **14** | Project |
| **15** | Project presentations |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF507 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Information Retrieval and Extraction | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide an introduction to the core principles and techniques used in IR, and to demonstrate how statistical models of language can be used to solve document indexing and retrieval problems. In addition, we will look at the issues involved in indexing the entire web and the creative solutions to this problem currently deployed by large scale online search providers. | | | | | |
| **Content** | Boolean Model and Vector Space Model, evaluation in information retrieval, text representation and processing, relevance feedback and query expansion, index construction and compression, language models and smoothing techniques, document clustering, text classification, dimensionality reduction and semantic similarity, IR on the Web (Page Rank, HITS), web usage mining, other IR topics and challenges. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Gain an understanding of the basic concepts and techniques in Information Retrieval; |
| **2** | Understand how statistical models of text can be used to solve problems in IR, with a focus on how the vector-space model and language models are implemented and applied to document retrieval problems; |
| **3** | Understand how statistical models of text can be used for other IR applications, for example clustering and news aggregation; |
| **4** | Appreciate the importance of data structures, such as an index, to allow efficient access to the information in large bodies of text; |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **5** | Understand common text compression algorithms and their role in the efficient building and storage of inverted indices. |
| **6** | Have experience of building a document retrieval system, through the practical sessions, including the implementation of a relevance feedback mechanism; |
| **7** | Understand the issues involved in providing an IR service on a web scale, including distributed index construction and user modeling for recommendation engines. |
| **Weekly Content** | |
| **1** | Introduction to Information Retrieval (IR) systems: Goals and history of IR; the impact of the web on IR; Related areas to IR |
| **2** | Basic IR Models: Boolean and vector-space retrieval models; ranked retrieval; text-similarity metrics |
| **3** | Basic IR Models: text-similarity metrics; TF-IDF (term frequency/inverse document frequency) weighting; cosine similarity |
| **4** | Basic Searching and Indexing: Simple tokenizing, stop-word removal, and stemming |
| **5** | Basic Searching and Indexing: inverted indices and files; efficient processing with sparse vectors |
| **6** | Experimental Evaluation of IR: Performance metrics: recall, precision, and F-measure; Evaluations on benchmark text collections. |
| **7** | Query Operations and Languages: Relevance feedback and query expansion; Query Languages |
| **8** | Text representation and properties: Word statistics; Zipf's law; Porter stemmer; morphology; index term selection; using thesauri; Metadata and markup languages (SGML, HTML, XML, DTD) and schema Web linking technologies |
| **9** | Midterm |
| **10** | Hypermedia: Introduction; Hypermedia architectures and models: closed hypermedia (HyperWave), open hypermedia (DLS, Microcosm), the Dexter model, AHM, HAM |
| **11** | Using Hypermedia: browsing, navigation and orientation, paths, trails; Hypermedia design: modeling methodologies (OOHDM, RMM), link consistency, link patterns, rhetoric and context, Usability and evaluation |
| **12** | Web Search and Link Analysis: Introduction and web history; spidering; metacrawlers; directed spidering. |
| **13** | Web Search and Link Analysis: Web Interface |
| **14** | Web Search: Link Analysis, ranking (e.g. hubs and authorities, Google PageRank). |
| **15** | Information Extraction and Integration: Extracting data from text; XML; ontologies, thesauri, semantic web; collecting and integrating specialized information on the web. |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF508 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Recommender Systems | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | An overview of recommender systems, including content-based and collaborative algorithms for recommendation, programming of recommender systems, and evaluation and metrics for recommender systems. | | | | | |
| **Content** | This course is a hybrid (partially-flipped) course in which students will receive most of the lecture content (particularly for the first-10 weeks of the course) online. Class time will be spend on a mix of supplemental material and exercises, including at times making a productive start on class assignments. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Aggarwal, C. C. Recommender Systems: The Textbook. Springer 2016. ISBN 978-3-319-29657-9. |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Students will understand the typical recommender system architecture and recommendation tasks. |
| **2** | Students will understand core algorithms driving common recommender systems including the pros and cons of each. |
| **3** | Students will learn about different approaches to evaluating recommender systems, using a variety of metrics and methodologies. |
| **4** | Students will also learn about more contemporary recommender systems research covering a variety of more advanced topics including opinion mining, explanation, alternative ranking strategies, robustness etc. |
| **5** | Students will build and evaluate their own recommender systems during the course of the module. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Weekly Content | |
|---|---|
| **1** | Introduction to Recommender Systems |
| **2** | Neighborhood-based methods |
| **3** | Recommendation and information retrieval. Knowledge sources. Introduction to the LibrRec system |
| **4** | Model-based Collaborative Recommendation |
| **5** | Dimensionality reduction. Regression: Slope1 and SLIM models. Association rules and Naïve Bayes models. |
| **6** | Factorization Methods of Collaborative Recommendation |
| **7** | Content-based Recommendation |
| **8** | Knowledge-based Recommendation (Constraint-based recommendation. Critiquing systems) |
| **9** | Midterm |
| **10** | Types of evaluation for recommender systems. Evaluation design. Prediction metrics and ranking metrics. A/B Testing |
| **11** | Hybrid Recommendation |
| **12** | Context-aware recommendation |
| **13** | Recommendations in Networks |
| **14** | Learning to Rank I |
| **15** | Learning to Rank II |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF509 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Deep Generative Models | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | In this course, we will study the probabilistic foundations and learning algorithms for deep generative models and discuss application areas that have benefitted from deep generative models. | | | | | |
| **Content** | Generative models are widely used in many subfields of AI and Machine Learning. Recent advances in parameterizing these models using neural networks, combined with progress in stochastic optimization methods, have enabled scalable modeling of complex, high-dimensional data including images, text, and speech. In this course, we will study the probabilistic foundations and learning algorithms for deep generative models, including Variational Autoencoders (VAE), Generative Adversarial Networks (GAN), and flow models. The course will also discuss application areas that have benefitted from deep generative models, including computer vision, speech and natural language processing, and reinforcement learning.<br>● Autoregressive models<br>● Variational autoencoders<br>● Normalizing flow models<br>● Generative adversarial networks<br>● Energy-based models | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |
| **Additional Course Material** | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 20 | | % |
| **Engineering** | 20 | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | 10 | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | | | |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Learning Outcomes** | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

| **Weekly Content** | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF510 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| IT Security | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | | | | | | |
| **Content** | Information and IT security is a central part in modern software engineering. Many threats can injure companies and private persons today. The course covers how security issues can be handled in business development and software engineering. The course includes human factors in security work, threat modeling, encryption, and security aspects in software development. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Scott M L, Programming Language Pragmatics, 3rd Edn., Morgan Kaufmann Publishers, 2009. |
| **Other Sources** | - David A Watt, Programming Language Design Concepts, Wiley Dreamtech, 2004<br>- Ghezzi C and M. Jazayeri, Programming Language Concepts, 3rd Edn, Wiley.1997 |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 20 | % |

| | | |
|---|---|---|
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Describe standards and policy for information security |
| **2** | Describe models and guidelines for development of secure web applications |
| **3** | Carry out risk analysis and threat modeling |
| **4** | Apply models and guidelines for development of secure web applications |
| **5** | Use tools to identify and characterise security weaknesses of applications |

| | |
|---|---|
| **6** | Identify and use APIs for encryption and authentication for web applications |
| **Weekly Content** | |
| **1** | Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage |
| **2** | Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace. |
| **3** | Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications |
| **4** | Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management. |
| **5** | Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, |
| **6** | Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques |
| **7** | Anti-Malware software, Network based Intrusion detection Systems |
| **8** | Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation. |
| **9** | Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls-Types of Firewalls |
| **10** | User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec |
| **11** | Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards |
| **12** | Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation |
| **13** | Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information |
| **14** | Tracing Internet access |
| **15** | Tracing memory in real-time |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF511 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Distributed Systems | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successfully completing this module, students will be able to design component-based distributed applications and web applications using the latest technologies and tools, and implement them using an object-oriented programming language and a given framework. By working on practical problems, students can independently discuss, evaluate and apply current methods of analysis, design and implementation of distributed systems and applications for operational problems.<br>The focus is on procedures for the design and implementation of distributed systems and their basic - concepts, properties and characteristics such as technical and economic requirement profiles (e.g. scalability, functionality, load distribution) - underlying design and implementation approaches (architecture models, multi-layer models) - communication infrastructure: distributed object systems and remote method calls (e.g. Java RMI, CORBA), message-oriented middleware (e.g. JMS, publish-subscribe mechanisms) | | | | | |
| **Content** | The above-mentioned principles of distributed systems are deepened and supplemented by exercises in the following areas: - implementation of client and server components that communicate via UDP and TCP - implementation of client and server components that communicate via Java RMI method calls - XML data structure and XML schema, frameworks for handling XML files | | | | | |
| **Prerequisites** | Desirable: INF102 Object Oriented Programming | | | | | |
| **Coordinator** | Dipl.-Ing. Dr. Burcu Yıldız | | | | | |
| **Lecturer(s)** | Dipl.-Ing. Dr. Burcu Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Tanenbaum, A. S. und Van Steen, M.: Verteilte Systeme: Prinzipien und Paradigmen, Pearson Studium, München, Boston (u.a.) |
| **Other Sources** | Coulouris, G., Dollimore, J. und Kindberg,T.: Distributed Systems: Concepts and Design, Addison-Wesley, Amsterdam. |

| Additional Course Material | |
|---|---|
| **Documents** | - |

| | | | |
|---|---|---|---|
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | | | % |
| **Engineering** | 40 | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 60 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | | | |
| **Quiz** | | | |
| **Assignments** | | | |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | 1 | | 40 |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 36 | 36 |
| **Assignments** | 5 | 10 | 50 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 2 | 25 | 50 |
| **Final Exam** | 1 | 2 | 2 |
| | | **Total Work Load** | **166** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |
| **Learning Outcomes** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Understand the role and benefits of distributed systems |
| **2** | Understand different architectural approaches |
| **3** | Understand design principles for distributed systems |
| **4** | Understanding of current communication architectures and protocols |
| **5** | Independent implementation of middleware service components |
| **6** | Independent implementation of distributed applications |
| **Weekly Content** | |
| **1** | Introduction, definitions and design goals |
| **2** | Architectures of distributed systems |
| **3** | System architectures |
| **4** | System architectures |
| **5** | Processes, threads and sockets |
| **6** | Protocols and layer models |
| **7** | Protocols and layer models |
| **8** | Message representation |
| **9** | Midterm exams |
| **10** | Message representation |
| **11** | Remote procedure calls |
| **12** | Remote procedure calls |
| **13** | Message Oriented Middleware |
| **14** | Message Oriented Middleware |
| **15** | Repetition |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | | | 3 | 1 |
| **2** | 5 | 5 | 5 | | | 3 | 1 |
| **3** | 5 | 5 | 5 | | | 3 | 1 |
| **4** | 5 | 5 | 5 | | | 3 | 1 |
| **5** | 5 | 5 | 5 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 02.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF512 | 3 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Software Validation and Verification | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | The objectives of this course are to evaluate verification and validation theory and practice from a software engineering perspective, research the history, principles and techniques of verification and validation across varied software domains, and apply verification and validation techniques and practices to various software artifacts across the development life cycle for both large and smaller software systems. | | | | | |
| **Content** | Introduction and motivation for verification and validation; software testing overview, fundamentals of test process, general principles of testing, definitions and concepts, testing in software development life cycle, types of testing, levels of testing, test metrics; software inspection and code reviews, technical reviews, pair programming; specification-based testing, input-based partitioning, equivalence class partitioning, boundary value analysis, state transition test, decision table technique, used case testing; structural testing, graph coverage, logic coverage, syntax-based testing, statement coverage, branch coverage, condition coverage, path coverage, instrumentation and tool support; system, acceptance, and regression testing; model-based testing; run-time verification; model-checking, temporal logic in finite-state verification, computational tree logic; safety analysis and software reliability engineering. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Software Testing and Analysis: Process, Principles and Techniques, Wiley, ISBN 0471455938., Mauro Pezzè, Michal Young, 2008, Wiley |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Other Sources** | - | |
| **Additional Course Material** | | |
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 10 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |

| | | | |
|---|---|---|---|
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understand the concepts and theory related to software verification, validation, general concepts and theory related to software testing |
| **2** | Understand the concepts and theory related to model-based testing, model-checking and know how to apply these |
| **3** | Understand the concepts and theory related to run-time verification and know how to apply these |
| **4** | Select and apply appropriate software verification and validation techniques in development projects |
| **5** | Understand the possibilities and limitations of software verification and validation |
| **6** | Learn to use automated verification and validation tools |

**Weekly Content**

| | |
|---|---|
| **1** | Course Organization |
| **2** | Motivation for Software Verification and Validation |
| **3** | Finite models, dependency and data flow models |
| **4** | Software Testing Levels |
| **5** | Test Automation Framework (JUnit); Test Case Selection and Adequacy |
| **6** | Functional Testing |
| **7** | Combinatorial Testing |
| **8** | Midterm |
| **9** | Finite Models; |
| **10** | Dependence and dataflow models |
| **11** | Structural Testing - Coverage Metrics |
| **12** | Structural Testing - Dataflow Testing |
| **13** | Process; Test-Driven Development |
| **14** | Model Checking |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF513 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Deep Learning and Classification Techniques | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face to face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To comprehend deep learning techniques for the big data acquired by means of big data systems. | | | | | |
| **Content** | Supervised and unsupervised learning, introduciton to deep learning and ANN; comparing NN to classical regression models; Activation functions, ReLU; Deeper networks, Multilayer neural networks; Forward and backpropagation, weight update affecting accuracy; Building deep learning models; Specifying a model, compiling the model, classification models; Non-linear classification; Deep learning models in keras: modeling, optimization, adding layers to a network; Data Preparation: Feature Engineering, Dimension reduction, PCA, clustering with k-means; CNN & RNN, principles of Generative Adversarial Network; Implementations of DL | | | | | |
| **Prerequisites** | Recommended: Machine Learning, Intelligent Systems | | | | | |
| **Coordinator** | Assist. Prof. Dr. Dilek Göksel Duru | | | | | |
| **Lecturer(s)** | Assist. Prof. Dr. Dilek Göksel Duru | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, Buzdağı Yayınevi, 2018.<br>- Deep Learning with Python, François Chollet, Manning, 2018.<br>- Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019. |
| **Other Sources** | - Artificial Intelligence: A Modern Approach, S. Russel und P. Norvig, Prentice Hall, Englewood Cliffs, 2003.<br>- Maschine Learning, Tom Mitchell, McGraw-Hill, 1997.<br>- Deep Learning with TensorFlow 2 and Keras: Regression, ConvNets, GANs, RNNs, NLP, and more with TensorFlow 2 and the Keras API, Antonio Gulli, Amita Kapoor, Sujit Pal, Packt Publishing, 2019. |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |

| | | | |
|---|---|---|---|
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 30 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 70 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 14 | 4 | 56 |
| **Assignments** | 10 | 5 | 50 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / Hour) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Identify machine learning model design |

| | |
|---|---|
| **2** | Apply deep learning for classification |
| **3** | Be capable of confidently applying common techniques and algorithms in building intelligent systems. |
| **4** | Implement Tensorflow-Keras and apply advanced machine learning models to perform sentiment analysis |
| **5** | Carries out the applications in the field independently |
| **Weekly Content** | |
| **1** | Basics of deep learning and artificial neural nets |
| **2** | Supervised vs unsupervised learning, comparing NN to classical regression models |
| **3** | Activation functions, ReLU |
| **4** | Deeper networks, Multilayer neural networks |
| **5** | Forward and backpropagation, weight update affecting accuracy |
| **6** | Building deep learning models |
| **7** | Specifying a model, compiling the model, classification models |
| **8** | Non-linear classification |
| **9** | Deep learning models in keras: modeling, optimization, adding layers to a network |
| **10** | Data Preparation: Feature Engineering, Dimension reduction, PCA, clustering with k-means |
| **11** | Convolutional Neural Networks |
| **12** | Recurrent Neural Networks |
| **13** | CNN & RNN, principles of Generative Adversarial Network |
| **14** | Implementations of DL |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** |
|---|---|---|---|
| **1** | 5 | 5 | 4 |
| **2** | 5 | 5 | 4 |
| **3** | 5 | 5 | 4 |
| **4** | 5 | 5 | 4 |
| **5** | 5 | 5 | 4 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ali Osman İSKENDERLİ |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF514 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Graphics I | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | - Introduction to Computer Graphics, focusing on the rendering pipeline of common graphics hardware, transformations and coordinates, as well as global illumination computation. | | | | | |
| **Content** | - Details: I/O devices relevant to graphics, affine and projective transformations, homogeneous coordinates, rasterization, sampling/signal theory, visibility computation, color, local shading models, global illumination computation, textures | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Have a basic understanding of the core concepts of computer graphics. |
| **2** | Be capable of using OpenGL to create interactive computer graphics. |
| **3** | Understand a typical graphics pipeline. |
| **4** | Have made pictures with their computer |
| **Weekly Content** | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Introduction and Math Basics |
| **2** | Math Basics - Transformations |
| **3** | OpenGL |
| **4** | Geometry Rendering |
| **5** | Lighting, Texturing |
| **6** | Surface Analysis |
| **7** | Polygonal Meshes |
| **8** | Halfedge Data Structure |
| **9** | Midterm |
| **10** | Mesh Processing |
| **11** | Acceleration DS |
| **12** | Grids and Hierarchies |
| **13** | Spatial Queries |
| **14** | Optimization |
| **15** | Advanced Techniques , Extro |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF515 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Graphics II | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | - The course introduces the basics of Geometry Processing. Mathematical models, data structures and algorithm to represent geometry on modern computer applications are presented and manipulated through practical exercises. The techniques seen in the course are fundamental for application like 3D modeling, geometry reconstruction from scanned objects, physical simulation, … | | | | | |
| **Content** | - Spatial Data structures<br>- Parametric curves and surfaces<br>- Implicit curves and surfaces<br>- Mesh reconstruction and simplification<br>- Mesh parametrization<br>- Re-meshing and smoothing<br>- Subdivision surfaces<br>- Mesh deformation | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | **-** |
| **Other Sources** | **-** |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| | | | |
|---|---|---|---|
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |
| **Learning Outcomes** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | explain the core concepts of computer graphics, including viewing, projection, perspective, modelling and transformation in two and three dimensions. |
| **2** | apply the concepts of colour models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering. |
| **3** | interpret the mathematical foundation of the concepts of computer graphics. |
| **4** | describe the fundamentals of animation, parametric curves and surfaces, and spotlighting. |
| **5** | identify a typical graphics pipeline and apply graphics programming techniques to design and create computer graphics. |
| **6** | create effective OpenGL programs to solve graphics programming issues, including 3D transformation, objects modelling, colour modelling, lighting, textures, and ray tracing. |
| **Weekly Content** | |
| **1** | Einführung in die Klasse & OmegaLib / SAGE |
| **2** | Damit es funktioniert - Hardware |
| **3** | Damit es funktioniert - Software |
| **4** | Physiologische Probleme |
| **5** | Projekt 1 Rückblick |
| **6** | Projekt 1 Rückblick |
| **7** | Interaktion |
| **8** | Zusammenarbeit |
| **9** | Mittelfristig |
| **10** | Papierpräsentationen |
| **11** | Papierpräsentationen |
| **12** | Papierpräsentationen |
| **13** | Papierpräsentationen |
| **14** | Projekt 3 Rückblick |
| **15** | Projekt 3 Rückblick |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF516 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Reinforcement Learning | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | To be determined | | | | | |
| **Content** | To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | Ayşe Betül Yüce | | | | | | |
| **Date of Compilation:** | 24.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF517 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Foundations of Medical Image Processing | 2 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | **X** | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | **X** | | |
| **Objectives** | After successful completion of this course,<br>- Students are going to have a basic knowledge of the foundations of medical image processing<br>- Students are going to be able to apply filtering operations on images<br>- Students are going to be able to apply region segmentation techniques<br>- Students are going to be able to detect simple objects in an image | | | | | |
| **Content** | - Spatial Filtering<br>- Image Registration<br>- Morphological Transforms<br>- Image Segmentation | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Birkfellner, Wolfgang; Applied Medical Image Processing: A Basic Course, Second Edition. CRC Press, 2014. |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 30 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 30 | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 25 |
| **Quiz** | | |
| **Assignments** | 5 | 25 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 5 | 8 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | To have a basic knowledge of the foundations of medical image processing |
| **2** | To be able to apply filtering operations on images |

| | |
|---|---|
| **3** | To be able to understand and make use of histograms |
| **4** | To understand the basic methods on medical image segmentation |
| **5** | To be able to apply image enhancement techniques |
| **6** | To be able to classify objects in an image |
| **Weekly Content** | |
| **1** | Introduction to Medical Image Processing |
| **2** | Medical Imaging Techniques |
| **3** | Histogram Transforms |
| **4** | Spatial Filtering I |
| **5** | Spatial Filtering II |
| **6** | Feature Extraction |
| **7** | Image Registration |
| **8** | Image Segmentation I |
| **9** | Midterm Exam |
| **10** | Image Segmentation II |
| **11** | Classification |
| **12** | Data Visualization |
| **13** | Morphological Image Processing |
| **14** | Optimization |
| **15** | Course Wrap-up |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF518 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Foundations of Computer Vision | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Upon successful completion of this course;<br>- Students are going to be proficient in computer vision algorithms<br>- Students are going to be able to apply basic methods to common computer vision problems | | | | | |
| **Content** | - Linear Algebra<br>- Scientific Programming<br>- Image Processing | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Forsyth, David A.; Ponce, Jean, Computer Vision: A Modern Approach. Pearson, 2011. |
| **Other Sources** | - Computer Vision: Foundations and Applications [Lecture Notes]. Stanford, 2019. http://vision.stanford.edu/teaching/cs131_fall1920/index.html |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | 25 | % |
| **Engineering Design** | 25 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | | |
| **Assignments** | 4 | 20 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 65 | 65 |
| **Assignments** | 5 | 8 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **167** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | To understand the basics of computer vision |
| **2** | To be able to implement basic image processing algorithms in MATLAB |
| **3** | To have a good understanding of edge and corner detection methods |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **4** | To understand and apply the convolution operation |
| **5** | To be able to come up with new filter designs for specific tasks |
| **6** | To be able to segment different object regions in an image |
| **7** | To be able to apply dimensionality reduction methods |
| **8** | To be able to detect simple objects in an image |
| **9** | To be able to create basic face recognition applications |
| **Weekly Content** | |
| **1** | Introduction to Computer Vision |
| **2** | Linear Algebra Review |
| **3** | Basics of Scientific Programming, MATLAB Review |
| **4** | Pointwise Image Processing |
| **5** | Geometric Transforms |
| **6** | Spatial Filtering I (Edge Detection) |
| **7** | Spatial Filtering II ( Corner Detection) |
| **8** | Segmentation |
| **9** | Midterm Exam |
| **10** | Dimensionality Reduction |
| **11** | Optical Flow, Motion Estimation |
| **12** | Object Detection |
| **13** | Object Tracking |
| **14** | Face Recognition |
| **15** | Course Wrap-up |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |

http://bm.tau.edu.tr/learning-objectives-of-the-program

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF519 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Oyun Teorisi | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The main aim of this course is:<br>1. To systematically analyze the strategic situations in which the well-being of individuals depends on the behavior of other individuals.<br>2. To understand the basic principles and results of non-cooperative games | | | | | |
| **Content** | Static Games: (Uncomplicated) strategies. Nash equilibrium. Dominant strategy balance. Static games: Mixed Strategies. Collective Games. Consecutive Games. Sub Game Perfect Balance. Sequential and Static Games. Strategy and Voting. Marketing. Markets and Competition. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Avinash Dixit and Susan Skeath, Games of Strategy, Norton, 2004 |
| **Other Sources** | - Avinash Dixit and Barry Nalebuff, Thinking Strategically, Norton, 1991 .<br>- Martin Osborne, An Introduction to Game Theory, Oxford University Press 2004.<br>- Robert Gibbons, Game Theory for Applied Economists, 1992. |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |

| | | |
|---|---|---|
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | To be able to use game theory concepts correctly |
| **2** | To be able to construct simple models with strategic interaction |
| **3** | Being able to establish a relationship between real life situations and games in the classroom. |
| **4** | To be able to propose simple changes in games in order to achieve desired social results |

| | |
|---|---|
| **5** | |
| **6** | |
| **7** | |
| **8** | |
| **9** | |
| **10** | |
| **11** | |
| **12** | |
| **Weekly Content** | |
| **1** | Introduction to Game Theory |
| **2** | Static Games (Uncomplicated Strategies |
| **3** | Static Games (Uncomplicated Strategies), Dominant strategy balance |
| **4** | Static Games: Mixed Strategies I |
| **5** | Static Games: Mixed Strategies II |
| **6** | Collective Games |
| **7** | Consecutive Games I |
| **8** | Consecutive Games II |
| **9** | Midterm |
| **10** | Consecutive Games III |
| **11** | Sequential and Static Games |
| **12** | Strategy and Voting |
| **13** | Bargain |
| **14** | Markets and Competition |
| **15** | An overview |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | | | | | | | |
| **6** | | | | | | | |
| **7** | | | | | | | |
| **8** | | | | | | | |
| **9** | | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | | | | | | | |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | Ayşe Betül Yüce | | | | | | |
| **Date of Compilation:** | 24.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF520 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Game Engine Architecture | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This course introduces students to game engine architecture and the game development pipeline by teaching students how to design and implement a 3D game engine based (this semester) on the open source Ogre graphics engine. | | | | | |
| **Content** | The course will cover the following topics.<br>The Ogre graphics engine<br>Game engine architecture<br>Adding 3D models to a Scene<br>Keyboard interaction<br>Game entity management<br>Introductory game physics<br>Introductory AI<br>Interaction design<br>If time permits<br>– Sound<br>– Multiplayer networking | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Bob Nystrom. 2014. Game Programming Patterns. Genever Benning; 1 edition. (available for free online) |
| **Other Sources** | - |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Composition | | |
|---|---|---|
| Mathematics und Basic Sciences | 50 | % |
| Engineering | | % |
| Engineering Design | | % |
| Social Sciences | | % |
| Educational Sciences | | % |
| Natural Sciences | | % |
| Health Sciences | | % |
| Expert Knowledge | 50 | % |

| Assessment | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| Midterm Exam | 1 | 40 |
| Quiz | | |
| Assignments | 1 | 10 |
| Attendance | | |
| Recitations | | |
| Projects | | |
| Final Exam | 1 | 50 |
| | **Total** | **100** |

| ECTS Points and Work Load | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| Lectures | 14 | 2 | 28 |
| Self-Study | 1 | 66 | 66 |
| Assignments | 10 | 4 | 40 |
| Presentation / Seminar Preparation | | | |
| Midterm Exam | 1 | 3 | 3 |
| Recitations | 14 | 2 | 28 |
| Laboratory | | | |
| Projects | | | |
| Final Exam | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| Learning Outcomes | |
|---|---|
| **1** | Students will have an ability to apply knowledge of computing, mathematics, science, and engineering. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **2** | Students will have an ability to analyze a problem, and identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution. |
| **3** | Demonstrate strong analytic, design, and implementation skills required to formulate and solve computer science or computer engineering problems in a professional or research environment |
| **4** | Students will have an ability to apply design and development principles in the construction of software systems or computer systems of varying complexity. |
| **5** | Students will have an ability to use current techniques, skills, and tools necessary for computing and engineering practice. |
| **6** | Students demonstrate they can learn to design and implement computing solutions using modern computing tools such as an Integrated Development Environment in the pursuit of broader assignment and project goals. |
| **7** | |
| **8** | |
| **9** | |
| **10** | |
| **11** | |
| **12** | |
| **Weekly Content** | |
| **1** | Introduction |
| **2** | GFX: Setting up Ogre,  Coordinate Systems, Scenes, Entities, lights |
| **3** | GFX/UI: Input/Output Systems, Cameras, mice, keyboards |
| **4** | GFX: Ogre architecture |
| **5** | Game Engine Architecture |
| **6** | Entity Management: Creation |
| **7** | PHX: Entity movement: Physics |
| **8** | AI: Entity smarts: Unit AI |
| **9** | Zwischenprüfungen |
| **10** | AI: Group AI |
| **11** | Unity3d |
| **12** | UI: Game Interaction (UI) |
| **13** | Net: Game Networking |
| **14** | Brainstorming a game |
| **15** | Designing and finishing a complete game |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | | | | | | | |
| **8** | | | | | | | |
| **9** | | | | | | | |
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | | | | | | | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF521 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Information Visualisation | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | To provide an overview of the area of information visualisation and how it is applied in different professional and casual contexts.<br>To introduce the principles and methods of creating effective information visualisations.<br>To allow students to experiment with different ways of visualising data in a hands-on way.<br>To provide the skills to critically assess existing visual displays of data. | | | | | |
| **Content** | The purpose and principles of information visualisation and visual analytics.<br>What to visualise: data types, datasets and attributes.<br>How to visualise information: visual variables and perception.<br>Why to visualise information: actions, tasks, and goals.<br>Basic visualisation techniques.<br>Interaction design: facilitating interactive analysis and exploration.<br>Visualisation toolkits.<br>Application areas.<br>Evaluation of information visualisations. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

| **Assessment** | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Be able to design and justify the design of a visual representation of a given data set. |

| | |
|---|---|
| **2** | Be able to critically assess the design of a data visualisation based on the nature of its underlying data, targeted audience, and general purpose. |
| **3** | Be able to make use of existing low- and high-level visualization toolkits to create effective information visualisations. |
| **4** | Be able to communicate and document their visualisation design process and outcomes. |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction |
| **2** | Overview of Data Visualization, Introduction to Web Technologies |
| **3** | The Shapes of Data |
| **4** | Marks and Channels |
| **5** | Common Visualization Idioms |
| **6** | Visualization of Spatial Data, Networks, and Trees |
| **7** | Visualization of Spatial Data, Networks, and Trees |
| **8** | Using Color and Size in Visualization |
| **9** | Midterm |
| **10** | Interaction Techniques |
| **11** | Multiple Linked Views I |
| **12** | Multiple Linked Views II |
| **13** | Data Reduction I |
| **14** | Data Reduction II |
| **15** | Focus + Context |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| [http://bm.tau.edu.tr/learning-objectives-of-the-program](http://bm.tau.edu.tr/learning-objectives-of-the-program) | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF522 | | | 3 | | Fall |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Web Engineering | 2 | 0 | 2 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | In this course, topics covered include the application of software engineering principles and techniques to the development, deployment, and maintenance of high quality Web-based systems and applications; markup languages, distributed objects, hypermedia and Web integration; architecture and security issues; client side and server side technologies; distributed technologies; data integration across heterogeneous Web sources. | | | | | |
| **Content** | This course will address some of the issues associated with large-scale Web application development including architectural design and documentation, and service-oriented computing technologies. In the first block of the course. We aim to understand the concepts behind software architectures for largescale Web-based systems as well as to design, recognize, evaluate and document software architectures. In the second block, we extend our understanding of service-oriented architecture. In particular, we focus on principles behind service-oriented software engineering, and approaches and methods for efficient service production in service ecosystems. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Web Engineering: A Practitioner's Approach by Roger Pressman and David Lowe (ISBN: 9780073523293) |
| **Other Sources** | Software Architecture in Practice by Len Bass, Paul C. Clements, and Rick Kazman (ISBN: 9780321815736) |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

| Assessment | | |
|---|---|---|
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| ECTS Points and Work Load | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| Learning Outcomes | |
|---|---|
| **1** | Employ techniques to analyze and evaluate software architectures on a real-world large-scale web-based software systems. |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **2** | Create and document a reference architecture for a non-trivial Webbased technological product. |
| **3** | Present findings of case study analysis of software architectures of a family of large-scale webbased software systems. |
| **4** | Envision an innovative product for a wicked problem and develop an architecture for the product that utilizes service-oriented computing technologies |
| **5** | Write a research-in-progress paper on a Web engineering topic that utilizes Design Science Research methodology and adheres to appropriate academic standards. |
| **6** | |
| **7** | |
| **8** | |
| **9** | |
| **10** | |
| **11** | |
| **12** | |
| **Weekly Content** | |
| **1** | Course Introduction and Syllabus Review |
| **2** | Web Engineering and Application Design Principles |
| **3** | Software Architectures in SDLC |
| **4** | Documenting Architectural Views and Styles |
| **5** | Documenting Architectural Views and Styles II |
| **6** | Architectural Tactics and Quality Attributes |
| **7** | Design Science Research Methodology |
| **8** | SOA and Web Service Technologies I |
| **9** | Vise |
| **10** | SOA and Web Service Technologies II |
| **11** | RESTful Web Services I |
| **12** | RESTful Web Services II |
| **13** | Integrating Applications using Web Services |
| **14** | Integrating Applications using Web Services II |
| **15** | Microservices and Internet of Things |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | | | | | | | |
| **7** | | | | | | | |
| **8** | | | | | | | |
| **9** | | | | | | | |
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | | | | | | | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF523 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Human-Machine Interaction | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Online course with VL, exercises and project work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | After successful completion of thismodule, the<br>- Students will have a well-founded basic knowledge of human-machine interaction and its specific application areas<br>- Thestudents will be able to apply knowledgeof human-centered development and evaluation of human-machine systems<br>In addition to knowledge of basics, research methods and application domains, students will also gain the ability to incorporate ethical and social aspects into the design process. | | | | | |
| **Content** | - Human information processing and function allocation in the human-machine system<br>- Human-centered system development and evaluation<br>- Research methods and conception of user studies<br>Application domains, such as automotive, aviation and human-robot interaction | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Öğr. Üyesi Ahmet Yıldız | | | | | |
| **Lecturer(s)** | Dr. Felix Siebert | | | | | |
| **Assistant(s)** | Eileen Roesler | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Provided in the digital classroom to suit any appointment. |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | Online scripts in the form of PowerPoint Slides |
| **Assignments** | Reading current scientific articles |
| **Exams** | Portfolio review with 20% presentation of the project idea, 20% presentation of the results and 60% project report |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | 50 | % |
| **Engineering Design** | 50 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 2 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 60 |
| **Final Exam** | | |
| | **Total** | 100 |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 12 | 3 | 36 |
| **Assignments** | 5 | 8 | 40 |
| **Presentation / Seminar Preparation** | 2 | 12 | 24 |
| **Midterm Exam** | 2 | 4 | 8 |
| **Recitations** | 7 | 2 | 14 |
| **Laboratory** | | | |
| **Projects** | 7 | 2 | 14 |
| **Final Exam** | 1 | 4 | 4 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Cross-learning in Denmark - current state of research & design challenges in the field of human-machine systems |
| **2** | Knowledge of relevant cognitive psychology basics in human-machine interaction (MMI) |
| **3** | Rules for the design of human-machine interfaces |
| **4** | In-depth knowledge of challenges in mml i.d. Domains Automation, Mobility, Robotics and AI |

| | |
|---|---|
| **5** | Practical knowledge in the evaluation of human-machine interfaces |
| **Weekly Content** | |
| **1** | Introduction to human-machine interaction |
| **2** | Human information processing |
| **3** | Function allocation in the human-machine system |
| **4** | Human-centered development |
| **5** | Research methods |
| **6** | Conception |
| **7** | Evaluation |
| **8** | Project idea |
| **9** | Application Domain - Automobil l |
| **10** | Application domain - new forms of mobility |
| **11** | Application Domain - Aviation |
| **12** | Application Domain - Human-Robot Interaction |
| **13** | Application Domain - Artificial Intelligence |
| **14** | Project presentation and seminar closing |
| **1** | Introduction to human-machine interaction |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | | | | | 5 | |
| **2** | 5 | | | | | 5 | |
| **3** | 5 | | | | | 5 | |
| **4** | 5 | | | | | 5 | |
| **5** | 5 | | | | | 5 | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF524 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Applied Computer Science: Selected Topics I | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in applied computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development solution oriented skills. | | | | | |
| **Content** | The focus can be on one or more of the following fields, but is not limited to these:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

## Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | Ayşe Betül Yüce | | | | | | |
| **Date of Compilation:** | 24.05.2022 | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF525 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics IV<br>Content based search in multimedia data | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-face teaching lecture, group work, self-study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This module teaches students the basic ideas and formal methods of content-based searches in multimedia documents (such as images, videos and audio). | | | | | |
| **Content** | Search approaches, information retrieval models, feature extraction, object representation, similarity measures, distance-based similarity measures for histograms and signatures, efficient query processing, similarity queries, multi-level query processing, lower bounds, multimedia data retrieval, other similarity models, metric and Ptolemaic indexing | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | Dr.-Ing. Merih Seran Uysal | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | The content of the lectures is shaped by current research results, which is why there is no specific book on the subject. The resources and publications will be announced in the lecture. |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 40 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Students should understand tasks, models and methods of content-based search in multimedia data. |
| **2** | The ability to conceive object representations and similarity measures should be taught. |
| **3** | Which distance-based similarity measures are used for which cases are understood. |

| | |
|---|---|
| **4** | It is understood that efficient query processing approaches to accelerate the search. |
| **5** | Metric and Ptolemaic indexing approaches are taught. |
| **Weekly Content** | |
| **1** | Organization and introduction to multimedia |
| **2** | Search approaches, information retrieval models, feature extraction, object representation |
| **3** | Clustering based calculation, fundamental similarity measures |
| **4** | Measures of similarity, definitions |
| **5** | Distance-based similarity measures for histograms |
| **6** | Distance-based similarity measures for signatures (Part 1) |
| **7** | Distance-based similarity measures for signatures (Part 2) |
| **8** | Efficient query processing: similarity queries, multilevel query processing |
| **9** | Efficient request processing through lower barriers (part 1) |
| **10** | Efficient request processing through lower barriers (part 2) |
| **11** | Lower barriers, multimedia data retrieval |
| **12** | Bag of Words model, approaches to image search, evaluation |
| **13** | Further similarity models, sequence search |
| **14** | Indexing, metric and Ptolemaic indexing |
| **15** | Summary |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | **5** | **5** | **4** | | | **3** | **1** |
| **3** | **5** | **5** | **4** | | | **3** | **1** |
| **4** | **5** | **5** | **4** | | | **3** | **1** |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 24.05.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF526 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Applied Computer Science: Selected Topics III<br>Python for Engineers | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Having finished this course, students have basic knowledge and methods of computer science using Python language. They will use software and library packages related with industrial engineering using their Python APIs. They may develop algorithms to solve complex problems using Python language. | | | | | |
| **Content** | Computer structure, operating system, setting up a Python programming environment, programming basics, loading / saving data, sample data generation using random functions, modules for scientific computing (numpy, scipy), visualization, use of specific software and libraries with Python APIs | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Dr. Önder Tombuş | | | | | |
| **Assistant(s)** | Ahmet Yükseltürk | | | | | |
| **Work Placement** | - | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | J. VanderPlas: A Whirlwind Tour of Python (https://jakevdp.github.io/WhirlwindTourOfPython/) |
| **Other Sources** | G. Varoquaux et al.: Scipy Lecture Notes (https://scipy-lectures.org) |

| **Additional Course Material** | |
|---|---|
| **Documents** | Cplex User Manual, Gurobi User Manual |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 60 | % |
| **Engineering Design** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 20 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 15 |
| **Quiz** | | |
| **Assignments** | 4 | 20 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 15 |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 40 | 60 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | 1 | 20 | 20 |
| **Final Exam** | 1 | 10 | 10 |
| | | **Total Work Load** | **149** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Representation of Data Structures in Computer |
| **2** | Mathematical operations in Computer |
| **3** | Robust coding skills |
| **4** | Developing algorithms in Python |
| **5** | Ability to use Software Packages and Libraries in algorithms using Pyhon APIs |

**Weekly Content**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Computer structure, operating system, |
| **2** | Setting up a Python programming environment |
| **3** | Programming basics: Syntax, Datatypes, Control structures, Objects, Functions, Modules |
| **4** | Programming basics: Syntax, Datatypes, Control structures, Objects, Functions, Modules |
| **5** | Programming basics: Syntax, Datatypes, Control structures, Objects, Functions, Modules |
| **6** | Loading / saving data, sample data generation using random functions, |
| **7** | Modules for scientific computing (numpy, scipy), |
| **8** | Implementation of linear algebra functions |
| **9** | Mid term exams |
| **10** | Visualization |
| **11** | Visualization |
| **12** | Use of specific software and libraries with Python APIs (Mixed Integer Programming Softwares Cplex and Gurobi as examples as examples) |
| **13** | Use of specific software and libraries with Python APIs (Mixed Integer Programming Softwares Cplex and Gurobi as examples as examples) |
| **14** | Use of specific software and libraries with Python APIs (Mixed Integer Programming Softwares Cplex and Gurobi as examples as examples) |
| **15** | Evaluation of Project |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 5 | 5 | 4 | 1 | 1 |
| **2** | 5 | 5 | 5 | 5 | 4 | 1 | 1 |
| **3** | 5 | 5 | 5 | 5 | 4 | 1 | 1 |
| **4** | 5 | 5 | 5 | 5 | 4 | 1 | 1 |
| **5** | 5 | 5 | 5 | 5 | 4 | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Ayşe Betül Yüce |
| **Date of Compilation:** | 25.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF527 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Applied Computer Science: Selected Topics IV: Probabilistic Machine Learning | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Parameter inference in science & engineering is of utmost importance. In natural dynamical systems (such as an ecosystem or a galaxy) we attempt to estimate parameters without an exact understanding of the intrinsic, often too complex, physics. In artificial dynamical systems (such as a mega-city or a deep neural network), we also need to infer parameters without having to dig into the smallest-scale elements or processes of such increasingly complex things that we want to understand, e.g., for more accurate predictions.<br>Probabilistic (especially Bayesian) approaches in machine learning are becoming increasingly attractive in modelling complex systems with all sorts of noise and with several degenerate parameters. This course will be an introduction to the topic, with examples from astronomical data, which is good because they really come from complex black-box systems, such as planets or stars. | | | | | |
| **Content** | - Bayessche statistische Inferenz<br>- Suche nach Struktur in Punktdaten<br>- Kernel-Regression<br>- Gaußsche Prozessregression<br>- Simulationsbasierte Inferenz | | | | | |
| **Prerequisites** | INF714 Advanced Top. in Math for Cmp. Sci. (recommended) | | | | | |
| **Coordinator** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Lecturer(s)** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Statistics, data mining & machine learning in astronomy. Z. Ivezic, A.J. Connolly, J.T. VanderPlas, A. Gray, Princeton University Press 2020<br>- Mathematics for Machine Learning. Deisenroth, M.P., Faisal, A.A., Ong, C.S. 2020, Cambridge University Press |
| **Other Sources** | - Various tutorials in internet |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 20 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | 10 | 40 |
| **Projects** | | |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 14 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | 14 | 2 | 14 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Use of Bayesian inference in machine learning |
| **2** | Density estimation know-how |
| **3** | Markov-Chain Monte Carlo sampling know-how |
| **4** | Ability to estimate regression models with functional uncertainties |
| **5** | Understanding of how to use simulators to infer parameters from multi-dimensional data |

| **Weekly Content** | |
|---|---|
| **1** | Bayesian linear regression 1 |
| **2** | Bayesian linear regression 2 |
| **3** | MCMC for complex problems |
| **4** | MCMC for complex problems |
| **5** | Nonparametric density estimation |
| **6** | Parametric density estimation & clustering |
| **7** | Kernel regression |
| **8** | Uncertainties in the data & robust regression |
| **9** | Mid term exams |
| **10** | Gaussian process regression |
| **11** | Applications |
| **12** | Applications |
| **13** | Simulation-based inference |
| **14** | Simulation-based inference |
| **15** | Applications |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | 1 | 4 | 5 | - |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Emre Işık |
| **Date of Compilation:** | 27.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF528 | | 3 | | | Spring |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Applied Computer Science: Selected Topics V | | 1 | 0 | 2 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in applied computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development solution oriented skills. | | | | | |
| **Content** | The focus can be on one or more of the following fields, but is not limited to these:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 20 | 20 |
| **Assignments** | 10 | 2 | 20 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **84** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF529 | | | 3 | | Spring |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Applied Computer Science: Selected Topics VI | 1 | 0 | 2 | | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in applied computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development solution oriented skills. | | | | | |
| **Content** | The focus can be on one or more of the following fields, but is not limited to these:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |
| **Additional Course Material** | |
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 20 | 20 |
| **Assignments** | 10 | 2 | 20 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **84** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF530 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Programming Project I | 0 | 0 | 4 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis, software design, project management, documentation, programming, testing and evaluation, for the development of software solutions for complex tasks. | | | | | |
| **Content** | Students must develop software solutions for problems from the following fields:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Ahmet Yıldız | | | | | |
| **Lecturer(s)** | Dr. Ahmet Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Ability to provide software solutions for a complex problem |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF531 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Programming Project II | 0 | 0 | 4 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis, software design, project management, documentation, programming, testing and evaluation, for the development of software solutions for complex tasks. | | | | | |
| **Content** | Students must develop software solutions for problems from the following fields:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Ahmet Yıldız | | | | | |
| **Lecturer(s)** | Dr. Ahmet Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Ability to provide software solutions for a complex problem |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF532 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Programming Project III | 0 | 0 | 4 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis, software design, project management, documentation, programming, testing and evaluation, for the development of software solutions for complex tasks. | | | | | |
| **Content** | Students must develop software solutions for problems from the following fields:<br>- Business informatics<br>- Medical informatics<br>- Media informatics<br>- Computer Science and Society | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Ability to provide software solutions for a complex problem |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Code** | | | | | **Academic Year** | | **Semester** |
| INF533 | | | | | 3 | | Fall |
| **Title** | | | | | **T** | **A** | **L** | **ECTS** |
| AI in Medicine | | | | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | **X** | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | **X** | **Elective** | | | |
| **Objectives** | To be determined | | | | | |
| **Content** | To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF534 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Introduction to Bioinformatics | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Develop an advanced understanding of signal transduction pathways and their effects on normal development and disease. | | | | | |
| **Content** | Biological sequence (DNA, RNA, protein) analysis: alignment, scoring matrices, sequence similarity and distinction, motif scanning; molecular structure prediction: RNA secondary structure prediction, protein folding, protein knotting, homology modeling; functional genomics and proteomics: microarray data analysis, transcriptomics, SNP and exon sequence analysis, high throughput protein profiling; Path analysis: network modeling, graph theory, biochemical and metabolic path simulations; Bioinformatics tools: Introduction of biological databases on the Internet and software tools used in biological data analysis, familiarization with these software and databases and explaining the principles and concepts used in their production. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **3** | To be determined | | | | | | |
| **4** | To be determined | | | | | | |
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

<table>
<tr><th colspan="7">Course Details</th></tr>
<tr><td colspan="3">Code</td><td colspan="3">Academic Year</td><td>Semester</td></tr>
<tr><td colspan="3">INF535</td><td colspan="3">3</td><td>Spring</td></tr>
<tr><td colspan="3">Title</td><td>T</td><td>A</td><td>L</td><td>ECTS</td></tr>
<tr><td colspan="3">Deep Generative Models</td><td>2</td><td>0</td><td>2</td><td>6</td></tr>
</table>

<table>
<tr><td>Language</td><td colspan="6">German</td></tr>
<tr><td>Level</td><td>Undergraduate</td><td>X</td><td>Graduate</td><td></td><td>Postgraduate</td><td></td></tr>
<tr><td>Department / Program</td><td colspan="6">Computer Science</td></tr>
<tr><td>Forms of Teaching and Learning</td><td colspan="6">Lecture, Personal Study</td></tr>
<tr><td>Course Type</td><td>Compulsory</td><td>X</td><td colspan="2">Elective</td><td colspan="2"></td></tr>
<tr><td>Objectives</td><td colspan="6">In this course, we will study the probabilistic foundations and learning algorithms for deep generative models and discuss application areas that have benefitted from deep generative models.</td></tr>
<tr><td>Content</td><td colspan="6">Generative models are widely used in many subfields of AI and Machine Learning. Recent advances in parameterizing these models using neural networks, combined with progress in stochastic optimization methods, have enabled scalable modeling of complex, high-dimensional data including images, text, and speech. In this course, we will study the probabilistic foundations and learning algorithms for deep generative models, including Variational Autoencoders (VAE), Generative Adversarial Networks (GAN), and flow models. The course will also discuss application areas that have benefitted from deep generative models, including computer vision, speech and natural language processing, and reinforcement learning.<ul><li>Autoregressive models</li><li>Variational autoencoders</li><li>Normalizing flow models</li><li>Generative adversarial networks</li><li>Energy-based models</li></ul></td></tr>
<tr><td>Prerequisites</td><td colspan="6">None</td></tr>
<tr><td>Coordinator</td><td colspan="6">To be determined</td></tr>
<tr><td>Lecturer(s)</td><td colspan="6">To be determined</td></tr>
<tr><td>Assistant(s)</td><td colspan="6">To be determined</td></tr>
<tr><td>Work Placement</td><td colspan="6">None</td></tr>
<tr><th colspan="7">Recommended or Required Reading</th></tr>
<tr><td>Books / Lecture Notes</td><td colspan="6">- To be determined</td></tr>
<tr><td>Other Sources</td><td colspan="6">- To be determined</td></tr>
<tr><th colspan="7">Additional Course Material</th></tr>
</table>

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Learning Outcomes** | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

| **Weekly Content** | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | MSc. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 26.09.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF601 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Real Time Systems | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | It aims to develop students in the field of real-time / embedded systems, programming tools and techniques on modern cards (Texas Instruments EvalBOT, Zoom OMAP-L138 EVM / Experimenter Development Kit, ARM NXP LPC1768 Development Board). This course aims to teach the design / implementation / debugging of real-time embedded systems with a series of laboratory exercises. | | | | | |
| **Content** | I / O programming, cyclic programs, real-time principles (multi-task, job distribution, synchronization), real-time kernels, DSPLink, DSPBIOS, RTAI, uCOS-III, MDK-ARM, and RTX. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Jean J Labrosse, Micrium's uC/OS-III: The Real-Time Kernel |
| **Other Sources** | Donald Reay, Digital Signal Processing and Applications with the OMAPL138 Experimenter, Wiley. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Accesses information in breadth and depth by conducting scientific research in Computer Science and Engineering, evaluates, interprets and applies information. |
| **2** | Completes and applies the information with scientific methods using limited or missing data; integrates information from different disciplines. |
| **3** | Sets up Computer Science and Engineering problems, develops methods to solve them and applies innovative methods in solutions. |
| **4** | Develops new and / or original ideas and algorithms; develops innovative solutions in system, part or process designs. |
| **5** | Has comprehensive information about current techniques and methods applied in Computer Engineering and their limitations. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| 6 | Designs and implements analytical, modeling and experimental researches, analyzes and interprets complex situations encountered in this process. |
| 7 | Communicates verbally and in writing using a foreign language (English) at least at the level of B2 of the European Language Portfolio. |
| 8 | He leads multidisciplinary teams, develops solution approaches in complex situations and takes responsibility. |
| 9 | Transfers the processes and results of Computer Science and Engineering studies systematically and clearly in written or oral form in national and international settings in or outside of that field. |
| 10 | It considers social, scientific and ethical values in the stages of data collection, interpretation, and announcement and in all professional activities. |
| 11 | Being aware of new and developing applications of Computer Science and Engineering, examines and learns them when necessary. |
| 12 | Describe the social and environmental aspects of Computer Science and Engineering applications. |

**Weekly Content**

| | |
|---|---|
| 1 | Introduction to the course with theoretical knowledge |
| 2 | Back / foreground systems and real-time operating systems, real-time operating systems |
| 3 | Critical parts of the code, resource sharing, multi-tasking, tasks, changing content |
| 4 | Kernel types, scheduler, priority, non-priority cores |
| 5 | Reentrant functions |
| 6 | Mutual exclusion, semaphores, dead-end, synchronization |
| 7 | Round-robin scheduler, task priorities, static / dynamic priorities, priority reversibility, priority heritage |
| 8 | Mutual exclusion, semaphores, dead-end, synchronization |
| 9 | Midterm |
| 10 | Interrupts, interrupt delay / response / recovery, heat processing time |
| 11 | Non-maskable interrupts, impact memory requirement |
| 12 | Advantages / disadvantages of real-time cores |
| 13 | OMAP-L138 EVM / Embedded scarce embedded system programming |
| 14 | Embedded system programming with OMAPL138 SOM |
| 15 | DSP / BIOS, Audio processing |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| 1 | 5 | 5 | 4 | | | 3 | 1 |
| 2 | 5 | 5 | 4 | | | 3 | 1 |
| 3 | 5 | 5 | 4 | | | 3 | 1 |
| 4 | 5 | 5 | 4 | | | 3 | 1 |
| 5 | 5 | 5 | 3 | | | 3 | 1 |
| 6 | 5 | 5 | 3 | | | 3 | 1 |
| 7 | 5 | 5 | 3 | | | 3 | 1 |
| 8 | 5 | 5 | 3 | | | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **9** | 5 | 5 | 3 | | | 3 | 1 |
| **10** | 5 | 5 | 3 | | | 3 | 1 |
| **11** | 5 | 5 | 3 | | | 3 | 1 |
| **12** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF602 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Compiler Construction | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to provide students with knowledge and skills in compiler design and development. | | | | | |
| **Content** | This course explains to students the methods used to translate from a formal language to another formal language. The course explains the steps used from the browser step to the parser design and development. In addition, the course provides information on semantic analysis and local and global compiler optimization. During the course, each student is expected to design a simple compiler using lex and yacc software tools. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | A.V. AHO, M.S. LAM, R. SETHI, J.D. ULLMAN, “COMPILERS: PRINCIPLES, TECHNIQUES AND TOOLS, 2nd ED., ADDISON WESLEY, 2006. |
| **Other Sources** | K.D. COOPER, L. TORCZON, “ENGINEERING A COMPILER”, 2nd ED., MORGAN KAUFMANN, 2012. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Adequate knowledge in mathematics, science and related engineering discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. |
| **2** | Ability to identify, define, formulate, and solve complex engineering problems; ability to select and apply appropriate analysis and modeling methods for this purpose. |
| **3** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions; ability to apply modern design methods for this purpose. |
| **4** | Ability to develop, select and use modern techniques and tools necessary for the analysis and solution of complex problems encountered in engineering applications; ability to use information technologies effectively. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **5** | Ability to design and conduct experiments, collect data, analyze and interpret results for studying complex engineering problems or discipline-specific research topics. |
| **6** | Ability to work effectively in disciplinary and multidisciplinary teams; ability to work individually. |
| **7** | Ability to communicate effectively in Turkish, both orally and in writing; at least one foreign language knowledge; ability to write effective reports and understand written reports, to prepare design and production reports, to make effective presentations, to give clear and understandable instructions. |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction to Compilers |
| **2** | Browsers I (Regular Languages, Lexical Features) |
| **3** | Scanners II (NFA, DFA Implementation) |
| **4** | Decomposers I |
| **5** | Decomposers II |
| **6** | Decomposers III |
| **7** | Decomposers IV |
| **8** | Context Sensitive Analysis I |
| **9** | Midterm |
| **10** | Code Format |
| **11** | Context Sensitive Analysis II |
| **12** | Procedure Abstraction |
| **13** | Code Drawing |
| **14** | Optimizations I |
| **15** | Optimizations II |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF603 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Mobile Communication | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | This course will provide an overview of wireless communications, with an emphasis on untethered transceivers. We will cover the traditional topics – channel modeling, demodulation in the presence of noise, and error control coding – and then move on to recent developments in multicarrier modulation, spread spectrum, and space-time modulation and coding. We will emphasize applications to successful wireless telephony and LAN systems. We will also consider higher-layer system concepts such as mobility management, with an emphasis on 3rd and 4th generation cellular systems. The course will conclude with a brief overview of communication and privacy law, with a discussion of recent research into privacy-aware network design techniques. | | | | | |
| **Content** | Basic of the theory of propagation of electromagnetic waves. Free space propagation, propagation in real conditions. Semi - empirical models of propagation: Hata model, WIN model, ETSI model, extensions propagation models to higher frequency bands. A brief history of the development of mobile communication systems. First generation systems and their characteristics. Systems of second-generation and second - generation plus and their characteristics. Third -generation systems and their characteristics, the fourth-generation systems and their characteristics. GSM standard. The basic architecture of a GSM network. Interfaces in a GSM network. Air interface in GSM, logical and physical channels. Radio Network GSM system functions TRAU, BSC, BTS and MS. The central network functions VLR, HLR, AUC and EIR. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Andrea Goldsmith, Wireless Communications |
| **Other Sources** | - |

**Additional Course Material**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 10 | | % |
| **Engineering** | 20 | | % |
| **Engineering Design** | 20 | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Learning Outcomes** | |
|---|---|
| **1** | Explain the basic physical and technical settings functioning of mobile communications systems, |
| **2** | Describe the basic principles of mobile communication system,. |
| **3** | Conduct field experiments and measurements, and measurements in the laboratory on actual components, devices, equipment and systems |
| **4** | The Wireless Channel:  Fading, Shadowing, and Multipath.  Specific Models |
| **5** | Interpret the collected data and measurement results |
| **6** | Describe the development and implementation of mobile communication systems |
| **7** | Test mobile communication equipment for the technical functionality |

| **Weekly Content** | |
|---|---|
| **1** | Modern Telecommunication Networks: Early wireless |
| **2** | Modern Telecommunication Networks: The Cellular Revolution: 1, 2, 2.5, 2.75, and 3G |
| **3** | Modern Telecommunication Networks:  Wireless LANs |
| **4** | The Wireless Channel:  Fading, Shadowing, and Multipath |
| **5** | Digital Modulation and Detection,  Signal Space Analysis,  Amplitude and Phase Modulation |
| **6** | Synchronization and Carrier Phase Recovery,  Performance over Wireless Channels |
| **7** | Multiple Antennas and Space Time Communications |
| **8** | Multicarrier and Spread Spectrum Modulation |
| **9** | Midterm Exam |
| **10** | FFT-Based Multicarrier |
| **11** | OFDM in 802.11 |
| **12** | Processing Gain,  Frequency Hopping and Direct Sequence |
| **13** | Multi-User Systems FDMA, TDMA, and CDMA |
| **14** | Telecommunication Law, Privacy Law, and Privacy-Aware Network Design |
| **15** | Data Collection Cases and Cellular Phone Tracking,  Electronic Communications Privacy Act,  Privacy-Aware Design |

**Contribution of Learning Outcomes to Program Objectives  (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF604 | 1 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| GPU Programming | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | - analyse GPU architecture, assess their advantages and identify potential software optimisations based on knowledge of the GPU architecture<br>- design and implement a programme for a GPU for applications in scientific computing, machine learning, image and video processing, computer graphics or for a mobile phone<br>- use experimental highly productive methods for GPU programming, such as GPU libraries and algorithmic packages, to speed up the development of large GPU applications<br>- use efficient development tools for GPU programming such as debuggers and tools for measuring performance | | | | | |
| **Content** | - CPU architecture. Computation and memory organisation of different commercial graphics processors will be introduced. A comparison with conventional CPUs and a presentation of new future GPUs will be given.<br>- GPU programming with CUDA. CUDA's concepts and how to use them to develop applications for GPUs will be introduced through examples from different areas, such as image processing and scientific computing. Also development tools, such as debuggers and tools to measure performance will be presented.<br>- GPU programming with GPU libraries and algorithmic packages. Packages for high productivity, for example the Thrust library, OpenACC and cuDNN will be presented. Different packages will be explained through examples from different areas of computer science. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | |
|---|---|---|---|
| **Work Placement** | None | | |
| **Recommended or Required Reading** | | | |
| **Books / Lecture Notes** | -A series of articles that present design and implementation of applications for GPU will be published on the course web page. A book that partly covers the course content is "CUDA left Engineers" by D. Storti and M. Yurtoglu.<br><br>-Soyata, Tolga. GPU parallel program development using CUDA. CRC Press, 2018. | | |
| **Other Sources** | - | | |
| **Additional Course Material** | | | |
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 50 | % | |
| **Engineering** | | % | |
| **Engineering Design** | | % | |
| **Social Sciences** | | % | |
| **Educational Sciences** | | % | |
| **Natural Sciences** | | % | |
| **Health Sciences** | | % | |
| **Expert Knowledge** | 50 | % | |
| **Assessment** | | | |
| **Activity** | **Count** | **Percentage (%)** | |
| **Midterm Exam** | 1 | 30 | |
| **Quiz** | | | |
| **Assignments** | 1 | 30 | |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 40 | |
| | **Total** | **100** | |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Knowledge and understanding of GPU architecture |
| **2** | Understand the role of visual effects in games and their connection to player experience |
| **3** | Understand how to use a GPU as a general processing device |
| **4** | Improved process around testing and assessing code. |
| **5** | Program the graphics processor (GPU), i.e. write shaders |
| **6** | Use software for testing and development of shaders |
| **7** | Implement a non graphics specific algorithm on a GPU |
| **8** | Improved ability to analyse a problem and find a parallel solution |
| **9** | Improved general programming ability |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to GPU Programming and CUDA C |
| **2** | CUDA Parallelism Models |
| **3** | CUDA Memory Model |
| **4** | Convolution, Constant Memory, and Constant Cache |
| **5** | Tiled Convolution Analysis |
| **6** | Reduction Tree |
| **7** | Floating Point Considerations |
| **8** | Atomic Operations and Histogramming |
| **9** | GPU as Part of the PC Architecture |
| **10** | Data Transfer and CUDA Streams |
| **11** | Performance Analysis |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **12** | Joint CUDA-MPI Programming |
| **13** | Introduction to OpenCL |
| **14** | Introduction to OpenACC |
| **15** | Project Demonstrations |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Melce Hüsünbeyi |
| **Date of Compilation:** | 26.09.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF605 | 4 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Foundations of Image Processing | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | After successful completion of this course,<br>- Students are going to have a basic knowledge of the foundations of image processing<br>- Students are going to be able to apply filtering operations on images<br>- Students are going to be able to apply image enhancement techniques<br>- Students are going to be able to detect simple objects in an image | | | | | |
| **Content** | - Spatial Filtering<br>- Image Compression<br>- Object Detection<br>- Image Segmentation | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | - | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | - Gonzales, Rafael C.; Woods, Richard E., Digital Image Processing, Fourth Edition. Pearson 2017. | | | | | |
| **Other Sources** | - | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | - | | | | | |
| **Assignments** | - | | | | | |
| **Exams** | - | | | | | |
| **Course Composition** | | | | | | |
| **Mathematics und Basic Sciences** | 20 | % | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | 20 | % |
| **Engineering Design** | 30 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 30 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 20 |
| **Quiz** | | |
| **Assignments** | 5 | 30 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 5 | 8 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | To have a basic knowledge of the foundations of image processing |
| **2** | To be able to apply filtering operations on images |
| **3** | To be able to compress a given image |
| **4** | To have a profound knowledge of wavelets |

| | |
|---|---|
| **5** | To be able to apply image enhancement techniques |
| **6** | To be able to detect simple objects in an image |
| **Weekly Content** | |
| **1** | Introduction to Image Processing |
| **2** | Image Sensing |
| **3** | Image Sampling and Quantization |
| **4** | Spatial Filtering |
| **5** | Image Enhancement |
| **6** | Image Restoration |
| **7** | Wavelets |
| **8** | Multiresolution Processing |
| **9** | Midterm Exam |
| **10** | Image Compression |
| **11** | Morphological Image Processing |
| **12** | Image Segmentation |
| **13** | Object Recognition I |
| **14** | Object Recognition II |
| **15** | Course Wrap-up |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF606 | 3 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Engineering: Selected Topics I | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı | | | | | | |
| **Date of Compilation:** | 14.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF607 | 3 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Engineering: Selected Topics II | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Digital Applications and Materials | |
|---|---|
| **Teaching platforms** | Google Meet, Google Classroom |
| **Digital Applications** | Multisim |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Weekly Content** | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | Melce Hüsünbeyi |
| **Date of Compilation:** | 26.09.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF607 | 3/4 | | | Fall/Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Engineering: Selected Topics II - Advanced Network Programming (EN) | 2 | 0 | 2 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Lecture, Individual Study, Programming | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | This course aims at teaching the students the analysis, design and implementations of computer networks which utilize the TCP/IP protocol suite | | | | | |
| **Content** | This course gives students in depth information on TCP/IP and enables them to write network applications | | | | | |
| **Prerequisites** | Preferrably: INF110, INF209 | | | | | |
| **Coordinator** | Assistant Prof. Dr. Ziya Cihan TAYŞİ | | | | | |
| **Lecturer(s)** | Assistant Prof. Dr. Ziya Cihan TAYŞİ | | | | | |
| **Assistant(s)** | BSc. Mehmet Emin Çeşitli | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Unix Network Programming Volume 1, 2, W. Richard Stevens, Prentice Hall, 1998<br>- TCP/IP Illustrated, Volume 1: The Protocols, 2nd Edition, Kevin R. Fall, W. Richard Stevens<br>- TCP/IP Illustrated, Volume 2: The Implementation, 2nd Edition, Kevin R. Fall, W. Richard Stevens |
| **Other Sources** | **-** |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Digital Applications and Materials | |
|---|---|
| **Teaching platforms** | Google Meet, Google Classroom |
| **Digital Applications** | Multisim |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Engineering** | 20 | | % |
| **Engineering Design** | 30 | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 25 |
| **Quiz** | | | |
| **Assignments** | 7 | | 35 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 40 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 26 | 26 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 8 | 8 |
| **Recitations** | | | |
| **Laboratory** | 14 | 2 | 28 |
| **Projects** | | | |
| **Final Exam** | 1 | 8 | 8 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Understanding of in-depth topics in networking and network programming |
| **2** | Ability to design and implement real life network protocols and applications |
| **3** | Ability to analyze existing protocols |

**Weekly Content**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Inter-Process Communication |
| **2** | UNIX Inter-process communication : pipes, fifos, message queues, shared memory |
| **3** | Synchronization Primitives; semaphores, mutexes, condition variables<br>Multithreading |
| **4** | Review of TCP-IP protocol suite<br>IP protocol – Network Layer |
| **5** | TCP protokol – Transport Layer |
| **6** | Sockets – Berkeley Sockets<br>Basic Sockets |
| **7** | Unicast, Multicast, Anycast, Broadcast |
| **8** | Non-blocking I/O<br>Raw sockets |
| **9** | Mid term exams |
| **10** | Application examples in C programming languages |
| **11** | |
| **12** | |
| **13** | |
| **14** | |
| **15** | |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | | 4 | | | 4 | 3 | |
| **2** | 4 | 4 | 5 | | 4 | 3 | |
| **3** | 5 | 4 | 5 | | 4 | 3 | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 14.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF608 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Engineering: Selected Topics III | 2 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | Dr. Merve Teke Budaklı | | | | | | |
| **Date of Compilation:** | 16.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF609 | 3 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Engineering: Selected Topics IV | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

## Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| IN610 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics V | 1 | 0 | 2 | 3 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | 7 | 5 | 35 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **91** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF611 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Theoretical Computer Science: Selected Topics VI | | 1 | 2 | 0 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | **X** | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | **X** | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics in technical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of system-related and / or electrical engineering skills. | | | | | |
| **Content** | The focus can be on one or more of the following topics, but is not limited to these:<br>- In-depth topics of computer networks and distributed systems<br>- Mobile communication systems<br>- Electrotechnical references in computer science<br>- Signal processing<br>- Embedded systems | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | 7 | 5 | 35 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **91** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in technical computer science |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF612 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Engineering Project I | 0 | 0 | 4 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis and system design for complex tasks. | | | | | |
| **Content** | Students must work individually or as a team on problems from the following fields:<br>- network architectures and distributed systems<br>- mobile communication<br>- signal processing<br>- VLSI design<br>- compiler construction and design<br>- robotics | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |
| **Engineering Design** | 20 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Ability to provide solutions for a complex problem |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | |
|---|---|
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF613 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Engineering Project II | 0 | 0 | 4 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis and system design for complex tasks. | | | | | |
| **Content** | Students must work individually or as a team on problems from the following fields:<br>- network architectures and distributed systems<br>- mobile communication<br>- signal processing<br>- VLSI design<br>- compiler construction and design<br>- robotics | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Ability to provide solutions for a complex problem |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |

| | |
|---|---|
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF614 | | 3 | | | Spring |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Computer Engineering Project III | | 0 | 0 | 4 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Personal Study or Team Work | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to gain experience in the areas of problem analysis and system design for complex tasks. | | | | | |
| **Content** | Students must work individually or as a team on problems from the following fields:<br>- network architectures and distributed systems<br>- mobile communication<br>- signal processing<br>- VLSI design<br>- compiler construction and design<br>- robotics | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | 20 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering Design** | 20 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 60 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | 1 | 100 |
| **Final Exam** | | |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | | | |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | 1 | 168 | 168 |
| **Final Exam** | | | |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Ability to provide solutions for a complex problem |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |

| | |
|---|---|
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 16.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF701 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Artificial Intelligence | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study, programming. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This module aims to give a broad introduction to the rapidly-developing field of artificial intelligence, and to cover the mathematical techniques used by this module and by other artificial intelligence modules in the computer science programm. | | | | | |
| **Content** | - States, actions, problem space<br>- Search (blind, informed): Latitude search, depth search, best ridge, branch-and-bound, A-star<br>- Local Search: Gradient Descent, Genetic/Evolutionary Algorithms (GA/EA)<br>- Games: Minimax, Alpha-Beta-Prunning, Heuristics<br>- Constraints: backtracking, heuristics, propagation, AC-3<br>- Feature vector, training set, training error, generalization<br>- Decision trees: CAL2, CAL3, ID3, C4.5<br>- Classification and Regression problems, Perceptron Learning Algorithm<br>- Linear regression, error function, mean square error (MSE), gradient descent<br>- Logistic regression, Backpropagation, training- and generalization errors, regularization<br>- Multilayer Perceptron (MLP), neural networks, cross-validation<br>- Support Vector Machines<br>- Naive Bayes classifier | | | | | |
| **Prerequisites** | Recommended: INF101, INF102, MAT106 (Linear Algebra), MAT204 (Probability Theory). | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | Prof. Dr. Carsten Gips<br>DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | MSc. Ayşe Betül Yüce | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - **[Russel2016]** Artificial Intelligence: A Modern Approach, S. Russel und P. Norvig, Pearson Education Limited 2016.<br>- **[Ertel2016]** Grundkurs Künstliche Intelligenz, Wolfgang Ertel, SPringer Vieweg, 2016. |
| **Other Sources** | - Machine Learning, Tom Mitchell, McGraw-Hill, 1997.<br>- Mathematics for Machine Learning, Marc Peter Deisenroth, Aldo Faisal, Cheng Soon Ong, Cambridge University Press, 2020.<br>- Machine Learning for Humans, Vishal Maini, Samer Sabri,<br>- Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurélien Géron, O'Reilly Media, 2019. |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 80 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | | |
| **Assignments** | 1 | 30 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Knowledge and understanding of the main strengths and limitations of AI. |
| **2** | Knowledge and understanding of the main techniques used in AI, their applications, possible future developments in AI. |
| **3** | Ability to evaluate the claims of AI practitioners regarding "intelligence", the validity of approaches to modeling intelligent processing, and the applicability of AI techniques in novel fields. |
| **4** | Ability to make an appropriate choice from a range of techniques when implementing intelligent systems. |
| **5** | To gain a basic understanding of applications in games, navigation, planning, smart assistants, autonomous vehicles. |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to ML (part 1), problem areas, strengths and weaknesses of ML, formalization, feature vector, vectorization, perceptron learning algorithm |
| **2** | regression problems, linear regression, error function, mean square error (MSE), gradient descent, training set (Train-Dev-Test Sets), training error, generalization, polynomial regression |
| **3** | Logistic regression, decision boundary, cross entropy loss, overfitting, regularization |
| **4** | MLP, backproppagation, cross-validation, outlook: Support Vector Machines (SVM) |
| **5** | Introduction AI (part 2), problem solving |
| **6** | Search (BS, TS, BB, A*) |
| **7** | Gradient descent, Simulated Annealing, GA/EA |
| **8** | Games: Minimax, Alpha-Beta-Prunning |
| **9** | Constraints, AC-3 |
| **10** | Decision trees (CAL2, CAL3, Pruning, ID3, C4.5) |
| **11** | Text classification with Naive Bayes |
| **12** | Backpropagation (contd. and summary), SVM vs. Logistic Regression |
| **13** | SVM as a large-margin classifier, mathematical intuition |
| **14** | Outlook and Intuition: Non-linear SVM classification, kernels |
| **15** | Summary, Exam Preparation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF702 | 4 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Knowledge Representation and Inferencing | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects;<br>- The broad principles of knowledge representation, such as the separation of representation and reasoning, the declarative nature of representations, the universal (domain independent) nature of inference mechanisms,<br>- Design, implement and apply a knowledge-based system,<br>- Understand the role of knowledge representation in the broader context of AI.<br>- Understand the limitations and complexity of reasoning algorithms applied in knowledge based systems | | | | | |
| **Content** | - The course will cover propositional and first-order logics, their object-oriented extensions (frames), temporal logic and reasoning, inheritance relations, probabilistic models for reasoning and decision making, as well as new topics related to Semantic web and knowledge-based ontologies. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - S. Russell and P. Norvig. Artificial Intelligence. 2e. Prentice Hall, 2002 |
| **Other Sources** | - Brachman and Levesque. Knowledge Representation and Reasoning. Morgan Kauffman, 2004 |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | The overview of existing representational frameworks developed within AI |
| **2** | Understand key concepts and inference methods of representational frameworks |
| **3** | Having comprehensive knowledge of propositional and first-order logics, their object-oriented extensions (frames), temporal logic and reasoning, inheritance relations |
| **4** | Understand Semantic web and knowledge-based ontologies |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **5** | Understand probabilistic models for reasoning and decision making |
| **6** | Model complex planning environments using logic-based action description languages |
| **Weekly Content** | |
| **1** | Propositional logic and inference |
| **2** | First-order logic: syntax and semantics, key theorems |
| **3** | First order logic. Efficient inferences. |
| **4** | Production systems. Frame-based representations |
| **5** | Description Logic |
| **6** | Inheritance and Defaults |
| **7** | Temporal relations |
| **8** | Ontologies and commonsense knowledge |
| **9** | Semantic Web |
| **10** | Midterm Exam |
| **11** | Modeling uncertainty |
| **12** | Bayesian belief networks |
| **13** | Probabilistic Inferences |
| **14** | Planning and decision making in the presence of uncertainty |
| **15** | Markov decision processes |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF703 | 4 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Code Theory and Cryptology | 2 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects;<br>- Basic coding theory (rate, weight, distance, distance of a code, bounds, error correcting/detecting, linear codes including parity generating matrix and check matrix and how to use the latter to find the distance)<br>- The importance of the simple concepts of Hamming distance and the minimum distance of a code in the theory of error detection and error correction<br>- How linear algebra can be used to good effect in the theory of linear codes.<br>- Cryptography from the most basic examples to modern public key systems<br>- The number-theoretic concepts used in public-key cryptosystems and to show how these are applied in practical examples | | | | | |
| **Content** | - Error correcting and error detecting codes<br>- Number Theory (Groups, Fields, Vector Spaces, Polynomials)<br>- Linear codes<br>- Historical ciphers<br>- Symmetric / Private-key crypto<br>- Asymmetric / Public-key crypto<br>- Protocols | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Hill, Raymond. A first course in coding theory. Oxford University Press, 1986.<br>- Katz, Jonathan, and Yehuda Lindell. Introduction to modern cryptography. CRC press, 2014. |
| **Other Sources** | - Trappe, Wade, and Lawrence C. Washington. "Introduction to Cryptography." (2007).<br>- Koblitz, Neal. A course in number theory and cryptography. Vol. 114. Springer Science & Business Media, 1994. |

| Additional Course Material |
|---|

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Documents** | - | |
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Learning Outcomes** | |
|---|---|
| **1** | Understand the mathematical ideas underlying the theory of error- detection and error-correction using linear codes. |
| **2** | Apply the theory of error-detecting and error-correcting codes. |
| **3** | Understand the mathematical ideas underlying the theory of cryptography. |
| **4** | Apply the theory of cryptography. |
| **5** | Explain and create proofs in coding theory and cryptography. |

| **Weekly Content** | |
|---|---|
| **1** | Noisy Channels, Encoding/Decoding, Binary Symmetric Channel, Maximum Likelihood Decoding, Error Probabilties, Repetition Codes, Hamming Weight |
| **2** | Hamming Distance, Block Codes, Alphabets, Error Correcting, Error Detecting, General Hamming Code, The Main Coding Theory Problem |
| **3** | Beginning of Abstract Algebra sub-course. Introduced Groups, Fields, Rings, Modular Arithmetic. |
| **4** | Algebra Part 2: Dihedral Groups, Permuation Groups, Subgroups, Vector Spaces, Finite Fields, Cosets |
| **5** | Algebra Part 3: Generators, Bases, Orders, Fermat's Little Theorem, Euler Fermat Theorem, Legendre's Theorem, Subspaces. |
| **6** | From Vector Spaces to Linear Codes. Building a Generator and Parity Check Matrix |
| **7** | Golay codes, dual codes, decoding linear codes. |
| **8** | Intro to crypto |
| **9** | Midterm Exam |
| **10** | Computational Security, Pseudo-Random Generators, Indistinguishability, Intro to Stream and Block Ciphers, from PRG to PKE |
| **11** | Security for multiple encrpytions, pitfalls of determinism, CPA-security, from block cipher to CPA-multiple-security |
| **12** | Introduction to discrete log problem and Diffie-Hellman key-sharing |
| **13** | Public-Key Encryption, ElGamal, good discrete log settings |
| **14** | RSA challenge and mini frequency tool |
| **15** | Pollard's p-1 and Pollard's Rho factoring techniques, Trivium and RC4/Spritz |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF704 | | | 4 | | Fall |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Principles of Algorithmic Geometry | 2 | 2 | 0 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects;<br>- design provably correct and efficient algorithms to solve basic geometric problems<br>- apply algorithmic techniques such as plane sweep, randomized incremental construction, multi-level data structures, and duality<br>use concepts such as Voronoi diagrams, Delaunay triangulations, and Arrangements | | | | | |
| **Content** | - This course include the design and analysis of geometric algorithms and data structures. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - De Berg, M., Van Kreveld, M., Overmars, M., & Schwarzkopf, O. (1997). Computational geometry. In Computational geometry (pp. 1-17). Springer, Berlin, Heidelberg. |
| **Other Sources** | - O'rourke, J. (1998). Computational geometry in C. Cambridge university press. |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Explain the basic concepts of computational geometry and standard algorithms such as plane sweeping, linear programming, Voronoi diagrams and Delaunay triangulation. |
| **2** | Explain the basic principles and theory of geometric algorithms, which may guide students to develop their own algorithms for solving geometric problems. |
| **3** | Demonstrate the ability to implement the algorithms in the course. |
| **4** | Demonstrate the ability to do mathematical derivation of the algorithms in the course. |
| **5** | - |

### Weekly Content

| | |
|---|---|
| **1** | Introduction to Computational Geometry |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **2** | Line segment Intreserction |
| **3** | Thematic Map Overlay |
| **4** | Polygon Triangulation |
| **5** | Linear Programming |
| **6** | Smallest Enclosing Disk |
| **7** | Range searching and Kd-trees |
| **8** | Range trees |
| **9** | Midterm Exam |
| **10** | Voronoi Diagrams |
| **11** | Arrangements and Duality |
| **12** | Delaunay Triangulations |
| **13** | Windowing Queries |
| **14** | Convex hulls |
| **15** | Non-orthogonal range searching |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 4 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF705 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Algorithm Engineering | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to provide students with basic algorithmic design techniques and basic algorithm knowledge, knowledge of analyzing sequential and recursive algorithms, application knowledge of basic algorithms for similar problems and knowledge of NP theory. | | | | | |
| **Content** | - Algorithm design concepts and algorithm complexity analysis knowledge, solving and proving recursive equations, formal and intuitive introduction to level and growth rate, brute force approach, divide and manage approach, dynamic programming, greedy approach, graph algorithms and NP theory. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | MSc. Nihal Zuhal Kayalı | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Neapolitan, and K. Naimipour, Foundations of Algorithms |
| **Other Sources** | - |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Adequate information on algorithm analysis; ability to analyze sequential and recursive algorithms with theoretical and experimental methods; Sufficient knowledge of the theory of NP. |
| **2** | Adequate knowledge of algorithm design techniques and algorithmic solutions of basic problems |
| **3** | Ability to use design techniques to model and solve problems; Ability to adapt basic algorithms to mixed problems. |
| **4** | An ability to use the tools necessary to design and develop algorithms. |
| **5** | Ability to analyze scientific articles. |

**Weekly Content**

| | |
|---|---|
| **1** | Theoretical Infrastructure |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **2** | Productivity, Analysis and Growth Rate |
| **3** | recursion |
| **4** | Recursion II |
| **5** | Brute Force Algorithms |
| **6** | Divide and Conquer |
| **7** | Divide and Conquer II |
| **8** | Dynamic Programming |
| **9** | Midterm |
| **10** | Dynamic Programming II |
| **11** | Greedy Approach |
| **12** | Graph Algorithms |
| **13** | Graph Algorithms |
| **14** | NP Theory |
| **15** | Review |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF706 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics I | 2 | 0 | 2 | 6 | |

| | | | | | |
|---|---|---|---|---|---|
| **Language** | German | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** |
| **Department / Program** | Computer Science | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- Algorithmic verification | | | | |
| **Prerequisites** | None | | | | |
| **Coordinator** | To be determined | | | | |
| **Lecturer(s)** | To be determined | | | | |
| **Assistant(s)** | To be determined | | | | |
| **Work Placement** | None | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

### Weekly Content

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF707 | 3 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Theoretical Computer Science: Selected Topics II | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- Algorithmic verification | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

## Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

## Weekly Content

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Dr. Merve Teke Budaklı |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF708 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics III | 2 | 2 | 0 | 6 | |

| | | | | | |
|---|---|---|---|---|---|
| **Language** | German | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** |
| **Department / Program** | Computer Science | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- Algorithmic verification | | | | |
| **Prerequisites** | None | | | | |
| **Coordinator** | To be determined | | | | |
| **Lecturer(s)** | To be determined | | | | |
| **Assistant(s)** | To be determined | | | | |
| **Work Placement** | None | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## Course Composition

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

**Weekly Content**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Cesitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF709 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Theoretical Computer Science: Selected Topics IV | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- Algorithmic verification | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

**Weekly Content**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| 1 | To be determined |
| 2 | To be determined |
| 3 | To be determined |
| 4 | To be determined |
| 5 | To be determined |
| 6 | To be determined |
| 7 | To be determined |
| 8 | To be determined |
| 9 | Mid term exams |
| 10 | To be determined |
| 11 | To be determined |
| 12 | To be determined |
| 13 | To be determined |
| 14 | To be determined |
| 15 | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| 1 | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF710 | 3 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics V | 1 | 0 | 2 | 3 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- - Algorithmic verification | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

**Course Composition**

DEPARTMENT OF COMPUTER SCIENCE
COURSE SYLLABUS

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | 7 | 5 | 35 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **91** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

**Weekly Content**

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF711 | 3 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Theoretical Computer Science: Selected Topics VI | 1 | 0 | 2 | 3 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to convey in-depth topics from theoretical computer science that go beyond basic knowledge. The skills acquired make a particular contribution to the development of formal, mathematical and algorithmic skills. | | | | | |
| **Content** | The focus can be, but is not limited to one or more of the following topics:<br>- Complex techniques of proof on problems of predictability and complexity theory<br>- Polynomial time hierarchy and P-complete problems<br>- Calculation models and design of algorithms<br>- Formal semantics of programming languages<br>- Algorithmic verification | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition |
|---|

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | 7 | 5 | 35 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **91** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in theoretical computer science |

### Weekly Content

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1** | To be determined | | | | | | |
| **2** | To be determined | | | | | | |
| **3** | To be determined | | | | | | |
| **4** | To be determined | | | | | | |
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli | | | | | | |
| **Date of Compilation:** | 17.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

## Course Information

| Course Unit Title | Computer-aided Statistics | | | |
|---|---|---|---|---|
| **Course Unit Code** | **Semester** | **Regular Cycle** | **T+A+L Hour** | **ECTS** |
| **BWL019** | **Elective** | **3 and/or 4** | **2+2+0** | **6** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Course Language** | German | | | | | |
| **Course Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Types of Education** | Face to face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives of the Course** | The aim of this course is to enable students to gain the ability to apply the knowledge acquired in statistics courses into the computer environment. | | | | | |
| **Course Content** | Basic information about R, data structures, control expressions and functions, descriptive statistics, data visualization, discrete and continuous probability distributions, parametric tests, analysis of variance, non-parametric tests, non-parametric analysis of variance, categorical data analysis, correlation analysis, regression analysis | | | | | |
| **Prerequisite** | - | | | | | |
| **Course Coordinator** | Asst. Prof. Dr. Mehmet Hakan ÖZDEMİR | | | | | |
| **Name of Lecturers** | - | | | | | |
| **Course Assistants** | - | | | | | |
| **Work Placement(s)** | - | | | | | |

## Recommended or Required Reading

| | |
|---|---|
| **Text Book(s) / Lecture Notes** | Demir, İ., R ile Uygulamalı İstatistik, 2017, Papatya Yayıncılık Eğitim<br>Arslan, İ., R ile İstatistiksel Programlama, 2017, Pusula Yayıncılık<br>Hellbrück, R., Angewandte Statistik mit R - Eine Einführung für Ökonomen und Sozialwissenschaftler, 2009, Gabler |
| **Other Sources** | - |

## Material Sharing

| | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

## Course Composition

| | |
|---|---|
| **Mathematics and Basic Sciences** | 50% |
| **Engineering** | - |
| **Engineering Design** | - |
| **Social Sciences** | 20% |
| **Educational Sciences** | - |
| **Science** | - |
| **Health Sciences** | - |
| **Field Knowledge** | 30% |

## Assessment Criteria

| Semester Works | Quantity | Percentage % |
|---|---|---|
| **Midterm Exam** | 1 | 40% |
| **Quiz** | - | - |
| **Assignment** | - | - |
| **Attendance** | - | - |
| **Application** | - | - |
| **Project** | - | - |
| **Final examination** | 1 | 60% |
| **Total** | 2 | 100% |

DEPARTMENT OF COMPUTER SCIENCE
COURSE SYLLABUS

## ECTS Points and Workload

| Activities | Quantity | Duration (Hour) | Total Work Load (Hour) |
|---|---|---|---|
| **Course Duration** | 14 | 2 | 28 |
| **Self-Study Hours** | 14 | 2 | 28 |
| **Assignment** | - | - | - |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm exams** | 1 | 40 | 40 |
| **Application** | 14 | 2 | 28 |
| **Laboratory** | - | - | - |
| **Project** | - | - | - |
| **Final examination** | 1 | 56 | 56 |
| **Total Work Load(Hour)** | 180 | | |
| **Total Work Load(Hour)/ 30 (h)** | 6 | | |
| **ECTS Credit of the Course** | 6 | | |

## Learning Outcomes of the Course

| No. | Learning Outcomes |
|---|---|
| **1** | Students can use R program. |
| **2** | Students can visualize data in computer environment. |
| **3** | Students can perform parametric and nonparametric tests in computer environment. |
| **4** | Students can make analysis of variance in computer environment. |
| **5** | Students can make regression and correlation analysis in computer environment. |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

## Weekly Content

| Week | Topic | Preparation | Documents |
|---|---|---|---|
| **1** | Introduction and basic information about R | - | - |
| **2** | Data structures | - | - |
| **3** | Control expressions and functions | - | - |
| **4** | Descriptive statistics | - | - |
| **5** | Data visualization | - | - |
| **6** | Discrete probability distributions | - | - |
| **7** | Continuous probability distributions | - | - |
| **8** | Parametric tests | - | - |
| **9** | Midterm Exam | - | - |
| **10** | Analysis of variance | - | - |
| **11** | Non-parametric tests | - | - |
| **12** | Non-parametric analysis of variance | - | - |
| **13** | Categorical data analysis | - | - |
| **14** | Correlation analysis | - | - |
| **15** | Regression analysis | - | - |

| Contribution of Learning Outcomes to Program Objectives (1-5) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** | **P8** | **P9** | **P10** | **P11** |
| **ALL** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **L1** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **L2** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **L3** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **L4** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **L5** | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 4 | 5 |
| **Contribution Level: 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High** | | | | | | | | | | | |

| **Prepared by:** | **BSc. Mehmet Emin Çeşitli** |
|---|---|
| **Date of Issue:** | 02.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF713 | 4 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Differential Equations and Numerics | 2 | 1 | 1 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This course focuses on linear differential equations and their applications in science and engineering. . | | | | | |
| **Content** | • Solution of First-order ODE's by Analytical, Graphical and Numerical Methods;<br>• Linear ODE's, Especially Second Order with Constant Coefficients;<br>• Undetermined Coefficients and Variation of Parameters;<br>• Sinusoidal and Exponential Signals: Oscillations, Damping, Resonance;<br>• Complex Numbers and Exponentials;<br>• Fourier Series, Periodic Solutions;<br>• Delta Functions, Convolution, and Laplace Transform Methods;<br>• Matrix and First-order Linear Systems: Eigenvalues and Eigenvectors; and<br>• Non-linear Autonomous Systems: Critical Point Analysis and Phase Plane Diagrams. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic** | 20 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Sciences** | | |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

### Weekly Content

| | |
|---|---|
| **1** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **2** | To be determined | | | | | | |
| **3** | To be determined | | | | | | |
| **4** | To be determined | | | | | | |
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli | | | | | | |
| **Date of Compilation:** | 17.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF714 | 4 | | | Autumn | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Advanced Topics in Mathematics for Computer Scientists | 2 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Help students to gain a good understanding of the mathematical framework underlying mainstream machine-learning methods. | | | | | |
| **Content** | In the first half-semester, we outline matrix decomposition methods, vector calculus, probabilistic distributions, and functional optimisation. In the second half, we employ these mathematical tools in central problems of machine learning, namely, linear regression, dimensionality reduction, density estimation, and SVM classification. | | | | | |
| **Prerequisites** | MAT103, MAT106, MAT204 | | | | | |
| **Coordinator** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Lecturer(s)** | Assoc. Prof. Dr. Emre Işık | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - Deisenroth, M.P., Faisal, A.A., Ong, C.S. 2020, Mathematics for Machine Learning, Cambridge University Press |
| **Other Sources** | - Nield, T., 2022 (Early Release) Essential Math for Data Science, O'Reilly Media |

| **Additional Course Material** | |
|---|---|
| **Documents** | - Companion web page for the book Mathematics for Machine Learning https://mml-book.github.io/ |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 60 | % |
| **Engineering** | - | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 40 | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | 14 | 30 |
| **Projects** | - | - |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

### Learning Outcomes

| | |
|---|---|
| **1** | Awareness of the algebraic and geometric concepts that are used in developing ML algorithms |
| **2** | Understanding of matrix decompositions and their role in machine learning |
| **3** | Gaining insight about the role of vector calculus in several machine learning methods |
| **4** | Deepening the understanding of probability distributions |
| **5** | Understanding convex optimisation problems, linear and quadratic programs |

| | |
|---|---|
| **6** | Ability to apply the mathematical tools in regression, inference, dimensionality reduction, density estimation, and classification problems |
| **7** | Ability to code parts of some machine learning algorithms from scratch |
| **Weekly Content** | |
| **1** | Overview of linear algebra and analytic geometry |
| **2** | Matrix decompositions I |
| **3** | Matrix decompositions II |
| **4** | Vector calculus I |
| **5** | Vector calculus II |
| **6** | Probability and distributions |
| **7** | Probability and distributions / Continuous optimisation |
| **8** | Continuous optimisation |
| **9** | Mid-term exams |
| **10** | Empirical risk minimisation and parameter inference |
| **11** | Linear regression |
| **12** | Linear regression / Dimensionality reduction with PCA |
| **13** | Dimensionality reduction with PCA |
| **14** | Density estimation with Gaussian mixtures |
| **15** | Classification with support vector machines |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF715 | | 4 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Algorithmics and Complexity Theory | | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects<br>- The modern theory of algorithms, focusing on computational efficiency; We will cover algorithms for several specific problems as well as general algorithm design paradigms.<br>- How to reason precisely about computation and prove mathematical theorems about its capabilities and limitations.<br>- Models of computation; We will focus on universal models (Turing machines) that capture our intuitive notion of computation and allow us to reason about the capabilities of computers in a technology-independent manner.<br>- The intrinsic limits of computation; Computational problems that cannot be solved by any algorithm whatsoever (undecidability), and problems that are solvable but require inordinate computational resources (computational complexity). | | | | | |
| **Content** | - Principles of algorithm design: Decomposition, greedy algorithms, dynamic programming. Algorithm analysis. Probabilistic algorithms. Approximation. Selected applications to sets, graphs, arithmetic, and geometry.<br>- Computability and complexity: Reductions. Complexity classes P (polynomial time), NP (non-deterministic polynomial time), and PSPACE (polynomial space). NP-complete problems. Undecidable problems. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). *Introduction to algorithms*. MIT press. |
| **Other Sources** | - Kleinberg, J., & Tardos, E. (2006). *Algorithm design*. Pearson Education India.<br>- Sipser, M. (1996). Introduction to the Theory of Computation. *ACM Sigact News*, *27*(1), 27-29.<br>- Moore, C., & Mertens, S. (2011). *The nature of computation*. OUP Oxford. |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | - | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | 1 | 10 |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | The fundamental skills needed to develop algorithms using data structures and analyze their correctness and efficiency |
| **2** | An introduction to complexity theory |
| **3** | Explain how one can handle problems with high complexity |
| **4** | Design programs that use computer resources efficiently |
| **5** | Investigate which problems can besolved in reasonable time with the help of computer |
| **6** | Realize that there are problems that are impractical or even impossible to solve by a computer |

| **Weekly Content** | |
|---|---|
| **1** | Introduction to Graph Algortihms |
| **2** | Algorithm Analysis |
| **3** | Greedy Algorithms, Divide and Conquer Algorithms |
| **4** | Dynamic Programming |
| **5** | Network Flow and Applications |
| **6** | Complexity and NP-problems |
| **7** | NP-completeness |
| **8** | Undecidability and its relation to Godel's Incompletenss Theorem |
| **9** | Midterm Exam |
| **10** | Random-Access models of Computation (RAMs) |
| **11** | Turing machines and the Church-Turing thesis |
| **12** | PSPACE-complete problems |
| **13** | Approximation Algorithms and Hardness of Approximation |
| **14** | Randomized algorithms (e.g. hashing, Markov chains) and complexity (RP, BPP) |
| **15** | Data structures and lower bounds |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | - | - | 3 | 1 |
| **2** | 5 | 5 | 4 | - | - | 3 | 1 |
| **3** | 5 | 5 | 4 | - | - | 3 | 1 |
| **4** | 5 | 5 | 4 | - | - | 3 | 1 |
| **5** | 5 | 5 | 3 | - | - | 3 | 1 |
| **6** | 5 | 5 | 3 | - | - | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF716 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Programming Paradigms | | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | · To introduce the basic constructs that underlie all programming languages<br>· To introduce the basics of programming language design and implementation<br>· To introduce the organizational framework for learning new programming languages. | | | | | |
| **Content** | Names, Scopes, and Bindings - Binding Time, Scope Rules, Storage Management, Overloading, Polymorphism; Control Flow - Expression Evaluation, Structured and Unstructured Flow, Nondeterminacy; Data Types - Type Systems, Type Checking, Equality Testing and Assignment; Subroutines and Control Abstraction - Static and Dynamic Links, Calling Sequences, Parameter Passing, Exception Handling, Co-routines; Functional and Logic Languages; Data Abstraction and Object Orientation - Encapsulation, Inheritance, Dynamic Method Binding; Innovative features of Scripting Languages; Concurrency - Threads, Synchronization, Language-Level Mechanisms; Run-time program Management. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Öğr. Üyesi Canan Yıldız | | | | | |
| **Lecturer(s)** | Dr. Öğr. Üyesi Canan Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Scott M L, Programming Language Pragmatics, 3rd Edn., Morgan Kaufmann Publishers, 2009. |
| **Other Sources** | - David A Watt, Programming Language Design Concepts, Wiley Dreamtech, 2004<br>- Ghezzi C and M. Jazayeri, Programming Language Concepts, 3rd Edn, Wiley.1997 |

| Additional Course Material |
|---|

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Documents** | - | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 10 | | % |
| **Engineering** | 20 | | % |
| **Engineering Design** | 20 | | % |
| **Social Sciences** | - | | % |
| **Educational Sciences** | - | | % |
| **Natural Sciences** | - | | % |
| **Health Sciences** | - | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | - | | - |
| **Assignments** | 1 | | 10 |
| **Attendance** | - | | - |
| **Recitations** | - | | - |
| **Projects** | - | | - |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Compare scope and binding of names in different programming languages |
| **2** | Analyze control flow structures in different programming languages |
| **3** | Appraise data types in different programming languages |
| **4** | Analyze different control abstraction mechanisms |
| **5** | Appraise constructs in functional, logic and scripting languages |
| **6** | Analyze object oriented constructs in different programming languages |
| **7** | Compare different concurrency constructs |
| **8** | Interpret the concepts of run- time program management |

| **Weekly Content** | |
|---|---|
| **1** | Names, Scopes and Bindings:- Names and Scopes, Binding Time |
| **2** | Scope Rules, Storage Management, Binding of Referencing Environments |
| **3** | Control Flow: - Expression Evaluation, Structured and Unstructured Flow |
| **4** | Sequencing, Selection, Iteration, Recursion, Non-determinacy |
| **5** | Data Types:-Type Systems, Type Checking, Records and Variants |
| **6** | Arrays, Strings, Sets, Pointers and Recursive Types, Lists |
| **7** | Files and Input/Output, Equality Testing and Assignment |
| **8** | Subroutines and Control Abstraction: - Static and Dynamic Links, Calling Sequences |
| **9** | Parameter Passing, Generic Subroutines and Modules, Exception Handling, Co-routines |
| **10** | Functional and Logic Languages:- Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation |
| **11** | Streams and Monads, Higher-Order Functions |
| **12** | Logic Programming in Prolog, Limitations of Logic Programming |
| **13** | Data Abstraction and Object Orientation:-Encapsulation, Inheritance, Constructors and Destructors, Aliasing, Overloading, Polymorphism, Dynamic Method Binding, Multiple Inheritance |
| **14** | Innovative features of Scripting Languages:-Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation |
| **15** | Concurrency:- Threads, Synchronization. Run-time program Management:- Virtual Machines, Late Binding of Machine Code |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | - | - | 3 | 1 |
| **2** | 5 | 5 | 4 | - | - | 3 | 1 |
| **3** | 5 | 5 | 4 | - | - | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **4** | 5 | 5 | 4 | - | - | 3 | 1 |
| **5** | 5 | 5 | 3 | - | - | 3 | 1 |
| **6** | 5 | 5 | 3 | - | - | 3 | 1 |
| **7** | 5 | 5 | 3 | - | - | 3 | 1 |
| **8** | 5 | 5 | 3 | - | - | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF801 | 4 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Business Informatics: Selected Topics I | 2 | 0 | 2 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The goal of the course is to provide students with basic knowledge of business information systems and selected current topics. | | | | | |
| **Content** | Business informatics deals with the design of computer-aided information systems in business. It is an interdisciplinary subject based on business administration and computer science.<br>In this course, the fundamentals of business informatics are first taught and then selected current topics are dealt with.<br>In particular, the following topics will be discussed during the course:<br><br>1) Corporate strategy and information management<br>2) IT Governance<br>3) Management of data and information quality<br>4) IT service management<br>5) Business process management<br>6) Outsourcing of information technology<br>7) Specific application areas and challenges:<br>a.Enterprise Resource Planning (ERP)<br>b.Customer Relationship Management (CRM)<br>c.Supply Chain Management (SCM)<br>d.Knowledge Management (KM)<br>e.Business Intelligence (BI)<br>f.Self Service Analytics (SSA) | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | Prof. Dr. Adem Alparslan | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | The students each work separately on a scientific essay (seminar paper) of 1,000 words on one of the topics listed under 1) to 7) a. to 7) f.. Working as a group is not possible. In addition, students will deliver their written Scientific Essay as a presentation during lecture hours throughout the semester.<br><br>Students will be allowed to work on their own topics as well. However, these topics must be directly related to Information Systems and must be coordinated with the instructor.<br><br>The overall grade is composed of the grade for the presentation and the grade for the Scientific Essay.<br><br>The requirements for the preparation of the Scientific Essay and for the presentation will be announced in the first lecture. Likewise, the schedule will be presented in the first lecture.<br><br>Translated with www.DeepL.com/Translator (free version) |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |

| | | | |
|---|---|---|---|
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |

http://bm.tau.edu.tr/learning-objectives-of-the-program

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | |
|---|---|
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

TÜRK-ALMAN ÜNİVERSİTESİ
TÜRKISCH-DEUTSCHE UNIVERSITÄT

MÜHENDİSLİK FAKÜLTESİ
FAKULTÄT FÜR INGENIEURWISSENSCHAFTEN

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF802 | 1 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Business Informatics: Selected Topics II | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Face to face | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | On successful completion of this course, students will have in-depth insight into basic economic concepts (opportunity costs, allocations, allocation mechanisms, money and relative prices, Pareto efficiency, notions of competition, etc.), the role of markets and price signals for the decentralization of allocations, rational choice theory (preferences, rationality, representation theorem, optimization), economic modelling by means of the Ricardo model and the market model, welfare analysis in partial equilibrium model (Marshallian surplus and deadweight loss), taxes and externalities, national accounting and balance of payment; price indices and inflation;interest rates, money, banks and financial market. | | | | | |
| **Content** | Terms and definition, Ricardo model (specialization according to comparative advantages), preference orders and rationality (decision theory), market model (partial analysis), welfare analysis in the partial model, national accounts and balance of payments. | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Dr. Zehra Çankaya Bayraklı | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | Mankiw, N. G. und Taylor, M. P. (2018): Grundzüge der Volkswirtschaftslehre, Schäffer-Poeschel, 7. Aufl.; ausführliches lecture notes. |
| **Other Sources** | - |
| **Additional Course Material** | |
| **Documents** | Lecture notes |
| **Assignments** | In form of two mock exams and excercises that are integrated into the lecture |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 30 | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Engineering** | - | % |
| **Engineering Design** | - | % |
| **Social Sciences** | 70 | % |
| **Educational Sciences** | - | % |
| **Natural Sciences** | - | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | - | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | - | - | - |
| **Assignments** | 2 | 22 | 44 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 30 | 30 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 50 | 50 |
| | | **Total Work Load** | **180** |
| | | **ECTS Points** (Total Work Load / Hour) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Basic economic concepts (opportunity costs, allocations, allocation mechanisms, money and relative prices, Pareto efficiency, notions of competition, etc. |
| **2** | Role of markets and price signals for the decentralization of allocations |
| **3** | Rational choice theory (preferences, rationality, representation theorem, optimization) |
| **4** | Economic modelling by means of the Ricardo model and the market model. Welfare analysis in partial equilibrium model (Marshallian surplus and deadweight loss), taxes and externalities |

| | |
|---|---|
| **5** | National accounting and balance of payment; price indices and inflation; interest rates, money, banks and financial markets |
| **Weekly Content** | |
| **1** | Introduction, concepts and definitions |
| **2** | Principles of Economics |
| **3** | Ricardo model 1: assumptions, concepts, numerical example |
| **4** | Ricardo model 2: propositions, welfare analysis |
| **5** | Choice theory 1: preferences, rationality, representation theorem |
| **6** | Choice theory 2: utility functions, indifference maps, optimization (graphical solution) |
| **7** | Theory of the firm: production and cost functions, economies of scale, diminishing returns, individual supply |
| **8** | Market model: existence, uniqueness, stability |
| **9** | Midterm Exam |
| **10** | Market model: welfare analysis, Marschallian surplus, taxes, externalities |
| **11** | National accounting and price indices, interest rates |
| **12** | National accounting and price indices, interest rates |
| **13** | Money, banks and financial markets |
| **14** | Balance of payments |
| **15** | Balance of payments |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 5 | 4 | 2 | 1 | 1 | 1 |
| **2** | 2 | 2 | 2 | 3 | 5 | 4 | 2 | 1 | 1 | 1 |
| **3** | 3 | 2 | 2 | 3 | 5 | 4 | 2 | 1 | 1 | 1 |
| **4** | 4 | 2 | 2 | 3 | 5 | 4 | 2 | 1 | 3 | 1 |
| **5** | 5 | 3 | 2 | 3 | 5 | 4 | 2 | 1 | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=202 | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF803 | 4 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Business Informatics: Selected Topics III | 2 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide students with the basic knowledge of business informatics. | | | | | |
| **Content** | After examining the development of business informatics and its relationship with other disciplines, the basics of business informatics are transferred to the students and an introduction is made about the relationship of business informatics with other fields. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Natural Sciences** | 10 | | % |
| **Health Sciences** | - | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | - | | - |
| **Assignments** | - | | - |
| **Attendance** | - | | - |
| **Recitations** | - | | - |
| **Projects** | - | | - |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| | |
|---|---|
| **Learning Outcomes** | |
| **1** | Understanding of in-depth topics in applied computer science |
| **Weekly Content** | |
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF804 | 4 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Business Informatics: Selected Topics IV | 2 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide students with the basic knowledge of business informatics. | | | | | |
| **Content** | After examining the development of business informatics and its relationship with other disciplines, the basics of business informatics are transferred to the students and an introduction is made about the relationship of business informatics with other fields. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |

| | | | |
|---|---|---|---|
| **Natural Sciences** | 10 | | % |
| **Health Sciences** | - | | % |
| **Expert Knowledge** | 50 | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | - | | - |
| **Assignments** | - | | - |
| **Attendance** | - | | - |
| **Recitations** | - | | - |
| **Projects** | - | | - |
| **Final Exam** | 1 | | 60 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 55 | 55 |
| **Assignments** | 7 | 10 | 70 |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **155** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |
| **Weekly Content** | |
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli | | | | | | |
| **Date of Compilation:** | 17.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF805 | 4 | | | Spring |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Business Informatics: Selected Topics V | 1 | 0 | 2 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide students with the basic knowledge of business informatics. | | | | | |
| **Content** | After examining the development of business informatics and its relationship with other disciplines, the basics of business informatics are transferred to the students and an introduction is made about the relationship of business informatics with other fields. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |
| **Educational Sciences** | - | % |

| | | |
|---|---|---|
| **Natural Sciences** | 10 | % |
| **Health Sciences** | - | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 4 | 7 | 28 |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **112** |
| | | **ECTS Points** (Total Work Load / 28) | **4** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | - | - | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | | | | | | | |
| **Compiled by:** | BSc. Mehmet Emin Çeşitli | | | | | | |
| **Date of Compilation:** | 17.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF806 | 4 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Business Informatics: Selected Topics VI | 1 | 2 | 0 | 4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide students with the basic knowledge of business informatics. | | | | | |
| **Content** | After examining the development of business informatics and its relationship with other disciplines, the basics of business informatics are transferred to the students and an introduction is made about the relationship of business informatics with other fields. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 20 | % |
| **Engineering** | 20 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | |
|---|---|---|
| **Natural Sciences** | 10 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 4 | 7 | 28 |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **112** |
| | | **ECTS Points** (Total Work Load / 28) | **4** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of in-depth topics in applied computer science |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | **Semester** |
| INF901 | | | | 4 | Spring |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Soft Skills I | 1 | 0 | 0 | | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture, Personal Study | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to provide students with soft skills and emphasize their significance across industries. | | | | | |
| **Content** | - Critical thinking<br>- Creative Problem Solving<br>- Communication<br>- Collaboration | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 30 | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Educational Sciences** | 30 | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 40 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 7 | 1 | 7 |
| **Self-Study** | 1 | 40 | 40 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 5 | 5 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 5 | 5 |
| | | **Total Work Load** | **57** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Students work as part of a team allow them to practice collaboration, listening, and leadership. |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | To be determined | | | | | | |
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF902 | | - | | | - |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Soft Skills II | | 2 | 0 | 0 | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **84** |
| | | **ECTS Points** (Total Work Load / 28) | **3** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF903 | | - | | | - |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Soft Skills III | | 2 | 0 | 0 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 4 | 7 | 28 |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **112** |
| | | **ECTS Points** (Total Work Load / 28) | **4** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| INF904 | - | | | - | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Soft Skills IV | 2 | 1 | 0 | 5 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

DEPARTMENT OF COMPUTER SCIENCE
COURSE SYLLABUS

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 7 | 56 |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **140** |
| | | **ECTS Points** (Total Work Load / 28) | **5** |

## Learning Outcomes

| | |
|---|---|
| **1** | Understanding of soft skills topics |

## Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF905 | | | - | | - |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Soft Skills V | 2 | 2 | 0 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 7 | 56 |
| **Presentation / Seminar Preparation** | 9 | 6 | 54 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF906 | | - | | | - |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Soft Skills VI | | 1 | 0 | 0 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

| **ECTS Points and Work Load** | | | |
|---|---|---|---|
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

| **Learning Outcomes** | |
|---|---|
| **1** | Understanding of soft skills topics |

| **Weekly Content** | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF907 | | | - | | - |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Soft Skills VII | 2 | 0 | 0 | | 3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | **Semester** |
| INF908 | | | | - | - |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Soft Skills VIII | 2 | 0 | 0 | 4 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| **Additional Course Material** | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| INF909 | | - | | | - |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Soft Skills IX | | 2 | 1 | 0 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | **Semester** |
| INF910 | | | - | | - |
| **Title** | **T** | **A** | **L** | | **ECTS** |
| Soft Skills X | 2 | 2 | 0 | | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | |
|---|---|
| **6** | To be determined |
| **7** | To be determined |
| **8** | To be determined |
| **9** | Mid term exams |
| **10** | To be determined |
| **11** | To be determined |
| **12** | To be determined |
| **13** | To be determined |
| **14** | To be determined |
| **15** | To be determined |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 4 | 5 | 5 | | | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | |
| **Compiled by:** | R.A. Halit Canap Demir |
| **Date of Compilation:** | 31.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| INF911 | - | | | - |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Computer Science Seminar I | 2 | 0 | 0 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | To be determined | | | | | |
| **Content** | - To be determined | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | To be determined | | | | | |
| **Lecturer(s)** | To be determined | | | | | |
| **Assistant(s)** | To be determined | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding of soft skills topics |

**Weekly Content**

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Code** | | | | | **Academic Year** | | **Semester** |
| INF912 | | | | | - | | - |
| **Title** | | | | | **T** | **A** | **L** | **ECTS** |
| Computer Science Seminar II | | | | | 2 | 0 | 0 | 4 |
| **Language** | German | | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | | |
| **Department / Program** | Computer Science | | | | | | |
| **Forms of Teaching and Learning** | Lecture | | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | | |
| **Objectives** | To be determined | | | | | | |
| **Content** | - To be determined | | | | | | |
| **Prerequisites** | None | | | | | | |
| **Coordinator** | To be determined | | | | | | |
| **Lecturer(s)** | To be determined | | | | | | |
| **Assistant(s)** | To be determined | | | | | | |
| **Work Placement** | None | | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - To be determined |
| **Other Sources** | - To be determined |

| Additional Course Material | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | | | |
| **Assignments** | 8 | 2 | 16 |
| **Presentation / Seminar Preparation** | 2 | 5 | 10 |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Understanding of soft skills topics |

## Weekly Content

| | |
|---|---|
| **1** | To be determined |
| **2** | To be determined |
| **3** | To be determined |
| **4** | To be determined |
| **5** | To be determined |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | To be determined | | | | | | |
| **7** | To be determined | | | | | | |
| **8** | To be determined | | | | | | |
| **9** | Mid term exams | | | | | | |
| **10** | To be determined | | | | | | |
| **11** | To be determined | | | | | | |
| **12** | To be determined | | | | | | |
| **13** | To be determined | | | | | | |
| **14** | To be determined | | | | | | |
| **15** | To be determined | | | | | | |
| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 4 | 5 | 5 | | | 1 | 1 |
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High | | | | | | |
| **http://bm.tau.edu.tr/learning-objectives-of-the-program** | | | | | | | |
| **Compiled by:** | R.A. Halit Canap Demir | | | | | | |
| **Date of Compilation:** | 31.05.2022 | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| **Course Details** | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| AIT001 | 2 | | | 3 | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Atatürk's Principles and History of Revolution I | 2 | - | - | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | Turkish | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Formal Education | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This seminar aims to teach the establishment of the Republic of Turkey and Mustafa Kemal Atatürk's modernization reforms after the collapse of the Ottoman Empire | | | | | |
| **Content** | This seminar begins with the state of the Ottoman Empire after the First World War and continues with the War of Independence and the establishment of the Republic of Turkey. It particularly concentrates on the reasons and outcomes of Atatürk's modernization reforms and their social, cultural and political impacts on contemporary Turkey | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Lecturer Gül Ayşe AKAR | | | | | |
| **Lecturer(s)** | Dr. Güneş ÇAP, Dr. Ömer Emrullah EGELİĞİ | | | | | |
| **Assistant(s)** | Res. Assist. Başak Berkün, Res. Assist. Ceren Hilal Günaydın | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | None | | | | | |
| **Other Sources** | Eric Jan Zürcher, "Modernleşen Türkiye'nin Tarihi", İletişim yayınları, 2012.<br>Bülent Tanör, "Kuruluş- Kurtuluş", Cumhuriyet Kitapları, 2010.<br>Feroz Ahmad, "Modern Türkiye'nin Oluşumu", Kaynak Yayınları, 1999.<br>İlber Ortaylı, "Cumhuriyet'in ilk Yüzyılı (1923-2023), Timaş Yayınları | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | None | | | | | |
| **Assignments** | None | | | | | |
| **Exams** | None | | | | | |
| **Course Composition** | | | | | | |
| **Mathematics und Basic Sciences** | | % | | | | |
| **Engineering** | | % | | | | |
| **Engineering Design** | | % | | | | |

DEPARTMENT OF COMPUTER SCIENCE
COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | %40 |
| **Quiz** | | % |
| **Assignments** | | % |
| **Attendance** | | % |
| **Recitations** | | % |
| **Projects** | | % |
| **Final Exam** | 1 | %60 |
| | **Total** | 100 |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 14 | 2 | 28 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 2 | 2 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 2 | 2 |
| | | **Total Work Load** | 60 |
| | | **ECTS Points** (Total Work Load / 30) | 2 |

**Learning Outcomes**

| | |
|---|---|
| 1 | Students will have information about the emergence and function of the concepts of revolution, reform, power-state. |
| 2 | Students examine the reasons for the collapse of the Ottoman Empire and understand and compare the results of the interaction between the positions of the other states in the world balance. |
| 3 | Students will have general information about World War I and its effects on world politics. |
| 4 | Students will have information about the circumstances of foundation of the Republic of Turkey. |
| 5 | |

**Weekly Content**

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **1** | Introduction to the Course and Basic Concepts (Revolution, Reform) |
| **2** | Overview of Medieval Europe and the Ottoman Empire |
| **3** | Ottoman Reform Works since the Tulip Era |
| **4** | First Constitution and Constitutional Monarchy Period |
| **5** | World Politics and the Ottoman Empire at the Beginning of the 20th Century |
| **6** | The World During the First World War (1914-1918) |
| **7** | First World War and Ottoman Empire |
| **8** | The End of the First World War: The Wilson Principles and the Armenian Question |
| **9** | Midterm Exam |
| **10** | Mudros Armistice Agreement and Its Reflections to Anatolia |
| **11** | Ottoman after the Sevres Agreement, Resistance Movements and Organization Process: Circulars, Congresses |
| **12** | National Pact and National Independence |
| **13** | Opening of Parliament in Ankara |
| **14** | Independence War and Armed Struggle Period |
| **15** | Lausanne Treaty and Controversial Issues |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **2** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **3** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **4** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208** | |
| **Compiled by:** | Res. Assist. Ceren Hilal Günaydın |
| **Date of Compilation:** | 23.05.2022 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| **Course Details** | | | | | | |
|---|---|---|---|---|---|---|
| **Code** | | | **Academic Year** | | | **Semester** |
| AIT002 | | | 2 | | | 4 |
| **Title** | | | **T** | **A** | **L** | **ECTS** |
| Atatürk's Principles and History of Revolution I | | | 2 | - | - | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | Turkish | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Formal Education | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This seminar aims to teach the establishment of the Republic of Turkey and Mustafa Kemal Atatürk's modernization reforms after the collapse of the Ottoman Empire | | | | | |
| **Content** | This seminar begins with the state of the Ottoman Empire after the First World War and continues with the War of Independence and the establishment of the Republic of Turkey. It particularly concentrates on the reasons and outcomes of Atatürk's modernization reforms and their social, cultural and political impacts on contemporary Turkey | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Lecturer Gül Ayşe AKAR | | | | | |
| **Lecturer(s)** | Dr. Güneş ÇAP, Dr. Ömer Emrullah EGELİĞİ | | | | | |
| **Assistant(s)** | Res. Assist. Başak BERKÜN, Res. Assist. Ceren Hilal Günaydın | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | None | | | | | |
| **Other Sources** | Eric Jan Zürcher, "Modernleşen Türkiye'nin Tarihi", İletişim yayınları, 2012.<br>Bülent Tanör, "Kuruluş- Kurtuluş", Cumhuriyet Kitapları, 2010.<br>Feroz Ahmad, "Modern Türkiye'nin Oluşumu", Kaynak Yayınları, 1999.<br>İlber Ortaylı, "Cumhuriyet'in ilk Yüzyılı (1923-2023), Timaş Yayınları | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | None | | | | | |
| **Assignments** | None | | | | | |
| **Exams** | None | | | | | |
| **Course Composition** | | | | | | |
| **Mathematics und Basic Sciences** | | % | | | | |
| **Engineering** | | % | | | | |
| **Engineering Design** | | % | | | | |

DEPARTMENT OF COMPUTER SCIENCE
COURSE SYLLABUS

| | | |
|---|---|---|
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | **1** | **%40** |
| **Quiz** | | **%** |
| **Assignments** | | **%** |
| **Attendance** | | **%** |
| **Recitations** | | **%** |
| **Projects** | | **%** |
| **Final Exam** | **1** | **%60** |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | **14** | **2** | **28** |
| **Self-Study** | **14** | **2** | **28** |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | **1** | **2** | **2** |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | **1** | **2** | **2** |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / 30) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Students have knowledge of the Republic and the Revolution. |
| **2** | Students have knowledge of the founding conditions and the historical and philosophical foundations of the Republic of Turkey. |
| **3** | Students have general knowledge of the effects of World War II on world politics. |
| **4** | Students study the impact of constitutions on society and compare the 1961 and 1982 constitutions. |
| **5** | |

**Weekly Content**

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | |
|---|---|
| **1** | Introduction and basic terms |
| **2** | Treaty of Lausanne and the abolition of the Ottoman sultan |
| **3** | The concepts of constitutionalism and the republic |
| **4** | 1924 Constitution and Revolutions |
| **5** | New Democracy Experiences and Reactions (Progressive Republican Party) |
| **6** | New state, new law, new culture |
| **7** | New Democracy Experiment (Free Republican Party) and Foreign Policy |
| **8** | Treaty of Montreux and Hatay problem |
| **9** | Midterm Exam |
| **10** | World War II and Turkey |
| **11** | Transition to multiparty system in Turkey |
| **12** | The Democratic Party years and the Cyprus problem |
| **13** | 1960 military coup and ve Turkey between 1960-1980 |
| **14** | 1980 memorandum and 1982 constitution |
| **15** | Overview of the recent history of Turkey |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **2** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **3** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| **4** | 1 | 1 | 1 | 1 | 1 | 2 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208** | |
| **Compiled by:** | Res. Assist. Ceren Hilal Günaydın |
| **Date of Compilation:** | 23.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE INFORMATION

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| DEU121 | | 1 | | | Fall |
| **Title** | | **VL** | **UE** | **LU** | **ECTS** |
| Technical German I | | 2 | 0 | 0 | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Bachelor** | ✓ | **Master** | | **Doktor** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Formal | | | | | |
| **Course Type** | **Compulsory** | ✓ | **Elective** | | | |
| **Objectives** | To make students understand technical and current terms related to Computer Science | | | | | |
| **Content** | Practices to expand technical vocabulary with practical and up-to-date examples; Understanding technical contents related to Computer Science and expressing text contents verbally and in written form. | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | | | | | | |
| **Lecturer(s)** | The Lecturer assigned by The School of Foreign Languages | | | | | |
| **Asisstant(s)** | | | | | | |
| **Work Placement** | | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Related German resources<br>Book: Technical German for education and business. Several learning books<br>Several books in material science and know-how from internet |
| **Other Sources** | Current scientific articles and presentations in German |

| Additional Course Materials | |
|---|---|
| **Documents** | - |
| **Assignments** | - |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics and Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE INFORMATION

| | | |
|---|---|---|
| **Educational Sciences** | 100 | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

### Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

### ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 1 | 14 |
| **Self-Study** | 1 | 33 | 33 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **53** |
| | | **ECTS Points (Total Work Load / Hour)** | **2** |

### Learning Outcomes

| | |
|---|---|
| **1** | Learning how to make presentation and reporting |
| **2** | Fundamentals of engineering |

### Weekly Content

| | |
|---|---|
| **1** | Introduction to the course and description of the course outline |
| **2** | Basic technical terms in engineering |
| **3** | Basic technical terms in engineering |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE INFORMATION

| | |
|---|---|
| **4** | Basic technical terms in engineering |
| **5** | Basic technical terms in engineering |
| **6** | Basic technical terms in engineering |
| **7** | Basic technical terms in engineering |
| **8** | Basic technical terms in engineering |
| **9** | Midterm Exam |
| **10** | Basic technical terms in engineering |
| **11** | Basic technical terms in engineering |
| **12** | Basic technical terms in engineering |
| **13** | Basic technical terms in engineering |
| **14** | Basic technical terms in engineering |
| **15** | |

**Contribution of Leaning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 4 | 4 | | | | |
| **2** | 5 | 4 | 4 | | | | |
| **3** | 5 | 4 | 4 | | | | |
| **4** | 5 | 4 | 4 | | | | |
| **5** | 5 | 4 | 4 | | | | |

**Contribution Level: 1: Very Low 2: Low 3: Intermediate 4: High 5: Very High**

| | |
|---|---|
| **Compiled by:** | Nihal Zuhal KAYALI |
| **Date of Compilation:** | 18.02.2022 |

# DEPARTMENT OF COMPUTER ENGINEERING
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| **ENG101** | 1 | | | 1 |
| **Title** | **T** | **A** | **L** | **ECTS** |
| English 1 | 3 | X | X | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60% face-to-face, 40% online) | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to help learners improve their English language level to A2 with the help of integrated four skills and grammar, vocabulary and everyday life activities. | | | | | |
| **Content** | Integrated activities in A2 level along with a focus on grammar, vocabulary and daily conversational skills. | | | | | |
| **Prerequisites** | X | | | | | |
| **Coordinator** | X | | | | | |
| **Lecturer(s)** | Ins. Yasemin Aksoyalp, Ins. Vahap Sümer Özsüer, Ins. Burçin Baytur, Ins. İlknur Karadağlı Dirik | | | | | |
| **Assistant(s)** | X | | | | | |
| **Work Placement** | X | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | Hughes, J., Stephenson, H., & Dummet, P. (2014). Life - Elementary. National Geographic. |
| **Other Sources** | McCarthy, M. & O'Dell, F. (2019). *English Vocabulary in Use -Elementary*. Cambridge University Press. |

| **Additional Course Material** | |
|---|---|
| **Documents** | Worksheets |
| **Assignments** | Assignments will be given about grammar and vocabulary issues in each unit. |
| **Exams** | X |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40% |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60% |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 15 | 3 | 45 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 7 | 7 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 8 | 8 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / Hours) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Students will be able to acquire knowledge of English at A2 level. |
| **2** | Students will be able to improve their reading comprehension skills to A2 level. |
| **3** | Students will be able to improve their listening comprehension skills to A2 level. |
| **4** | Students will be able to gain grammatical knowledge at A2 level and effectively put it into practice |
| **5** | Students will be able to obtain lexical competency at A2 level and efficiently utilise this competency in their reading, listening and speaking. |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| **Weekly Content** | |
|---|---|
| **1** | An introduction to the course<br>Unit 1-People<br>To be (am/is/are), possessive ‘s, possessive adjectives<br>Vocabulary: personal information, family, everyday verbs<br>The Simple Present Tense & The Present Continuous Tense |
| **2** | Unit 1-People<br>Possessive adjectives, word roots, meeting people for the first time<br>Writing skill: A personal description, linkers: and/but |
| **3** | Unit 2-Possessions<br>Plural nouns, demonstrative adjectives, colours, everyday objects |
| **4** | Unit 2- Possessions<br>Prepositions of place, there is/are, furniture, countries and nationalities, suffixes, adjectives, a description of a room, adverts,<br>Writing skill: Describing objects with adjectives |
| **5** | Unit 3-Places<br>Present Simple, telling and asking the time, adjectives about cities, places of work |
| **6** | Unit 3-Places<br>Collocations, cardinal and ordinal numbers, giving directions<br>Writing skill: A description of a place, capital letters |
| **7** | Unit 4-Free Time<br>The use of like/love verbs with –ing, adverbs of frequency, expressions of frequency, forming sentences by using can/can’t |
| **8** | Unit 4-Free Time<br>Free-time activities, verb + noun collocations, talking about abilities & interests<br>Writing a short e-mail |
| **9** | Mid-Term Exams |
| **10** | Unit 5-Food<br>Countable and uncountable nouns (a, some and any), quantifiers (a lot of, not much / not many) |
| **11** | Unit 5-Food<br>Asking how many / how much<br>Vocabulary: Food and food verbs |
| **12** | Unit 5-Food<br>Menu; Instructions<br>Writing skill: punctuation |
| **13** | Unit 6-Money<br>was / were; Past Simple<br>Vocabulary: Currency, verb+money collocations |
| **14** | Unit 6-Money<br>Vocabulary: Past Simple (Affirmative), -ed / -ing adjectives<br>Writing: A description of someone’s life |
| **15** | Unit 6-Money<br>Regular and irregular verbs<br>Vocabulary: Compound nouns<br>Writing skill: Formal and informal expressions, thank you messages. |

## DEPARTMENT OF COMPUTER ENGINEERING
## COURSE SYLLABUS

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **2** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **3** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **4** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **5** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| ***https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208*** | |
| **Compiled by:** | Ins. İlknur Karadağlı Dirik |
| **Date of Compilation:** | 09.05.2022 |

# DEPARTMENT OF COMPUTER ENGINERING
# COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| **ENG102** | 1 | | | 2 |
| **Title** | **T** | **A** | **L** | **ECTS** |
| ENGLISH II | 3 | - | - | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | ENGLISH | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60%  face-to-face, 40% online) | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of the course is to provide students with basic English knowledge and practice. In this context, while teaching the necessary grammatical structures, it is aimed that students will be able to use these structures effectively in written and oral communication. | | | | | |
| **Content** | Integrated activities in A2 level along with a focus on grammar, vocabulary and daily conversational skills. | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Ins. Yasemin Aksoyalp, Ins. Vahap Sümer Özsüer, Ins. Burçin Baytur, Ins. İlknur Karadağlı Dirik | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | Hughes, J., Stephenson, H., & Dummet, P. (2014). Life - Elementary. National Geographic. |
| **Other Sources** | McCarthy, M. & O'Dell, F. (2019). *English Vocabulary in Use -Elementary*. Cambridge University Press. |
| **Additional Course Material** | |
| **Documents** | Worksheets |
| **Assignments** | Assignments will be given about grammar and vocabulary issues in each unit. |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |

## DEPARTMENT OF COMPUTER ENGINERING
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |
| **Assessment** | | |
| **Activity** | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40% |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60% |
| | **Total** | **100** |

| | | | |
|---|---|---|---|
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 15 | 3 | 45 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 7 | 7 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 8 | 8 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / Hours) | **2** |

| | |
|---|---|
| **Learning Outcomes** | |
| **1** | Students will be able to acquire knowledge of English at A2 level. |
| **2** | Students will be able to improve their reading comprehension skills to A2 level. |
| **3** | Students will be able to improve their listening comprehension skills to A2 level. |
| **4** | Students will be able to gain grammatical knowledge at A2 level and effectively put it into practice. |
| **5** | Students will be able to obtain lexical competency at A2 level and efficiently utilise this competency in their reading, listening and speaking. |

## DEPARTMENT OF COMPUTER ENGINERING
## COURSE SYLLABUS

| Weekly Content | |
|---|---|
| **1** | An introduction to the course<br>Unit 7- Journeys<br>Past simple: negatives and questions<br>Vocabulary: travel verbs, journey adjectives, online writing<br>Asking about a trip |
| **2** | Unit 7- Journeys<br>Comparative adjectives - superlative adjectives<br>Vocabulary: than<br>Writing skill: a travel blog – linkers "so" – "because" |
| **3** | Unit 8- Appearance<br>Have got /has got – present continuous<br>Vocabulary: adjectives about festivals – face and appearance – clothes |
| **4** | Unit 8- Appearance<br>Vocabulary: phrasal verbs- parts of the body<br>Talking about pictures and photos- people's appearance ve what people are wearing<br>Writing skill: texts and online messages |
| **5** | Unit 9- Film and the arts<br>Going to (for plans) – present continuous for future reference – infinitive of purpose<br>Vocabulary: types of film, art and entertainment, suffixes, nature |
| **6** | Unit 9- Film and the arts<br>Inviting and making arrangements<br>Deciding which films to see- your future plans- explaining preferences<br>Writing skill: Reviews and comments – giving your opinion with sense verbs |
| **7** | Unit 10- Science<br>Present perfect - Present perfect and past simple<br>Vocabulary: Science subjects, everyday technology, memory and learning, synonyms and antonyms, email addresses and websites |
| **8** | Revision for the Midterm Exams |
| **9** | Mid-Term Exams |
| **10** | Unit 10- Science<br>Checking and clarifying<br>Experience with technology, something you have learned<br>Writing skill: a telephone message, imperatives |
| **11** | Unit 11- Tourism<br>Should/shouldn't – have to / don't have to<br>Can / can't<br>Vocabulary: types of holiday, tourism |
| **12** | Unit 11- Tourism<br>Everywhere, somewhere, nowhere, anywhere<br>Advice for a tourist, rules, what's important in a hotel<br>Writing skill: a description of a tourist destination, closed and open questions |
| **13** | Unit 12- The Earth<br>Will/won't<br>Definite "the" or no article + names<br>Vocabulary: measurements, land and water, the Earth and other planets |
| **14** | Unit 12- The Earth<br>Making a presentation<br>Writing skill: a poster, important words and information |
| **15** | General revision |

## DEPARTMENT OF COMPUTER ENGINERING
## COURSE SYLLABUS

| Contribution of Learning Outcomes to Program Objectives (1-5) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **2** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **3** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **4** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **5** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| ***https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208*** | |
| **Compiled by:** | Ins. İlknur Karadağlı Dirik |
| **Date of Compilation:** | 09.05.2022 |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| **ENG201** | 2021-2022 | | | 3 | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| English 3 | 3 | - | - | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | COMPUTER ENGINEERING | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60% online, 40% face-to-face) | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to help learners improve their English language level to B1.1 with the help of integrated four skills and grammar, vocabulary and everyday life activities. | | | | | |
| **Content** | Integrated activities in B1.1 level along with a focus on grammar, vocabulary and daily conversational skills. | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Inst. Vahap Sümer ÖZSÜER – Inst. Yasemin AKSOYALP – Inst. Nuray GÜLEÇ | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Hughes, J. & Stephenson, H. (2012). *Life-Pre-intermediate*. National Geographic. |
| **Other Sources** | Clarke, S. (2008). *Macmillan English Grammar in Context-Essential*. Macmillan Publishing.<br>Dooley, J. & Evans, V. (2004). *Grammarway 1.* Express Publishing.<br>Dooley, J. & Evans, V. (2004). *Grammarway 2.* Express Publishing.<br>Redman, S. (1997). *English Vocabulary in Use-pre-intermediate and intermediate*. Cambridge University Press. |

| Additional Course Material | |
|---|---|
| **Documents** | Worksheets |
| **Assignments** | Assignments will be given about grammar and vocabulary issues in each unit. |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40% |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60% |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 15 | 3 | 45 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 7 | 7 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 8 | 8 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / Hours) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Students will be able to increase their existing vocabulary knowledge to B1.1 level. |
| **2** | Students will be able to increase their existing grammar knowledge to B1.1 level. |
| **3** | Students will be able to improve their reading and listening comprehension skills. |
| **4** | Students will be able to learn and practice how to write emails, short paragraphs, and notices. |
| **5** | Students will be able to carry out social activities such as giving advice, inviting, accepting or declining invitations, etc. |

## Weekly Content

| | |
|---|---|
| **1** | An introduction to the course<br>Unit 1-Health |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | |
|---|---|
| | The Simple Present Tense<br>Adverbs of frequency<br>The Simple Present Tense & The Present Continuous Tense |
| **2** | Unit 1-Health<br>Finding the main idea<br>Talking about illnesses<br>Giving advice |
| **3** | Unit 2-Competitions<br>Gerunds<br>Vocabulary: Sports<br>Modal verbs for rules<br>Vocabulary: Competitions |
| **4** | Unit 2-Competitions<br>Vocabulary: like<br>Reading between the lines-I<br>Talking about interests<br>Writing a notice |
| **5** | Unit 3-Transport<br>Vocabulary: Transport<br>Comparative & Superlative Adjectives |
| **6** | Unit 3-Transport<br>Reading between the lines-II<br>Taking a transport<br>Going on a journey<br>Writing messages |
| **7** | Unit 4-Adventure<br>The Simple Past Tense<br>Vocabulary: Personality adjectives<br>The Past Continuous Tense |
| **8** | Revision for the mid-term exams |
| **9** | Mid-Term Exams |
| **10** | Unit 4-Adventure<br>Identifying opinion<br>Vocabulary: Geographical features<br>Telling/Writing a story |
| **11** | Unit 5-The Environment<br>Quantifiers<br>Vocabulary: Household items<br>Definite & Indefinite Article<br>Vocabulary: Results & Figures |
| **12** | Unit 5-The Environment<br>Vocabulary: take<br>Close Reading<br>Phoning about an order<br>Writing an email |
| **13** | Unit 6-Stages in Life<br>Verbs with “to infinitive”<br>Vocabulary: Stages in life<br>Future forms |
| **14** | Unit 6-Stages in Life<br>Vocabulary: get<br>Identifying the key information<br>Inviting, accepting, declining the invitation |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | |
|---|---|
| | Writing a descriptive paragraph |
| **15** | General revision |

| **Contribution of Learning Outcomes to Program Objectives (1-5)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
| **1** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **2** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **3** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **4** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **5** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **OBS LINK: https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=tr&curSunit=208** | |
| **Compiled by:** | Inst. Vahap Sümer ÖZSÜER – Inst. Yasemin AKSOYALP – Inst. Nuray GÜLEÇ |
| **Date of Compilation:** | 10.05.2022 |

# DEPARTMENT OF COMPUTER ENGINEERING
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| **ENG202** | 2021-2022 | | | 4 | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| English 4 | 3 | - | - | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | COMPUTER ENGINEERING | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60% online, 40% face-to-face) | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | The aim of this course is to help learners improve their English language level to B1.1 with the help of integrated four skills and grammar, vocabulary and everyday life activities. | | | | | |
| **Content** | Integrated activities in B1.1 level along with a focus on grammar, vocabulary and daily conversational skills. | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Inst. Vahap Sümer ÖZSÜER – Inst. Yasemin AKSOYALP – Inst. Nuray GÜLEÇ | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Hughes, J. & Stephenson, H. (2012). *Life-Pre-intermediate*. National Geographic. |
| **Other Sources** | Clarke, S. (2008). *Macmillan English Grammar in Context-Essential*. Macmillan Publishing.<br>Dooley, J. & Evans, V. (2004). *Grammarway 1.* Express Publishing.<br>Dooley, J. & Evans, V. (2004). *Grammarway 2.* Express Publishing.<br>Redman, S. (1997). *English Vocabulary in Use-pre-intermediate and intermediate*. Cambridge University Press. |

| Additional Course Material | |
|---|---|
| **Documents** | Worksheets |
| **Assignments** | Assignments will be given about grammar and vocabulary issues in each unit. |
| **Exams** | - |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40% |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60% |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 15 | 3 | 45 |
| **Self-Study** | | | |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 7 | 7 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 8 | 8 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / Hours) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Students will be able to increase their existing vocabulary knowledge to B1.1 level. |
| **2** | Students will be able to increase their existing grammar knowledge to B1.1 level. |
| **3** | Students will be able to improve their reading and listening comprehension skills. |
| **4** | Students will be able to learn and practice how to write emails, short paragraphs, and notices. |
| **5** | Students will be able to carry out social activities such as giving advice, inviting, accepting or declining invitations, etc. |

## Weekly Content

| | |
|---|---|
| **1** | An introduction to the course<br>Unit 7-Work |

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | |
|---|---|
| | Vocabulary: Office equipment<br>Prepositions of place & movement<br>The Present Perfect Tense |
| **2** | Unit 7-Work<br>The author's opinion<br>Vocabulary: Job adverts<br>Job interview<br>Writing a CV |
| **3** | Unit 8-Technology<br>Defining relative clauses<br>Vocabulary: The Internet<br>Conditional Sentences-Type 0 and Type 1 |
| **4** | Unit 8-Technology<br>Vocabulary: have<br>Supporting the main argument<br>Vocabulary: Technology verbs<br>Writing a paragraph |
| **5** | Unit 9-Language and Learning<br>Vocabulary: Education<br>The present simple passive<br>Vocabulary: Phrasal Verbs |
| **6** | Unit 9-Language and Learning<br>The past simple passive<br>Differentiating between fact and opinion<br>Filling in a form |
| **7** | Unit 10-Travel and Holidays<br>The Past Perfect Tense<br>Subject & Object Questions<br>Vocabulary: Holiday adjectives |
| **8** | Revision for the mid-term exams |
| **9** | Mid-Term Exams |
| **10** | Unit 10-Travel and Holidays<br>-ed & -ing adjectives<br>Vocabulary: Places in a city<br>Direct and Indirect Questions<br>Writing a formal letter/email |
| **11** | Unit 11-History<br>Vocabulary: Archaeology<br>Used to<br>Reported Speech |
| **12** | Unit 11-History<br>Vocabulary: set<br>Giving a presentation<br>Writing a biography |
| **13** | Unit 12-Nature<br>Any-, every-, some- body, thing, where<br>Conditional Sentences-Type 2<br>Vocabulary: Extreme weather conditions |
| **14** | Unit 12-Nature<br>Close reading II<br>Will/might<br>Solving a problem<br>Writing a press release |

| | |
|---|---|
| **15** | General revision |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **2** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **3** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **4** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **5** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **OBS LINK: https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=tr&curSunit=208** | |
| **Compiled by:** | Inst. Vahap Sümer ÖZSÜER – Inst. Yasemin AKSOYALP – Inst. Nuray GÜLEÇ |
| **Date of Compilation:** | 10.05.2022 |

COMPUTER ENGINEERING
COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| ENG301 | 3 | | | 1 | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Advanced English I | 3 | - | - | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | x | **Graduate** | | **Postgraduate** | |
| **Department / Program** | COMPUTER ENGINEERING | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60% facetoface 40%online) | | | | | |
| **Course Type** | **Compulsory** | x | **Elective** | | | |
| **Objectives** | The students will be able to improve their English in terms of academic reading and writing. | | | | | |
| **Content** | Academic Reading & Academic Writing<br>Academic Vocabulary | | | | | |
| **Prerequisites** | | | | | | |
| **Coordinator** | | | | | | |
| **Lecturer(s)** | Burçin BAYTUR- Nuray Güleç – Yasemin AKSOYALP | | | | | |
| **Assistant(s)** | | | | | | |
| **Work Placement** | | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Schmitt, D., Schmitt, N., & Mann, D. (2011). *Focus on vocabulary I*. Pearson Longman: New York<br>Bailey, S. (2011). *Academic writing: A handbook for international students*. Routledge: New York. |
| **Other Sources** | Videos on Youtube<br>Videos on TedTalks |

| Additional Course Material | |
|---|---|
| **Documents** | |
| **Assignments** | There will be reading and writing assignments. They were identified below. |
| **Exams** | |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | 1 | 10 |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 3 | 42 |
| **Self-Study** | | | |
| **Assignments** | 1 | 3 | 3 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 2 | 6 | 12 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / 30) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Students will be able to learn about academic vocabulary through reading texts. |
| **2** | Students will be able to read and comprehend general reading texts at B1-B2 level. |
| **3** | Students will be able to carry out basic writing tasks (paragraph writing, summary writing, CV writing) |
| **4** | Students will be able to learn about academic writing (plagiarism, paraphrasing, reference writing) |
| **5** | |

## Weekly Content

| | |
|---|---|
| **1** | Revision of how to write a paragraph (cause and effect, advantage and disadvantage, opinion, comparison) |

| | |
|---|---|
| | Academic Vocabulary<br>HM: Reading, " Can we be happier?" |
| **2** | Writing a paragraph about happiness in the class.<br>Use of articles |
| **3** | Reading: "Happiness in Bhutan"<br>HM: Writing the summary of the text |
| **4** | Writing a summary.<br>HM: Reading, "Into the Flow" |
| **5** | Conjunctions<br>Writing a summary of the Chapter 2 "Into the flow" |
| **6** | Writing formal e-mails and letters<br>HM: Reading, "What are you thinking?" |
| **7** | Quiz<br>Reading: "What color is your laugh?" |
| **8** | Paraphrasing<br>Synonyms<br>HM: Paraphrasing of one paragraph of the text "What color is your laugh?" |
| **9** | Midterm Exams |
| **10** | Writing a CV<br>HM: Reading, "Did you have trouble getting up this morning?" |
| **11** | Prepositions<br>Punctuation |
| **12** | How to avoid plagiarism?<br>HM: Vocabulary revision of Units 1 and 2 |
| **13** | Reading: "Science Fiction Into Reality" |
| **14** | References and Quotations |
| **15** | General Revision |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **2** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **3** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **4** | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **5** | | | | | | | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |

***https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208***

| | |
|---|---|
| **Compiled by:** | Lect. Burçin BAYTUR |
| **Date of Compilation:** | 10.05.2022 |

# DEPARTMENT OF COMPUTER ENGINEERING
## COURSE SYLLABUS

| **Course Details** | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| ENG302 | 3 | | | 6 |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Advanced English II | 3 | - | - | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | English | | | | | |
| **Level** | **Undergraduate** | x | **Graduate** | | **Postgraduate** | |
| **Department / Program** | COMPUTER ENGINEERING | | | | | |
| **Forms of Teaching and Learning** | Hybrid (60% online, 40% face-to-face) | | | | | |
| **Course Type** | **Compulsory** | x | **Elective** | | | |
| **Objectives** | The students will be able to improve their English in terms of academic reading and writing. | | | | | |
| **Content** | Academic Reading & Academic Writing<br>Academic Vocabulary | | | | | |
| **Prerequisites** | - | | | | | |
| **Coordinator** | - | | | | | |
| **Lecturer(s)** | Inst. Yasemin AKSOYALP | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | - | | | | | |

| **Recommended or Required Reading** | |
|---|---|
| **Books / Lecture Notes** | Schmitt, D., Schmitt, N., & Mann, D. (2011). *Focus on vocabulary I*. Pearson Longman: New York<br>Bailey, S. (2011). *Academic writing: A handbook for international students*. Routledge: New York. |
| **Other Sources** | Videos on Youtube<br>Videos on TedTalks |

| **Additional Course Material** | |
|---|---|
| **Documents** | Worksheets |
| **Assignments** | There will be reading and writing assignments. They were identified below. |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |

DEPARTMENT OF COMPUTER ENGINEERING
COURSE SYLLABUS

| | | |
|---|---|---|
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | 1 | 10 |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 3 | 42 |
| **Self-Study** | | | |
| **Assignments** | 1 | 3 | 3 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 2 | 6 | 12 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **60** |
| | | **ECTS Points** (Total Work Load / 30) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Students will be able to learn about academic vocabulary through reading texts. |
| **2** | Students will be able to read and comprehend general reading texts at B1-B2 level. |
| **3** | Students will be able to carry out basic writing tasks (paragraph writing, summary writing, CV writing). |
| **4** | Students will be able to learn about academic writing (plagiarism, paraphrasing, reference writing). |
| **5** | Students will be able to practice academic listening skills. |

**Weekly Content**

**DEPARTMENT OF COMPUTER ENGINEERING**
**COURSE SYLLABUS**

| | |
|---|---|
| **1** | Introduction to the course<br>Presentation Skills: "How to introduce yourself and your team members" |
| **2** | How to make presentations in English?<br>HW: Finding a partner and choosing a topic for presentation |
| **3** | Writing introductions and conclusions<br>Arguments and discussions<br>HW: Writing, "for" and "against" paragraphs |
| **4** | Reading, "Positive design"<br>HW: Writing, Combining the paragraphs to make an essay |
| **5** | Reading, "What's behind an attractive face?"<br>HW: Reading, "Make-up: Painted faces" |
| **6** | Writing a cause and effect essay<br>HW: Writing a for and against essay on "make up" |
| **7** | Video watching –TEDtalks<br>HW: Writing a cause and effect essay |
| **8** | Presentation week I |
| **9** | Midterm |
| **10** | Presentation week II |
| **11** | Video watching -TEDtalks |
| **12** | Cohesion<br>HW: Reading, "Facial Recognition: Do you know who I am?" |
| **13** | Style<br>Abbreviations |
| **14** | Video-watching- TEDtalks<br>HW: Reading, "What makes a hero?" |
| **15** | Describing a person, overview of the class<br>HW: Writing, Describing your hero. |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **2** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **3** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **4** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |
| **5** | 1 | 1 | 1 | 1 | 2 | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **OBS LINK: https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=tr&curSunit=208** | |
| **Compiled by:** | Inst. Yasemin AKSOYALP |
| **Date of Compilation:** | 10.05.2022 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| ING404 | 4 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Entrepreneurship | 2 | 0 | 0 | 2 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects,<br>- Describe and explain the general process and the roles that are involved in developing an idea and starting a new technology-based company<br>- Analyse and evaluate company organisation and projects, customers, markets, finance and personnel issues when starting up a new technology-based company<br>- Describe and critically review a product and process development process | | | | | |
| **Content** | - Conceptual phase: introduction to thematic topic, case selection, project teams, first discussions<br>- Business phase (elaboration of business model, branding, market structure, venture process and finance) | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Ahmet Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Ahmet Yıldız | | | | | |
| **Assistant(s)** | - | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | - McGourty, Jack. "Technology Ventures: From Idea to Enterprise." (2009) | | | | | |
| **Other Sources** | - Bolton, Bill K., and John Thompson. Entrepreneurs: Talent, temperament, technique. Routledge (2004) | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | - | | | | | |
| **Assignments** | - | | | | | |
| **Exams** | - | | | | | |
| **Course Composition** | | | | | | |
| **Mathematics und Basic Sciences** | | % | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Engineering** | | % |
| **Engineering Design** | 50 | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | | |
| **Quiz** | | |
| **Assignments** | 3 | 50 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 10 | 10 |
| **Assignments** | 3 | 4 | 12 |
| **Presentation / Seminar Preparation** | 1 | 6 | 6 |
| **Midterm Exam** | | | |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | | | |
| | | **Total Work Load** | **56** |
| | | **ECTS Points** (Total Work Load / 28) | **2** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Identify and evaluate an idea; assess the market |
| **2** | Leverage experiments to validate your idea and refine your business strategy |
| **3** | Appreciate the risks and rewards of entrepreneurship |
| **4** | Discover the key financial decisions any entrepreneur must make in the early stages of a new venture |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **5** | Effectifely pitch a business idea to a potential investor |
| **Weekly Content** | |
| **1** | "Entrepreneur" and Lean Start-Up |
| **2** | Business Idea and Evaluation |
| **3** | Building a Team |
| **4** | Customer segmentation |
| **5** | Assignment in teamwork |
| **6** | Lean Canvas |
| **7** | Competition and Customer Feedback |
| **8** | Assignment in teamwork |
| **9** | Midterm Exam Week |
| **10** | Business Plan |
| **11** | Business Plan |
| **12** | Success Story |
| **13** | Assignment in teamwork |
| **14** | Techniques and Tipps for a good Pitch |
| **15** | Presentation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Arş. Gör. Nihal Zuhal Kayalı |
| **Date of Compilation:** | 01.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| ING406 | 4 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Law for Engineers | 2 | 1 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | Turkish | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Formal Education | | | | | |
| **Course Type** | **Compulsory** | | **Elective** | X | | |
| **Objectives** | Introduction to the main elements of law | | | | | |
| **Content** | Features of legal rules and legal system, sources, application, historical development, intelectual and patent rights, labor law | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Dr. Güneş Çap | | | | | |
| **Lecturer(s)** | Dr. Güneş Çap, Assoc. Prof. İrfan Akın | | | | | |
| **Assistant(s)** | Res. Assist. Başak Berkün, Res. Assist. Metin Bingöl | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | |
| **Other Sources** | |

| Additional Course Material | |
|---|---|
| **Documents** | |
| **Assignments** | |
| **Exams** | |

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | 100 | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |

| | | |
|---|---|---|
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| **Activity** | **Count** | **Percentage (%)** |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
|---|---|---|---|
| **Lectures** | 14 | 4 | 56 |
| **Self-Study** | 15 | 8 | 120 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 2 | 2 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 2 | 2 |
| | | **Total Work Load** | **180** |
| | | **ECTS Points** (Total Work Load / Hour) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understanding the legal rules and the legal system |
| **2** | Understanding the functioning of law |
| **3** | Understanding the historical, social and moral aspects of law |
| **4** | Understanding the legal elements related to engineering profession such as intellectual property and patent rights |
| **5** | Understanding the framework of relevant legislation and international treaties regarding the protection of industrial rights holders |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction |
| **2** | Legal systems |

## DEPARTMENT OF COMPUTER SCIENCE

| | |
|---|---|
| **3** | Sources of Law-I |
| **4** | Sources of Law-II |
| **5** | Branches of Law-I |
| **6** | Branches of Law-I |
| **7** | Basic Concepts of Law |
| **8** | Judicial Organisation |
| **9** | Midterm exam |
| **10** | Introduction to Intellectual and Industrial Rights |
| **11** | Trademark and Patent |
| **12** | Industrial Design |
| **13** | Utility Model and Other Industrial Rights |
| **14** | Labour Law |
| **15** | Final Exam |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **2** | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **3** | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **4** | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **5** | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| http://bm.tau.edu.tr/learning-objectives-of-the-program | |
| **Compiled by:** | Res. Assist. Metin Bingöl |
| **Date of Compilation:** | 04.06.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

## Course Details

| Code | | | Academic Year | | | Semester |
|---|---|---|---|---|---|---|
| ISG001 | | | 4 | | | Fall |
| **Title** | | | **T** | **A** | **L** | **ECTS** |
| Occupational Health and Safety I | | | 2 | | | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | ✓ | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Formal | | | | | |
| **Course Type** | **Compulsory** | ✓ | **Elective** | | | |
| **Objectives** | Students gain an understanding of the basic terms relating to occupational safety, the duties of the engineer and the manager. The ability to communicate with a specialist for occupational safety is trained. | | | | | |
| **Content** | The module is based on practical examples in occupational safety introduced. The following topics are particularly relevant:<br>1) Basic terms of occupational safety<br>2) Risk factors<br>3) Accident prevention procedures<br>4) Health protection<br>5) Fire and explosion protection | | | | | |
| **Prerequisites** | -- | | | | | |
| **Coordinator** | -- | | | | | |
| **Lecturer(s)** | Dipl.-Ing. J. KUNTZE, Arş. Gör. Dr. Ö. F. AYDIN | | | | | |
| **Assistant(s)** | -- | | | | | |
| **Work Placement** | -- | | | | | |

## Recommended or Required Reading

| | |
|---|---|
| **Books / Lecture Notes** | „Praxishandbuch Arbeitssicherheit: Rechtliche und technische Grundlagen, Praktische Umsetzung, 60 Checklisten“, Christian Mag. (FH) Bayer und Andrea Mag. Schwarz-Hausmann MBA LL.M |
| **Other Sources** | Lecture Notes |

## Additional Course Material

| | |
|---|---|
| **Documents** | |
| **Assignments** | |
| **Exams** | |

## Course Composition

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Engineering** | 30 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 30 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 10 | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 14 | 2 | 28 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **62** |
| | | **ECTS Points**(Total Work Load / Hour) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Students gain an understanding of the basic terms relating to occupational safety, the duties of the engineer and the managerial staff. |
| **2** | Ability to communicate with an occupational safety specialist. |
| **3** | |

| | |
|---|---|
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| **Weekly Content** | |
| 1 | Introduction to Legal Basics, work safety organization, accident preconditions, risk-factors, statistics. |
| 2 | Risk avoidance, avoidance hierarchy, machine safety manipulation, Machine directive 2006/42/EC, standardisation: cable colours, pipe colours, electrical installation zones. |
| 3 | Skin, sample danger factors, mechanical dangers, TS EN ISO 7010 warnings mechanical dangers, mechanical designs avoiding squeeze EN 349. |
| 4 | Forklifts, traffic separation, labelling & communication. |
| 5 | Free moving material, internal logistics, electrical factors, IP protection, RCD (FI Schutzschalter). |
| 6 | Principles electric protection, electric competencies D-TR, 5 electric safety rules, work in increased electric risk environment, choosing electric tools, plugs & sockets, obligatory electric safety check intervals, loop impedance Zs & triggering fuses. |
| 7 | Noise & vibration factors. |
| 8 | Thermal & climatic factors. |
| 9 | Midterm Exam |
| 10 | Radiation factors: Ionization Radiation, Laser radiation, Hazardous materials 1. |
| 11 | Illumination. |
| 12 | Hazardous Materials 2. |
| 13 | Ladders, Scaffolds. |
| 14 | Fire Protection. |
| 15 | |

**Contribution of Learning Outcomes to Program Objectives(1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| 1 | | | | | 4 | 5 | 5 |
| 2 | | | | | 4 | 5 | 5 |
| 3 | | | | | | | |
| 4 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **5** | | | | | | | |
| **6** | | | | | | | |
| **7** | | | | | | | |
| **8** | | | | | | | |
| **9** | | | | | | | |
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | | | | | | | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208** | |
| **Compiled by:** | Dr. Ömer Faruk Aydın |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
# COURSE SYLLABUS

## Course Details

| Code | | | Academic Year | Semester |
|---|---|---|---|---|
| ISG002 | | | 4 | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Occupational Health and Safety II | 2 | | | 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | ✓ | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Engineering | | | | | |
| **Forms of Teaching and Learning** | Formal | | | | | |
| **Course Type** | **Compulsory** | ✓ | **Elective** | | | |
| **Objectives** | Students gain an understanding of the basic terms relating to occupational safety, the duties of the engineer and the manager. The ability to communicate with a specialist for occupational safety is trained. | | | | | |
| **Content** | The module is based on practical examples in occupational safety introduced. The following topics are particularly relevant:<br>1) Basic terms of occupational safety<br>2) Risk factors<br>3) Accident prevention procedures<br>4) Health protection<br>5) Fire and explosion protection | | | | | |
| **Prerequisites** | -- | | | | | |
| **Coordinator** | -- | | | | | |
| **Lecturer(s)** | Dipl.-Ing. J. KUNTZE, Arş. Gör. Dr. Ö. F. AYDIN | | | | | |
| **Assistant(s)** | -- | | | | | |
| **Work Placement** | -- | | | | | |

## Recommended or Required Reading

| | |
|---|---|
| **Books / Lecture Notes** | „Praxishandbuch Arbeitssicherheit: Rechtliche und technische Grundlagen, Praktische Umsetzung, 60 Checklisten“, Christian Mag. (FH) Bayer und Andrea Mag. Schwarz-Hausmann MBA LL.M |
| **Other Sources** | Lecture Notes |

## Additional Course Material

| | |
|---|---|
| **Documents** | |
| **Assignments** | |
| **Exams** | |

## Course Composition

| | | |
|---|---|---|
| **Mathematics und Basic Sciences** | | % |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | |
|---|---|---|
| **Engineering** | 30 | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | 30 | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 10 | % |

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | | |
| **Assignments** | 1 | 30 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 40 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 14 | 2 | 28 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | | | |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **62** |
| | | **ECTS Points**(Total Work Load / Hour) | **2** |

## Learning Outcomes

| | |
|---|---|
| **1** | Students gain an understanding of the basic terms relating to occupational safety, the duties of the engineer and the managerial staff. |
| **2** | Ability to communicate with an occupational safety specialist. |
| **3** | |

| | |
|---|---|
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| **Weekly Content** | |
| 1 | Fire Protection. |
| 2 | Fire Protection. |
| 3 | Explosion Protection: Gas/vapor, Dust. |
| 4 | Explosion Protection: Gas/vapor, Dust. |
| 5 | Personal Protection Equipment. |
| 6 | Personal Protection Equipment. |
| 7 | Ladders, steps, scaffolds. |
| 8 | Midterm Exam. |
| 9 | Hoisting equipment. |
| 10 | Reserve. |
| 11 | Risk Analysis. |
| 12 | Health & Safety signs. |
| 13 | Medical exams obligatory and voluntary, hints for first aid. |
| 14 | Medical exams obligatory and voluntary, hints for first aid. |
| 15 | |

**Contribution of Learning Outcomes to Program Objectives(1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| 1 | | | | | 4 | 5 | 5 |
| 2 | | | | | 4 | 5 | 5 |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **8** | | | | | | | |
| **9** | | | | | | | |
| **10** | | | | | | | |
| **11** | | | | | | | |
| **12** | | | | | | | |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| **https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=208** | |
| **Compiled by:** | Dr. Ömer Faruk Aydın |
| **Date of Compilation:** | 17.05.2022 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | |
|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** |
| MAT103 | 1 | | | Fall |
| **Title** | **T** | **A** | **L** | **ECTS** |
| Calculus 1 | 3 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This course gives students<br>- The ability to model real conditions using functions,<br>- a deeper understanding of the basic terms and concepts of differential and integral calculus,<br>- knowledge of working with sequences and series,<br>- the ability to use learned knowledge and digital technologies to solve application-related problems.<br><br>Knowledge & Understanding: 70%<br>Analysis & methodology: 30% | | | | | |
| **Content** | - Equations, inequalities, sets of solutions<br>- Coordinate systems, straight line, slope<br>- Functions, function graphs<br>- Sequences of numbers, convergence and completeness<br>- Limits of functions, continuity<br>- Differences, rates of change, tangents<br>- Differential calculation, derivation of functions<br>- Applications of differential calculus<br>- Integral calculus, definite and indefinite integral<br>- The fundamental theorem of calculus<br>- Applications of integral calculus<br>- Infinite series, Taylor series, Fourier series | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Lecturer(s)** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Assistant(s)** | BSc. Mustafa Korkut Özarslan | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Thomas, George B. **, Analysis I**. Pearson Deutschland, Hallbergmoos 2013.<br>- Lothar, Papula, **Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2**. Wiesbaden, 2011. |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Other Sources** | - Single Variable Calculus [Online Kurs]. MIT OpenCourseWare, 2010. URL: http://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/ [16-03-2020] | | |
| **Additional Course Material** | | | |
| **Documents** | https://www.geogebra.org/u/canan.yildiz<br>OneNote Notizbuch MAT103 | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 100 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 3 | 42 |
| **Self-Study** | 1 | 62 | 62 |
| **Assignments** | 10 | 3 | 30 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |

| | | | |
|---|---|---|---|
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Understands the fundamental concepts of analysis: Derivation as a "rate of change", calculated as the limit of a difference quotient; The integral as an infinite "sum", calculated as a limit of Riemann sums. |
| **2** | Can analyze properties and behavior of functions and sketch function graphs (using asymptotes, critical points, derivation tests to determine slope and curvature behavior). |
| **3** | Can use differential calculus to solve application-related problems (e.g. optimization problems, related rates of change). |
| **4** | Can use the integral calculation among other things for the calculation of curve lengths, volumes and areas. |
| **5** | Can calculate definite and indefinite integrals using appropriate integration methods. |
| **6** | Can determine the convergence or divergence of improper integrals and solve convergent improper integrals. |
| **7** | Can determine the convergence or divergence of infinite series. |
| **8** | Can calculate the Taylor series of any function near a point. |

**Weekly Content**

| | |
|---|---|
| **1** | Equations, inequalities, sets of solutions |
| **2** | Coordinate systems, straight line, slope |
| **3** | Functions, function graphs |
| **4** | Sequences of numbers, convergence and completeness |
| **5** | Limits of functions, continuity |
| **6** | Differences, rates of change, tangents |
| **7** | Differential calculus, derivation of functions |
| **8** | Applications of differential calculus |
| **9** | Midterm exams |
| **10** | Integral calculus, definite and indefinite integrals |
| **11** | Fundamental theorem of calculus |
| **12** | Applications of integral calculus |
| **13** | Infinite series, Taylor series, Fourier series |
| **14** | Infinite series, Taylor series, Fourier series |
| **15** | Summary, recitation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | **P1** | **P2** | **P3** | **P4** | **P5** | **P6** | **P7** |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | DI Dr. Canan Yıldız |
| **Date of Compilation:** | 16.03.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| MAT106 | 1 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Linear Algebra | 2 | 2 | 1 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | This course covers matrix theory and linear algebra. Emphasis is given to topics that will be useful in other disciplines, including systems of equations, vector spaces, determinants and eigenvalues. After successfully completing this course, you will have a good understanding of the following topics and their applications: systems of linear equations, row reduction and echelon forms, matrix operations, linear dependence and independence, vector spaces and subspaces, orthogonal bases and orthogonal projections, Gram-Schmidt process, linear models and least-squares problems, determinants and their properties, Cramer's Rule, eigenvalues and eigenvectors, diagonalization of a matrix, Markov matrices. | | | | | |
| **Content** | - Vectors, Matrices<br>- Linear Equations, Gauss-Jordan<br>- Vector Spaces, the four fundamental subspaces, Nullspace, Column Space<br>- Dimension, Basis, Span<br>- Orhogonal vectors and subspaces, projections<br>- Orthogonal matrices and Gram-Schmidt<br>- Determinants, Cramer’s rule<br>- Eigenvalues, Eigenvectors, Diagonalization and Powers of A<br>- Differential Equations, exp(A)<br>- Markov Matrices | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | MSc. Ali Osman İskenderli<br>MSc. Mustafa Korkut Özarslan | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | - Strang, Gilbert. *Lineare Algebra*. Springer-Verlag Berlin Heidelberg GmbH, 2003.<br>- Teschl, Gerald; Teschl, Susanne. Mathematik für Informatiker, Band 1: Diskrete Mathematik und Lineare Algebra. Springer-Verlag Berlin Heidelberg 2006, 2007. |
| **Other Sources** | - Göllmann, Laurenz et.al. *Mathematik für Ingenieure: Verstehen, Rechnen, Anwenden*. Springer Vieweg, 2017. |

| | | | |
|---|---|---|---|
| | - Gilbert Strang. *18.06SC Linear Algebra.* Fall 2011. Massachusetts Institute of Technology: MIT OpenCourseWare, https://ocw.mit.edu. License: Creative Commons BY-NC-SA. Accessed 2020-03-14. | | |
| **Additional Course Material** | | | |
| **Documents** | https://www.geogebra.org/u/canan.yildiz | | |
| **Assignments** | - | | |
| **Exams** | - | | |
| **Course Composition** | | | |
| **Mathematics und Basic Sciences** | 100 | | % |
| **Engineering** | | | % |
| **Engineering Design** | | | % |
| **Social Sciences** | | | % |
| **Educational Sciences** | | | % |
| **Natural Sciences** | | | % |
| **Health Sciences** | | | % |
| **Expert Knowledge** | | | % |
| **Assessment** | | | |
| **Activity** | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | | | |
| **Assignments** | 1 | | 10 |
| **Attendance** | | | |
| **Recitations** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | | 50 |
| | | **Total** | **100** |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Work Load (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 62 | 62 |
| **Assignments** | 10 | 3 | 30 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | 14 | 1 | 14 |
| **Projects** | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | |
|---|---|---|---|
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

| | |
|---|---|
| **1** | Solving Ax = b for square systems by elimination (pivots, multipliers, back substitution, invertibility of A, factorization into A = LU) |
| **2** | Complete solution to Ax = b (column space containing b, rank of A, nullspace of A and special solutions to Ax = 0 from row reduced R) |
| **3** | Basis and dimension (bases for the four fundamental subspaces) |
| **4** | Least squares solutions (closest line by understanding projections) |
| **5** | Orthogonalization by Gram-Schmidt (factorization into A = QR) |
| **6** | Properties of determinants (leading to the cofactor formula and the sum over all n! permutations, applications to inv(A) and volume) |
| **7** | Eigenvalues and eigenvectors (diagonalizing A, computing powers A^k and matrix exponentials to solve difference and differential equations) |
| **8** | Linear transformations and change of basis (connected to the Singular Value Decomposition - orthonormal bases that diagonalize A) |
| **9** | Linear algebra applications (graphs and networks, Markov matrices, linear programming) |

**Weekly Content**

| | |
|---|---|
| **1** | Introduction, vectors |
| **2** | Span, bases, linear independence, vector spaces, subspaces |
| **3** | Linear transformations and matrices |
| **4** | Matrix multiplication and composition, systems of equations and their geometry |
| **5** | Elimination with matrices, Gauss-Jordan algorithm |
| **6** | Nullspace (Ax = 0), column space, row space and their dimensions |
| **7** | Dot product, orthogonal vectors, projections |
| **8** | Orthogonal projections, Least Squares |
| **9** | Midterm Exams |
| **10** | Orthonormal vectors and Gram-Schmidt |
| **11** | Properties and applications of determinants |
| **12** | Eigenvectors and eigenvalues |
| **13** | Diagonalization |
| **14** | Markov matrices |
| **15** | Summary, exercise |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|

## DEPARTMENT OF COMPUTER SCIENCE
### COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | DI Dr. Canan Yıldız |
| **Date of Compilation:** | 14.03.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| MAT108 | 1 | | | Spring | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Calculus 2 | 3 | 2 | 0 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | In this course students should<br>- master differential and integral calculus for functions of several variables as a prerequisite for dealing with mathematical models of engineering,<br>- develop an understanding of and the ability to work with functions in multidimensional space, master vector calculations in multidimensional space,<br>- have a sound knowledge of the scientific and mathematical concepts, principles and methods of the natural and engineering sciences,<br>- master basic terms and techniques and apply them to various (e.g. physical) problems,<br>- use digital technologies effectively to solve problems.<br><br>Knowledge & Understanding: 70%<br>Analysis & methodology: 30% | | | | | |
| **Content** | - Parameter display<br>- Polar coordinates<br>- Vectors, lines and planes in space<br>- Vector functions and movement in space<br>- Functions of several variables<br>- Partial derivatives, directional derivative, gradient<br>- Applications of multivariable differential calculus<br>- Multiple integrals<br>- Multiple integrals in polar coordinates<br>- Applications of integrals with multiple variables<br>- Vector fields, integrals along curves, surface integrals | | | | | |
| **Prerequisites** | Recommended: Calculus 1 | | | | | |
| **Coordinator** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Lecturer(s)** | PD.Dr.habil. Emre IŞIK | | | | | |
| **Assistant(s)** | MSc. Ozan Subaşı<br>MSc. Arda Çetiner<br>BSc. Mustafa Korkut Özarslan | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **Books / Lecture Notes** | - George B. Thomas, Analysis 2, Pearson Deutschland, Hallbergmoos 2013.<br>- Papula Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Band 2+3, Wiesbaden 2011.<br>- Şanal Ziya, Mathematik für Ingenieure, Vieweg+Teubner, Wiesbaden 2009. |
| **Other Sources** | - David Jerison, and Arthur Mattuck. MIT OpenCourseWare, *18.02 Multivariable Calculus*. URL: https://ocw.mit.edu/courses/mathematics/18-02-multivariable-calculus-spring-2006/ [16-03-2020] |
| **Additional Course Material** | |
| **Documents** | https://www.geogebra.org/u/canan.yildiz<br>OneNote Notizbuch MAT108 |
| **Assignments** | - |
| **Exams** | - |

| **Course Composition** | | |
|---|---|---|
| **Mathematics und Basic Sciences** | 100 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 30 |
| **Quiz** | 1 | 20 |
| **Assignments** | | |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 3 | 42 |
| **Self-Study** | 1 | 62 | 62 |
| **Assignments** | 10 | 3 | 30 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

| | | | |
|---|---|---|---|
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

| **Learning Outcomes** | |
|---|---|
| **1** | Parametrization of curves, calculus with parametrized curves |
| **2** | Calculate derivatives, tangents, surfaces and arc lengths in the parametric form |
| **3** | Vectors, angles between vectors, vector projections in space; Cross product of two vectors in space, determinant, the mixed product (spat product) |
| **4** | Vectors and parametrized lines and planes in space, angle between planes |
| **5** | Vector valued functions; Curves, derivatives and movement in space, integrals of vector functions |
| **6** | Functions of several variables, graphs, contour lines |
| **7** | Second and higher order partial derivatives, mixed derivatives, differentiability |
| **8** | Chain rule for functions of two and three variables, implicit differentiation |
| **9** | Directional derivations, calculation of gradients, gradients and tangents on contour lines |
| **10** | Tangential planes, linearization, error estimation, differentials, the total differential |
| **11** | Extreme values and saddle points, Hesse matrix, Lagrange multipliers |
| **12** | Double integrals over restricted areas, volumes, determination and exchange of the integration limits, double integrals in polar form, masses and center of mass |
| **13** | Line integrals, vector fields, gradient fields, work as an integral, flow integrals and circulation |
| **14** | Path independence, conservative fields, gradient fields and potential functions; Surface integrals, flow of a vector field through an oriented surface |

| **Weekly Content** | |
|---|---|
| **1** | Overview, introduction of multivariable functions, parametrization |
| **2** | Polar coordinates (points, intervals, point sets, curves, areas), calculation of areas in polar coordinates |
| **3** | Lines and planes in space, curves in space, tangents, vector functions, movement along a curve |
| **4** | Functions of several variables, partial derivatives, meaning of the partial derivative, slope in one point |
| **5** | Generalized chain rule, directional derivative, gradient |
| **6** | Tangential planes and differentials |
| **7** | Extreme values and saddle points, Lagrange multipliers |
| **8** | Double integrals, determination of the integration limits |
| **9** | Midterm exams |

| | |
|---|---|
| **10** | Double integrals, swapping the integral limits, double integrals with polar coordinates |
| **11** | Triple integrals, mass, center of mass |
| **12** | Vector fields line integrals |
| **13** | Line integrals of vector fields, work along curves, flow integrals and circulation |
| **14** | Flow through a flat curve, conservative fields, potential functions |
| **15** | Line integrals in conservative fields, determination of potentials, divergence and rotation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |
| **10** | 5 | 5 | 3 | | | 3 | 1 |
| **11** | 5 | 5 | 3 | | | 3 | 1 |
| **12** | 5 | 5 | 3 | | | 3 | 1 |
| **13** | 5 | 5 | 3 | | | 3 | 1 |
| **14** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | DI Dr. Canan Yıldız |
| **Date of Compilation:** | 16.03.2020 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | | **Academic Year** | | | **Semester** |
| MAT201 | | 3 | | | Fall |
| **Title** | | **T** | **A** | **L** | **ECTS** |
| Differential Equations | | 2 | 2 | 1 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects;<br>- Understand all of the concepts relating to the order and linearity of ODEs, analytic and computational solution methods for ODEs, and the real-world applications of ODEs.<br>- Apply your understanding of the concepts, formulas, and problem solving procedures to thoroughly investigate relevant models.<br>- Explain the concepts of linear systems, ODE solution methods, and related ideas at a fundamental level, as well as how and why we use the solution techniques that we use. | | | | | |
| **Content** | - First order differential equations<br>- Linear differential equations<br>- Series solutions of second order linear equations<br>- The Laplace transform<br>- First order systems (both linear and nonlinear) | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | DI Dr. Canan Yıldız | | | | | |
| **Assistant(s)** | | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | - Edwards, C., and D. Penney. Elementary Differential Equations with Boundary Value Problems. 6th ed. Upper Saddle River, NJ: Prentice Hall, 2003. | | | | | |
| **Other Sources** | - Brannan, James R., and William E. Boyce. Differential equations: An introduction to modern methods and applications. John Wiley & Sons, 2015.<br>- Boyce, William E., Richard C. DiPrima, and Douglas B. Meade. Elementary differential equations. John Wiley & Sons, 2017. | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | - | | | | | |
| **Assignments** | - | | | | | |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | |
|---|---|---|
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Model a simple system to obtain a first order ODE. Visualize solutions using direction fields and approximate them using Euler's method. |
| **2** | Solve a first order linear ODE by the method of integrating factors or variation of parameter. |
| **3** | Calculate with complex numbers and exponentials. |
| **4** | Solve a constant coefficient second order linear initial value problem |
| **5** | Compute Fourier coefficients, and find periodic solutions of linear ODEs by means of Fourier series. |
| **6** | Solve constant coefficient linear initial value problems using the Laplace transform together with tables of standard values. |
| **7** | Calculate eigenvalues, eigenvectors, and matrix exponentials, and use them to solve first order linear systems. Relate first order systems with higher-order ODEs. |
| **8** | Recreate the phase portrait of a two-dimensional linear autonomous system from trace and determinant. |
| **9** | Determine the qualitative behavior of an autonomous nonlinear two-dimensional system by means of an analysis of behavior near critical points. |
| **Weekly Content** | |
| **1** | Differential equations, Direction fields, Linear differential equations of first order with variable coefficients, Linear systems of equations; Definition of eigenvector and eigenvalue. |
| **2** | Review of complex numbers, Eigen values and eigen vector for matrices, Drawing phase portraits |
| **3** | Introduction to non-linear systems, Solutions and phase portraits for defective matrices and Wronskian |
| **4** | Similar matrices and matrix exponentials, Rewriting second order ODE as first order systems |
| **5** | Solving constant coefficient second order ODE, Mechanical vibrations |
| **6** | Forced vibrations and undetermined coefficients, Variation of parameters and fundamental matrix |
| **7** | Nonlinear ODE: bifurcation phenomenon in autonomous ODE |
| **8** | Linearization of systems; competing species, Existence and uniquness theory for ODE |
| **9** | Midterm Exam |
| **10** | Numerical methods: Euler's method as "connecting the dots" of a direction field, Runge-Kutta methods |
| **11** | Introduction to Laplace transform, Properties of Laplace transform |
| **12** | Inverse of Laplace transform, Solving ODE using Laplace transform |
| **13** | Review of power series, Ordinary points, regular singular and irregular singular points |
| **14** | Power series solutions to Airy equation, Fourier series; Even and odd functions |
| **15** | Laplace equation on a rectangle, Laplace equation on circle |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **6** | 5 | 5 | 3 | | | 3 | 1 |
| **7** | 5 | 5 | 3 | | | 3 | 1 |
| **8** | 5 | 5 | 3 | | | 3 | 1 |
| **9** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | MSc. Melce Hüsünbeyi |
| **Date of Compilation:** | 17.03.2020 |

# DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| Course Details | | | | | |
|---|---|---|---|---|---|
| **Code** | **Academic Year** | | | **Semester** | |
| MAT302 | 4 | | | Fall | |
| **Title** | **T** | **A** | **L** | **ECTS** | |
| Computer Numerics | 3 | 1 | 1 | 6 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Computer Science | | | | | |
| **Forms of Teaching and Learning** | Face-to-Face, Group Study, Individual Study. | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | |
| **Objectives** | Upon successful completion of this course, a student will have comprehensive knowledge of below subjects;<br>- Introduction to typical numerical questions<br>- Use numerical algorithms and numerical software<br>- Principles and methods for the numerical solution of mathematical problems<br>- Apply the general methods and principles to particular classes of problems<br>- Develop approaches to extracting practically useful solutions with appropriately chosen numerical software | | | | | |
| **Content** | - Basic error concepts: condition of mathematical problems, data error, discretization error, round-off error.<br>- Numerical solution of linear and nonlinear systems of equations<br>- Numerical differentiation and integration<br>- Polynomial interpolation and approximation<br>- Numerical solution of differential equation. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | DI Dr. Canan Yıldız | | | | | |
| **Lecturer(s)** | | | | | | |
| **Assistant(s)** | | | | | | |
| **Work Placement** | None | | | | | |
| **Recommended or Required Reading** | | | | | | |
| **Books / Lecture Notes** | - Quarteroni, A., R. Sacco, and F. Saleri. "Numerische Mathematik Springer-Verlag." (2002). | | | | | |
| **Other Sources** | - Dahmen, Wolfgang, and Arnold Reusken. Numerik für Ingenieure und Naturwissenschaftler. Springer-Verlag, 2006.<br>- Deuflhard, Peter, and Folkmar Bornemann. "Numerische Mathematik. II." (1994).<br>- Hanke-Bourgeois, Martin. Grundlagen der numerischen Mathematik und des wissenschaftlichen Rechnens. Wiesbaden: Vieweg+ Teubner, 2009. | | | | | |
| **Additional Course Material** | | | | | | |
| **Documents** | - | | | | | |

| | | |
|---|---|---|
| **Assignments** | - | |
| **Exams** | - | |
| **Course Composition** | | |
| **Mathematics und Basic Sciences** | 50 | % |
| **Engineering** | | % |
| **Engineering Design** | | % |
| **Social Sciences** | | % |
| **Educational Sciences** | | % |
| **Natural Sciences** | | % |
| **Health Sciences** | | % |
| **Expert Knowledge** | 50 | % |

**Assessment**

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | | |
| **Assignments** | 1 | 10 |
| **Attendance** | | |
| **Recitations** | | |
| **Projects** | | |
| **Final Exam** | 1 | 50 |
| | **Total** | **100** |

**ECTS Points and Work Load**

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 1 | 66 | 66 |
| **Assignments** | 10 | 4 | 40 |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 3 | 3 |
| **Recitations** | 14 | 2 | 28 |
| **Laboratory** | | | |
| **Projects** | | | |
| **Final Exam** | 1 | 3 | 3 |
| | | **Total Work Load** | **168** |
| | | **ECTS Points** (Total Work Load / 28) | **6** |

**Learning Outcomes**

## DEPARTMENT OF COMPUTER SCIENCE
## COURSE SYLLABUS

| | |
|---|---|
| **1** | Discussion about principles and methods for the numerical solution of mathematical problems |
| **2** | The ability to investigate mathematical problems using a scientific programming language |
| **3** | An awareness of fundamental numerical algorithms which are used to solve mathematical problems. |
| **4** | The ability to create well formatted scientific programming language functions. |
| **5** | The ability to communicate the principles and purposes of scientific computer codes. |
| **Weekly Content** | |
| **1** | Computer Arithmetic |
| **2** | Solution of linear systems of equations and condition number |
| **3** | Gaussian elimination with partial pivoting |
| **4** | Polynomial Interpolation, Approximation of the First Derivative by Interpolation |
| **5** | Solving Systems of Equations for Periodic Splines, Hermite Interpolation, Trigonometric Interpolation |
| **6** | Condition of the Newton-Cotes Formulas, Integral Representation of the Interpolation Error |
| **7** | Quadrature, Tschebyscheff polynomials |
| **8** | Composite Trapezoidal Rule with Non-Uniform Grid, Quadrature Rule Based on Interpolation, Adaptive Quadrature |
| **9** | Midterm Exam |
| **10** | Error of Simpson's Rule and Gaussian Quadrature, Gauss-Hermite Quadrature |
| **11** | Fixed-point Iteration in 1D, Gauss Quadrature Over General Interval, Fixed-point Iteration in 2D |
| **12** | Computing an Important Function using Newton's Method, Newton's Method for the Eigenvalue Problem |
| **13** | Convergence of Newton's Method, Conjugate Gradient Iteration Error |
| **14** | Conjugate Gradient Method: Number of Iterations, Newton meets Conjugate Gradient |
| **15** | Computer Implementation |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 5 | 5 | 4 | | | 3 | 1 |
| **2** | 5 | 5 | 4 | | | 3 | 1 |
| **3** | 5 | 5 | 4 | | | 3 | 1 |
| **4** | 5 | 5 | 4 | | | 3 | 1 |
| **5** | 5 | 5 | 3 | | | 3 | 1 |

| | |
|---|---|
| **Contribution Level** | 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High |
| | |
| **Compiled by:** | MSc. Melce Hüsünbeyi |
| **Date of Compilation:** | 17.03.2020 |

**DEPARTMENT OF COMPUTER SCIENCE**
**COURSE SYLLABUS**

## DEPARTMENT OF COMPUTER SCIENCE COURSE SYLLABUS

| Course Details | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | | | **Semester** | |
| TUR001 | | | | 1 | | | 1 | |
| **Title** | | | | **T** | **U** | **L** | **ECTS** | |
| Turkish | | | | 2 | - | - | 2 | |
| **Language** | Turkish | | | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | | | |
| **Department / Program** | Computer Science | | | | | | | |
| **Forms of Teaching and Learning** | Distance Learning | | | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | | | |
| **Objectives** | The aim of the course is to use your mother tongue effectively, to have effective speaking, writing, reading and listening skills, and to have strong communication skills. | | | | | | | |
| **Content** | Language<br>Culture<br>Communication<br>Grammar | | | | | | | |
| **Prerequisites** | - | | | | | | | |
| **Coordinator** | Instructor Gül Ayşe Akar | | | | | | | |
| **Lecturer(s)** | Instructor Gül Ayşe Akar | | | | | | | |
| **Assistant(s)** | - | | | | | | | |
| **Work Placement** | - | | | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Anadolu Üniversitesi Mergen Sistemi Türk Dili I Ders Kitabı |
| **Other Sources** | AKSAN, Doğan, Her Yönüyle Dil, Ana Çizgileriyle Dil bilim, Ankara: Türk Dil Kurumu Yayınları, Ankara, 2015.<br>_____________, Türkçenin Gücü, Ankara: Türkiye İş Bankası Kültür Yayınları, 1987.<br>_____________, Türkçenin Sözvarlığı, Engin Yayınevi, Ankara, 1996.<br>_____________, Türkçeye Yansıyan Türk Kültürü, Bilgi Yayınevi, Ankara, 2008.<br>______________, Türkiye Türkçesinin Dünü, Bugünü, Yarını, Bilgi Yayınevi, Ankara, 2000.<br><br>BANGUOĞLU, Tahsin, Dil Bahisleri, Kubbealtı Neşriyat, İstanbul, 1987.<br>___________________, Türkçenin Grameri, Türk Dil Kurumu, Ankara, 2007<br><br>CORBALLIS, Michael. C., İşaretten Konuşmaya Dilin Kökeni ve Gelişimi, (Çev: Aybek Görey), Kitap Yayınevi, İstanbul, 2003.<br><br>DEMİR, Nurettin, Türk Dili El Kitabı, Grafiker Yayınları, Ankara, 2005<br><br>ELİOT, T. S., Kültür Üzerine Düşünceler, (Çev. S. Kantarcı) Kültür ve Turizm Bakanlığı Yayınları, Ankara, 1987.<br><br>ERCİLASUN, Ahmet Bilge, Türk Dili Tarihi Başlangıçtan 20.Yüzyıla, Akçağ Yayınları, Ankara, 2011.<br><br>ERGİN, Muharrem, Türk Dili, Boğaziçi Yayınları, İstanbul, 2013.<br><br>GÖKBERK, Macit, Değişen Dünya Değişen Dil, Yapı Kredi Yayınları, İstanbul, 2008.<br><br>GÜLENSOY, Tuncer, Türkçe El Kitabı, Akçağ Yayınları, Ankara, 2010.<br><br>GÜLSEVİN, Gürer / BOZ, Erdoğan; Türk Dili ve Kompozisyon I-II., Tablet Kitabevi, Konya, 2009.<br>KARAHAN, Leyla, Türkçede Söz Dizimi, Akçağ Yayınları, Ankara, 2011. |

| | |
|---|---|
| | KIRIMLI, Atilla, Türk Dili: Dil ve Anlatım, Bilgi Üniversitesi Yayınları, İstanbul, 2006.<br><br>KORKMAZ, Zeynep, Türk Dili Üzerine Araştırmalar, Türk Dil Kurumu Yayınları, Ankara, 1995.<br>_______________, Türkiye Türkçesi Grameri: Şekil Bilgisi, Türk Dil Kurumu Yayınları, Ankara, 2014.<br><br>LEVEND, Agâh Sırrı, Türk Dilinde Gelişme ve Sadeleşme Evreleri, Türk Dil Kurumu Yayınları, Ankara, 1972<br><br>ÖZLEM, Doğan, Kültür Bilimleri ve Kültür Felsefesi, Notos Yayınevi, İstanbul, 2012.<br><br>USER, Hatice Şirin, Başlangıcından Günümüze Türk Yazı Sistemleri, Akçağ Yayınları, Ankara, 2006.<br><br>USLU, Mustafa, Ansiklopedik Türk Dili ve Edebiyatı Terimleri Sözlüğü, Yağmur Yayınları, İstanbul, 2007. |

| **Additional Course Material** | |
|---|---|
| **Documents** | + |
| **Assignments** | - |
| **Exams** | Midterm Exam and Final Exam |

| **Course Composition** | | |
|---|---|---|
| | | |
| **Social Sciences** | 100 | 100% |

| **Assessment** | | |
|---|---|---|
| | **Count** | **Percentage (%)** |
| **Midterm Exam** | 1 | 40 |
| **Quiz** | - | - |
| **Assignments** | - | - |
| **Attendance** | - | - |
| **Recitations** | - | - |

| | | |
|---|---|---|
| **Projects** | - | - |
| **Final Exam** | 1 | 60 |
| | **Total** | 100 |

**ECTS Points and Work Load**

| Activity | Count | Duration | Total Work Load (Hours) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 15 | 2 | 30 |
| **Assignments** | - | - | - |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | 60 |
| | | **ECTS Points**(Total Work Load/ 28) | 2 |

| **Learning Outcomes** | |
|---|---|
| **1** | Understand what language is in all aspects C |
| **2** | Classification of languages according to origin and structure |
| **3** | Knowing the characteristics of languages and language types |
| **4** | Understanding the differences between concepts like dialect, accent |
| **5** | Understanding terms such as mother tongue, ancestral language, creative language, correspondence language and official language |
| **6** | Determining the place of the Turkish language among the languages of the world |
| **7** | Understanding the relationship between cultures and the concept of culture |
| **8** | Understanding the relationship between culture and language |
| **9** | Knowing the grammar rules of Turkish |
| **10** | Analyzing the grammar rules |
| **11** | Internalization of the grammar rules and application in everyday life |

| **Weekly Content** | |
|---|---|
| **1** | Language and language universes |
| **2** | Language and the place of the Turkish language among the world languages |

| | |
|---|---|
| **3** | Alphabets used in the Turkish language |
| **4** | Language-culture relationship |
| **5** | Phonology |
| **6** | Morphology (Turkish suffixes, word formation) |
| **7** | Word structure |
| **8** | Word types |
| **9** | Elements of Sentence |
| **10** | Types of Sentence |
| **11** | Turkish Vocabulary |
| **12** | Interaction between languages and the impact of Turkish on world languages |
| **13** | Current problems in the Turkish language |
| **14** | The influence of mass media on language |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **2** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **3** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **4** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **5** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **6** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **7** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **8** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **9** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **10** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **11** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |

**Contribution Level:** 1: Low 2:Low-intermediate 3: Intermediate 4:High 5:Very High

*https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=tr&curSunit=208*

| | |
|---|---|
| **Compiled by:** | Instructor Gül Ayşe Akar |
| **Date of Compilation:** | 02.06.2022 |

## DEPARTMENT OF COMPUTER SCIENCE COURSE SYLLABUS

| **Course Details** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | | | **Semester** |
| TUR002 | | | | 1 | | | 2 |
| **Dersin Adı** | | | | **T** | **U** | **L** | **ECTS** |
| Türkçe | | | | 2 | - | - | 2 |
| **Language** | Turkish | | | | | | |
| **Level** | **Undergraduate** | X | **Graduate** | | **Postgraduate** | | |
| **Department / Program** | Computer Science | | | | | | |
| **Forms of Teaching and Learning** | Distance Learning | | | | | | |
| **Course Type** | **Compulsory** | X | **Elective** | | | | |
| **Objectives** | The aim of the course is to raise individuals who use their mother tongue effectively, have effective speaking, writing, reading and listening skills, and have strong communication skills. | | | | | | |
| **Content** | Composition Information<br>Types of Writing<br>Spelling Rules<br>Punctuation Marks | | | | | | |
| **Prerequisites** | - | | | | | | |
| **Coordinator** | Lecturer Gül Ayşe AKAR | | | | | | |
| **Lecturer(s)** | Lecturer Gül Ayşe AKAR | | | | | | |
| **Assistant(s)** | - | | | | | | |
| **Work Placement** | - | | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | Anadolu Üniversitesi Mergen Sistemi Türk Dili II Ders Kitabı |
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| **Additional Course Material** | | |
| **Documents** | + | |
| **Assignments** | - | |
| **Exams** | Midterm Exam and Final Exam | |
| **Course Composition** | | |
| | | |

| Social Sciences | - | | 100% |
|---|---|---|---|
| **Assessment** | | | |
| | **Count** | | **Percentage (%)** |
| **Midterm Exam** | 1 | | 40 |
| **Quiz** | - | | - |
| **Assignments** | - | | - |
| **Attendance** | - | | - |
| **Recitations** | - | | - |
| **Projects** | - | | - |
| **Final Exam** | 1 | | 60 |
| | | **Total** | 100 |
| **ECTS Points and Work Load** | | | |
| **Activity** | **Count** | **Duration** | **Workload (Hours)** |
| **Lectures** | 14 | 2 | 28 |
| **Self-Study** | 15 | 2 | 30 |
| **Assignments** | - | - | - |
| **Presentation / Seminar Preparation** | - | - | - |
| **Midterm Exam** | 1 | 1 | 1 |
| **Recitations** | - | - | - |
| **Laboratory** | - | - | - |
| **Projects** | - | - | - |
| **Final Exam** | 1 | 1 | 1 |
| | | **Total Work Load** | 60 |
| | | **ECTS Points**(Total Work Load/ 28) | 2 |
| **Learning Outcomes** | | | |
| **1** | He / she plans and creates a composition by comprehending the functions of expression styles in writing. | | |

| | |
|---|---|
| **2** | Understands the intended use of punctuation marks and uses them correctly. |
| **3** | Understands the spelling rules of Turkish written language and reaches the consciousness of using these rules in daily life. |
| **4** | Explains the features of thought writings. In these writings, he / she gets an idea of how thought is developed. |
| **5** | Distinguish the types of thought writings. Learn about these species. Examines sample texts from Turkish Literature. |
| **6** | Determines the place of Turkish among the world languages. |
| **7** | He/She thinks about what culture is. Analyzes the relationship between cultures. |
| **8** | Understands the ties of culture with language. |
| **9** | Understands the grammar rules of Turkish. |
| **10** | Analyze grammar rules. |
| **11** | Uses grammatical rules in daily correspondence by internalizing them. |
| **12** | Analyze the types of correspondence. Understands the properties of these species |
| **13** | Examines effective reading methods. Determines which methods should be used in line with his own learning strategy. Becomes able to apply these reading methods in daily life. Develops a unique reading strategy |
| **14** | By analyzing the types of listening, he / she makes a synthesis about which listening methods he / she will use in communication with people in his / her daily life. |
| **15** | Understands the basic principles of effective speech. He thinks about how this style of speech should be done. Evaluates the effect of body language on speech. Analyzes the types of speech. |
| **16** | Explain the rules of pronunciation that must be paid attention to while speaking in an effective presentation. Understands how speaking will make the presentation more effective by paying attention to pronunciation features such as emphasis, intonation, and choking. |
| **Weekly Content** | |
| **1** | Language and Language Universities |
| **2** | Language and the Place of Turkish Language Among World Languages |
| **3** | Alphabets Used in the Writing of Turkish |

| | |
|---|---|
| **4** | Language-Culture Relationship |
| **5** | Phonetics, Sound Events |
| **6** | Morphology (Attachments in Turkish, Word Making) |
| **7** | Word Structure |
| **8** | Types of Words |
| **9** | Elements of the sentence |
| **10** | Sentence Types |
| **11** | Turkish vocabulary |
| **12** | Interaction Between Languages and The Effect of Turkish on World Languages |
| **13** | Current Problems of Turkish |
| **14** | The Effect of Mass Media on Language |
| **15** | - |

**Contribution of Learning Outcomes to Program Objectives (1-5)**

| | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|
| **1** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **2** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **3** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **4** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **5** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **6** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **7** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **8** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **9** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **10** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **11** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **12** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **13** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **14** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **15** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |
| **16** | 1 | 1 | 1 | 3 | 3 | 5 | 1 |

**Contribution Level:** 1: Low 2:Low-intermediate 3: Intermediate 4:High 5:Very High
*https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=tr&curSunit=208*

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|---|---|
| **Compiled by:** | Instructor Gül Ayşe AKAR |
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