# DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
# COURSE SYLLABUS

| Course Details | | | | | | |
|---|---|---|---|---|---|---|
| **Code** | | | | **Academic Year** | | **Semester** |
| EBT316 | | | | 3 | | 5 |
| **Title** | | | | **T** | **A** | **L** | **ECTS** |
| Nuclear Energy | | | | 3 | 2 | 0 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Language** | German | | | | | |
| **Level** | **Undergraduate** | **X** | **Graduate** | | **Postgraduate** | |
| **Department / Program** | Energy Science and Technology | | | | | |
| **Forms of Teaching and Learning** | Face-to-face | | | | | |
| **Course Type** | **Compulsory** | **X** | **Elective** | | | |
| **Objectives** | Fundamentals of Nuclear Engineering is a course in which the main topics of nuclear engineering education such as reactor physics, reactor technology, reactor safety, health physics, radiation physics and technology are all considered as parts of a whole and aims to provide students with a general nuclear engineering formation. | | | | | |
| **Content** | Radiation physics and technology. Nuclear reactor systems and types; basic reactor physics; criticality calculations; fuel cycles; reactivity changes; reactor kinetics. Instrumentation and control, radiation protection. Reactor materials, shielding, energy withdrawal. Reactor safety and economics. Waste treatment. Reactor design. | | | | | |
| **Prerequisites** | None | | | | | |
| **Coordinator** | Assoc. Prof. Şahin UYAVER | | | | | |
| **Lecturer(s)** | | | | | | |
| **Assistant(s)** | | | | | | |
| **Work Placement** | None | | | | | |

| Recommended or Required Reading | |
|---|---|
| **Books / Lecture Notes** | J.R. and Baratta, A.J., Introduction to Nuclear Engineering, Lamarsh, 3rd Edition, Prentice-Hall. |
| **Other Sources** | |

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

| Course Composition | | |
|---|---|---|
| **Mathematics und Basic Sciences** | - | % |
| **Engineering** | 100 | % |
| **Engineering Design** | - | % |
| **Social Sciences** | - | % |

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

## Assessment

| Activity | Count | Percentage (%) |
|---|---|---|
| **Midterm Exam** | 1 | 40 |
| **Quiz** | 0 | |
| **Assignments** | 0 | |
| **Attendance** | 0 | |
| **Recitations** | 0 | |
| **Projects** | 0 | |
| **Final Exam** | 1 | 60 |
| | **Total** | **100** |

## ECTS Points and Work Load

| Activity | Count | Duration | Work Load (Hours) |
|---|---|---|---|
| **Lectures** | 14 | 3 | 42 |
| **Self-Study** | 14 | 3 | 42 |
| **Assignments** | | | |
| **Presentation / Seminar Preparation** | | | |
| **Midterm Exam** | 1 | 2 | 2 |
| **Recitations** | 0 | | |
| **Laboratory** | 0 | | |
| **Projects** | | | |
| **Final Exam** | 1 | 2 | 2 |
| | | **Total Work Load** | **88** |
| | | **ECTS Points** (Total Work Load / Hour) | **6** |

## Learning Outcomes

| | |
|---|---|
| **1** | To have knowledge about nuclear technologies. |
| **2** | To have knowledge about radiation, radiation units, usage areas. |
| **3** | To have knowledge about radiation safety. |
| **4** | To have knowledge about nuclear energy production |
| **5** | To be familiar with the terminology of nuclear technologies. |
| **6** | To have basic knowledge about energy production by nuclear fission. |
| **7** | To know the formation and results of nuclear reactions |

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| | |
|---|---|
| **8** | To have basic knowledge about nuclear safety and waste management. |
| **Weekly Content** | |
| **1** | Nuclear physics terms |
| **2** | Radiation definition, units, measurement and applications |
| **3** | Radiation safety |
| **4** | Radioactivity |
| **5** | Nuclear reaction concept |
| **6** | Neutron particles and their interactions with matter |
| **7** | Nuclear fission |
| **8** | Midterm exam |
| **9** | Nuclear power generation units |
| **10** | Nuclear power generation units |
| **11** | How nuclear reactors work |
| **12** | Types of nuclear reactors |
| **13** | Types of nuclear reactors |
| **14** | Nuclear fuel cycles and waste management |

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

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

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

**P1 Working with modern scientific sources.**
**P2 Having modern scientific knowledge and scientific analysis abilities and being able to apply them to scientific problems.**
**P3 Having theoretical and practical skills in the area of Energy Science and Technology.**
**P4 Having foreign language skills to follow the worldwide advancements in the field of Energy Science and Technology and to be able to discuss them with foreign colleagues.**
**P5 Having computational skills for research data analysis purposes.**
**P6 Having appropriate skills for academic and industrial jobs, being ready to take responsibility in working life.**
**P7 Having knowledge about work occupational work and safety.**

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| **Compiled by:** | Res. Ass. Muhammed Cihat Mercan |
| **Date of Compilation:** | 26.08.2022 |