TÜRK-ALMAN ÜNİVERSİTESİ
TÜRKISCH-DEUTSCHE UNIVERSITÄT

COURSE INFORMATION PACKAGE

Department of Energy Science and Technology

Undergraduate Program

Course Type	Code	Course Title	Semester	Term
Compulsory Courses	PHY111	Physics I	1	Fall
	CHE111	Chemistry I	1	Fall
	EBT103	Introduction to Energy Science and Technology	1	Fall
	MAT103	Analysis I	1	Fall
	EBT105	Technical Drawing and Computer Aided Design	1	Fall
	ENG101	English I	1	Fall
	DEU121	Technical German I	1	Fall
	PHY112	Physics II	2	Spring
	CHE112	Chemistry II	2	Spring
	MAT112	Analysis II and Linear Algebra	2	Spring
	EBT104	Scientific Programming	2	Spring
	NWI106	Project Management	2	Spring
	ENG102	English II	2	Spring
	DEU122	Technical German II	2	Spring
	EBT201	Renewable Energy Technologies	3	Fall
	EBT203	Electrochemistry	3	Fall
	MAT201	Differential Equations	3	Fall
	NWI206	Electrotechnics	3	Fall
	TUR001	Turkish I	3	Fall
	AIT001	Ataturk's Principles and History of Turkish Revolution I	3	Fall
	ENG201	English III	3	Fall
	EBT204	Thermodynamics	4	Spring
	EBT206	Solid State Physics	4	Spring
	TUR002	Turkish II	4	Spring
	AIT002	Ataturk's Principles and History of Revolution II	4	Spring
	ENG202	English IV	4	Spring
	EBT301	Solar Energy Systems	5	Fall
	EBT303	Fluid Mechanics	5	Fall
	EBT305	Statistics	5	Fall
	EBT307	Introduction to Raw Materials and Energy	5	Fall
	EBT308	Applied Research Laboratory in Energy Science	6	Spring
	EBT302	Numerical Analysis	6	Spring
	EBT304	Wind Energy	6	Spring
	EBT306	Heat Transfer	6	Spring
	EBT401	Project I (Thesis Preparation and Seminar)	7	Fall
	EBT403	Energy Economy and Policies	7	Fall
	ISG001	Occupational Health and Safety I	7	Fall

	ENG301	Advanced English I	7	Fall
	EBT402	Project II (Graduation Thesis)	8	Spring
	EBT404	Seminar	8	Spring
	EBT402	Energy Management	8	Spring
	PRK400	Internship Seminar	8	Spring
	ISG002	Occupational Health and Safety II	8	Spring
	ENG302	Advanced English II	8	Spring
Compulsory Elective Courses	EBT311	Hydrogen Energy and Fuel Cells	5	Fall
	EBT313	Optimization in Energy Systems	5	Fall
	EBT315	Physics of Solar Cells	5	Fall
	EBT317	Characterization of Energy Raw Materials	5	Fall
	EBT312	Sustainable Energy	5	Spring
	EBT314	Energy Storage Systems	6	Spring
	EBT316	Nuclear Energy	6	Spring
	EBT411	Energy System Modeling and Simulation	7	Fall
	EBT413	Coal Processing and Technology	7	Fall
	EBT415	Clean Combustion Technologies	7	Fall
Elective Courses	NWI202	Physical Chemistry 2	4	Spring
	MAT204	Statistical Methods for Data Analysis	4	Spring
	NWT302	Materials Production and Processing Technologies	6	Spring
	EBT318	Operations Research	6	Spring
	EBT319	Measurement Techniques in Energy Systems	5	Fall
	NWI401	Scientific Study Methods	7	Fall
	EBT412	Electrical Machines	8	Spring
	MWT405	Functional Materials	7	Fall

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES

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	Energy Science and Technologies					
Forms of Teaching and Learning	Formal Education					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To inform students about essential political, economic, social, and cultural facts of the historical period from the late eighteenth century through the signing of Lausanne Treaty in 1923; in other words, to inform them about the background of these facts during the transition from the Ottoman Empire to the establishment of republican Turkey. To provide students with some examples of a multi-layered point to make them able to approach historical events in a multi-dimensional way. To introduce to student's certain basic theoretical concepts, discussions, and methods of thought of different social sciences, with a particular emphasis on history.					
Content	Basic political, economic, social, and cultural facts of the historical period beginning by the classical age of the Ottoman Empire and ending by the signing of Lausanne Treaty in 1923 - the fundamental academic interpretations on them.					
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 GÜNAYDIN					
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Derleme Ders Notu / Syllabus Georg Iggers, "Giriş", Yirminci Yüzyılda Tarihyazımı içinde, s. 1-21 Donald Quateert, "Osmanlı Tarihini incelemek Neden Gereklidir ?", Osmanlı İmparatorluğu içinde, s. 25-41 Eric Jan Zürcher, "Giriş: Dönemleme, Kuram ve Yöntem", Modernleşen Türkiye'nin Tarihi içinde, s. 11-20 Eric Jan Zürcher, "Onsekizinci Yüzyıl Sonunda Osmanlı İmparatorluğu", Modernleşen Türkiye'nin Tarihi içinde,s 23-38 Niyazi Berkes, "İç ve Dış Engeller", Türkiye'de Çağdaşlaşma içinde,s. 65-80 Peter Burke, Tarih ve Toplumsal Kuram, s. 129-137 Eric Jan Zürcher, "Gelenek ve Bid'at Arasında", Modernleşen Türkiye'nin Tarihi içinde, s. 39-77 Şerif Mardin, "Tanzimat Fermanı'nın Manası", Türkiye'de Toplum ve Siyaset içinde, İstanbul: İletişim Yayınları, s. 288-310. İlber Ortaylı, "Osmanlı Tarihinde Bab-ı Ali Asrı", İmparatorluğun en Uzun Yüzyılı içinde, s. 77-107 Eric Jan Zürcher, "1873-1878 Bunalımı ve Sonuçları" ve "Gerici İstibdat ya da Islahatların Doruğu? Sultan II. Abdülhamit Saltanatı".

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COURSE SYLLABUS

Other Sources	Derleme Ders Notu / Syllabus Georg Iggers, "Giriş", Yirminci Yüzyılda Tarihyazımı içinde, s. 1- 21 Donald Quateert, "Osmanlı Tarihini incelemek Neden Gereklidir ?", Osmanlı İmparatorluğu içinde, s. 25-41 Eric Jan Zürcher, "Giriş: Dönemleme, Kuram ve Yöntem", Modernleşen Türkiye'nin Tarihi içinde, s. 11-20 Eric Jan Zürcher, "Onsekizinci Yüzyıl Sonunda Osmanlı İmparatorluğu", Modernleşen Türkiye'nin Tarihi içinde,s 23-38 Niyazi Berkes, "İç ve Dış Engeller", Türkiye'de Çağdaşlaşma içinde,s. 65-80 Peter Burke, Tarih ve Toplumsal Kuram, s. 129-137 Eric Jan Zürcher, "Gelenek ve Bid'at Arasında", Modernleşen Türkiye'nin Tarihi içinde, s. 39-77 Şerif Mardin, "Tanzimat Fermanı'nın Manası", Türkiye'de Toplum ve Siyaset içinde, İstanbul: İletişim Yayınları, s. 288-310. İlber Ortaylı, "Osmanlı Tarihinde Bab-ı Ali Asrı", İmparatorluğun en Uzun Yüzyılı içinde, s. 77-107 Eric Jan Zürcher, "1873-1878 Bunalımı ve Sonuçları" ve "Gerici İstibdat ya da Islahatların Doruğu ? Sultan II. Abdülhamit Saltanatı", Modernleşen Türkiye'nin Tarihi içinde, s. 109-136 Eric Jan Zürcher, "İkinci Meşrutiyet Dönemi", Modernleşen Türkiye'nin Tarihi içinde, s. 139-186 Zafer Toprak, "Milli İktisat", Tanzimat'tan Cumhuriyet'e Ansiklopedisi içinde, s. 740-747. Eric Jan Zürcher, "İdeolojik Tartışmalar", Modernleşen Türkiye'nin Tarihi içinde, s. 186-193 Gökçen-Faruk Alpkaya, "I. Dünya Savaşı", 20. Yüzyıl Dünya ve Türkiye Tarihi içinde, s. 71-79. Eric Jan Zürcher, "Bağımsızlık Savaşı", Modernleşen Türkiye'nin Tarihi içinde, s 194-196 Toktamış Ateş, "Savaş Dönemi", Türk Devrim Tarihi içinde, s. 71-159 Taner Timur, "Milli Kurtuluş Savaşı", Türk Devrimi ve Sonrası içinde, Ankara: İmge Yayınevi, s. 13-61. Ahmet Mumcu, 'Kurtuluş Savaşı'nın Bitişi (Mudanya Ateşkes Antlaşması / Saltanatın Kaldırılması /Lozan Antlaşması), Atatürk İlkeleri ve İnkılâp Tarihi I içinde, Eskişehir: Açıköğretim Fak. Yay., s. 212-233.

Additional Course Material	
Documents	None
Assignments	None
Exams	None

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		**%**

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COURSE SYLLABUS

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	The students will learn meaning and benefits of historical researches.
2	The students will learn the pre-modern Ottoman history in general.
3	The students will be able to evaluate Ottoman history within the European modernization process.
4	The students will be able to evaluate 19.th century Ottoman history within the context of reform efforts.
5	The Students will be able to understand and evaluate the present in relation to the history of the Ottoman Empire and the Republic of Turkey.

Weekly Content	
1	Introduction: The Possibilities and the limitations of history: basic concepts
2	Social and Administrative Structure of the Ottoman State, before the attempts of modernization: From 16th to the 18th Century
3	Transformation in the Social and Administrative Structure of the Ottoman State, before the attempts of modernization: 18th Century
4	The meaning of the modernization and the formation of the modern state
5	The Tanzimat Era (1839-1876): The Reconstruction of the centralized state
6	The Era of Abdülhamid II (1876-1908): Defensive Modernization
7	The Era of Second Constitutional Monarchy: Pluralism in the Public Sphere
8	The First World War: “Total War” and the rise of the nationalism
9	Midterm Exam

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10	The General Social and Political Situation in the world and in the Ottoman State after the First World War
11	National Pact and National Independence
12	The War of Independence I: The Political Developments
13	The War of Independence I: The Military Developments The Formation and the Contents of the Lausanne Treaty
14	The Formation and the Contents of the Lausanne Treaty

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

	P1	P2	P3	P4	P5	P6	P7	P8	P9
1	1	1	1	1	2	1	1	2	1
2	1	1	1	1	2	1	1	2	1
3	1	1	1	1	2	1	1	2	1
4	1	1	1	1	2	1	1	2	1
5	1	1	1	1	2	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=5706

Compiled by:	Res. Assist. Başak Berkün
Date of Compilation:	20.05.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
AIT002	2			4
Title	**T**	**A**	**L**	**ECTS**
Atatürk's Principles and History of Revolution II	2	-	-	2

Language	Turkish					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Formal Education					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The aim of this course is examine the reforms, which were made from the start of Turkish Republic, and the historical events, which occurred in Second World War era and in the following periods, comparatively with reflections to the contemporary.					
Content	Content of the Course: In the scope of this course, the reforms, which were made with the proclamation of the republic, and the reasons of those reforms, the reflections of those reforms to politics with reflections to the contemporary, will be examined; considering how Second World War changed the world politics and history, reflections of it to Turkey, new concepts and bases of international policy, 1960's and military coups, which were made in the following periods, will be examined, together with 1961 and 1982 Constitutions.					
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 GÜNAYDIN					
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	None
Other Sources	Eric Jan Zürcher, "Modernleşen Türkiye'nin Tarihi", İletişim yayınları, 2012. Bülent Tanör, "Kuruluş- Kurtuluş", Cumhuriyet Kitapları, 2010. Feroz Ahmad, "Modern Türkiye'nin Oluşumu", Kaynak Yayınları, 1999. 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		%

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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	**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.

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5	Students will be able to evaluate today within the context of Republican history.
Weekly Content	
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	P8	P9	P10
1	1	1	1	1	2	1	1	2	1	
2	1	1	1	1	2	1	1	2	1	
3	1	1	1	1	2	1	1	2	1	
4	1	1	1	1	2	1	1	2	1	
5	1	1	1	1	2	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=5706	
Compiled by:	Res. Assist. Başak BERKÜN
Date of Compilation:	23.05.2022

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MAB309	3			Fall
Title	**T**	**A**	**L**	**ECTS**
Fluid Mechanics	3	1	1	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	This module provides the basic knowledge of fluid mechanics required for the energy science and the ability to apply it in simple engineering-practical applications.					
Content	Fluid properties, hydrostatic, flow kinematics and kinetics, conservation laws (control volume, Euler, Navier-Stokes, Reynolds), potential, groundwater and boundary layer flows, pipe and channel flows, flow forces, similarity theory					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	• Çengel, Y.A., & Cimbalak, J.M., 2004, Fluid Mechanics, McGraw Hill. • Leopold Böswirth, 1993, Technische Strömungslehre Lehr- und Übungsbuch, Sabine Bschorer Wiesbaden Springer Verlag 2014.
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering	60	%
Engineering Design	40	%
Social Sciences		%
Educational Sciences		%

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Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	2	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	3	42
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	2	3	6
Recitations			
Laboratory	14	2	28
Projects			
Final Exam	1	3	3
		Total Work Load	**121**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	Student learns the flow movement
2	Students can apply fluid mechanics in simple engineering-practical structures.
3	
4	.
5	
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7	
8	

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COURSE SYLLABUS

9	
10	
11	
12	
Weekly Content	
1	Fundamentals of Fluid Mechanics
2	
3	
4	
5	
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7	
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9	
10	
11	
12	
13	
14	
15	

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

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

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

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Date of Compilation:	

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Course Details				
Code	**Academic Year**			**Semester**
MAT112	1			Spring
Title	**T**	**A**	**L**	**ECTS**
Analysis II and Linear Algebra	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	To make students use matrices, partial derivative and integral concepts in multivariable functions, to gain ability to use mathematics knowledge to solve scientific problems					
Content	Vectors, Real Matrices, Determinants, Linear Equation Systems, Gauss Algorithm, Linear Functions, Complex Matrices, Fourier Series, Multidimensional Derivatives and Integrals, Ordinary and Multidimensional Integrals, Laplace Transformation					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Şanal Ziya, Mathematik für Ingenieure, Vieweg+Teubner, Wiesbaden 2009. Papula Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2, Wiesbaden 2011. Skriptum „Analysis I für Ingenieure“, Prof. Dr. Dirk Ferus - Skriptum „Analysis II für Ingenieure“, Prof. Dr. Dirk Ferus.
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	100	%
Engineering		%
Engineering Design		%
Social Sciences		%

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Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	30
Self-Study	14	4	75
Assignments	14	3	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	4	2
		Total Work Load	**178**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	Solve the systems of linear equations. Provide arithmetic operations with matrices. Compute the inverse of matrix.
2	Determine the value of determinant of a matrix. Use Cramer rule to solve the systems.
3	.Learn the importance of the concepts of vector space, basis and dimension.
4	Compute the matrix representation of a linear transformation.
5	Find an orthonormal basis using the Gram-Schmidt process.
6	Evaluate the eigenvalues and the corresponding eigenvectors of the matrix.
7	

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COURSE SYLLABUS

8	
9	
10	
11	
12	
Weekly Content	
1	Matrices and Systems of Equations
2	Matrices and Systems of Equations
3	Matrices and Systems of Equations
4	Determinants
5	Determinants / Vector Space
6	Vector Space
7	Vector Space
8	Midterm
9	Vector Space / Linear Transformations
10	Linear Transformations
11	Eigenvalues
12	Eigenvalues / Orthogonality
13	Orthogonality
14	Orthogonality
15	

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

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

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

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY

COURSE SYLLABUS

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENEGY SCIENCE AND TECHNOLOGIES
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Course Details				
Code	**Academic Year**			**Semester**
MAT103	1			1
Title	**T**	**A**	**L**	**ECTS**
Analysis 1	3	2		6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Students should. -Develop an understanding of and ability to work with functions in one-dimensional space, -Master the differential and integral calculus for functions of a real variable as a prerequisite for working with mathematical models in engineering, -master the vector and matrix calculus.					
Content	1) Number representations, real numbers 2) equations, inequalities, systems of linear equations 3) vectors and vector spaces, vector geometry, vector algebra 4) matrices, matrix algebra 5) Coordinate systems, coordinate transformations 6) Number sequences, convergence 7) Limit and continuity of functions, 8) Elementary rational and transcendental functions 9) Complex numbers and functions 10) Differentiation, extreme values, mean value theorem 11) Higher derivatives, Taylor polynomial and series 12) Applications of differentiation 13) Definite and indefinite integral 14) Fundamental theorem of analysis 15) Improper integrals, Fourier series					
Prerequisites	-					
Coordinator	Dr. Orkide Coşkuner Weber					
Lecturer(s)	Dr. Orkide Coşkuner Weber					
Assistant(s)						
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	1) Papula Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2 2) P. Furlan, Das Gelbe Rechenbuch 1+2 3) Skriptum „Analysis I für Ingenieure“, Prof. Dr. Dirk Ferus 4) Gilbert Strang, Calculus (MIT) 5) G.B. Thomas, R.L. Finney, Calculus and Analytic Geometry
Other Sources	Şanal Ziya, Mathematik für Ingenieure, Vieweg+Teubner, Wiesbaden 2009

DEPARTMENT OF ENEGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Additional Course Material		
Documents		
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	2	30
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	5	70
Assignments	5	5	25
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**171**

DEPARTMENT OF ENEGY SCIENCE AND TECHNOLOGIES

COURSE SYLLABUS

ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

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

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

	P1	P2	P3	P4	P5	P6	P7
1							

DEPARTMENT OF ENEGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details						
Code			**Academic Year**			**Semester**
EBT104			1			2
Title			**T**	**A**	**L**	**ECTS**
Scientific Programming			2	0	2	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	To give basic information about Scientific Programming, data structures and algorithms					
Content	Students get an overview of the structure and operating principles of computers. They learn different programming paradigms and their advantages and disadvantages. Thus, they can choose the appropriate one for the problems they face. Theoretical computer science learning, such as data structures and algorithms, is followed by concrete applications, during which the use of program controls is reinforced. Structure and working principle of the computer, Boolean Algebra, Data structures and algorithms (List, Tree, Graph, etc.), Types of programming, Turing machine, Algorithm analysis, Computational complexity theory, Landau symbols (Big O notation), Functions and program control (Loop, Branch), Applications					
Prerequisites	None					
Coordinator						
Lecturer(s)	Assoc. Prof. Şahin UYAVER					
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	• Algorithmik: Die Kunst des Rechnens, David Harel, Springer, Deutschland, 2006 (Orjinal: Algorithmics: The Spirit of Computing, David Harel, Addison-Wesley, Great Britain, 2004
Other Sources	

Additional Course Material	
Documents	-
Assignments	-
Exams	-

Course Composition		
Mathematics und Basic Sciences	40	%
Engineering	40	%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	20	%
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	15	2	30
Self-Study	15	3	45
Assignments	5	15	75
Presentation / Seminar Preparation			
Midterm Exam			
Recitations			
Laboratory	15	2	30
Projects			
Final Exam	1	2	2
		Total Work Load	**182**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	To give basic information about programming, data structures and algorithms.
2	
3	
4	

Weekly Content

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

1	How does a computer think? How to interact with it? How does it work?
2	Introduction to data types and structures, logical operators, functions, data analysis.
3	Programming languages used in numerical sciences
4	Package management, code profiling and optimization.
5	Algorithms
6	Flowchart
7	Creation of "if" conditional statements (if)
8	Information about loops and the establishment of loops (Loops)
9	User-defined functions and their usage
10	Case Studies from Basic Sciences I
11	Case Studies from Basic Sciences II
12	Case Studies from Basic Sciences III
13	Case Studies from Basic Sciences IV
14	Case Studies from Basic Sciences V

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1	5	5	5	5	5	5	5
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.

Compiled by:	
Date of Compilation:	26.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
NWI401	4			7
Title	**T**	**A**	**L**	**ECTS**
Scientific Study Methods	2	0	0	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To provide the student with the ability to analyze the problem/system with which he/she is dealing and to develop solution ideas considering theoretical knowledge. To provide a useful experience through a self study to take the first step to his/her new career which will start after graduation. The student will communicate his/her study efficiently, verbal and written, so he/she will learn to express himself/herself better.					
Content	İ. To provide the student with the ability to analyze the problem/system with which he/she is dealing and to develop solution ideas considering theoretical knowledge. İİ. To provide a useful experience through a self study to take the first step to his/her new career which will start after graduation. İİİ. The student will communicate his/her study efficiently, verbal and written, so he/she will learn to express himself/herself better.					
Prerequisites						
Coordinator						
Lecturer(s)	Asist Prof.Dr. Duygu Ekinci					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering	40	%
Engineering Design	40	%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge	20	%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	5	4	20
Assignments			
Presentation / Seminar Preparation	1	10	10
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**62**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Formulate and analyze a problem by examining the current status
2	Develop applicable suggestions and/or solution methods for the problem dealt with, considering theoretical knowledge.
3	Gain the ability to implement a solution method to an existing problem and will be able to evaluate the results.
4	Learn to express himself/herself by reporting and presenting the work.
5	Learn to defend the idea that underlines the results of the study.

Weekly Content

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

1	Project work, literature search, presentations of exemplary studies from the methods of Materials science;

Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1	5	5	5	5	5	5	5
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Course Details				
Code	**Academic Year**			**Semester**
EBT317	3			6
Title	**T**	**A**	**L**	**ECTS**
Characterization of Energy Raw Materials	2	0	2	4

Language	English					
Level	**Undergraduate**	x	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	X		
Objectives	It is aimed to teach the detailed scientific and engineering knowledge of characterization of energy raw materials for the graduate level students enrolled in TAU FBE programs aiming to work in the fields of energy, materials, metallurgical, mining, mineralogical and chemical industries and academy.					
Content	The Concept of Characterization of Energy Raw Materials, Basic Principles and Methods, Laboratory Characterization and Tests, Scientific Thought Method, Research Types and Data Collection Methods, Using Computer in Text Creation and Using Internet Resources.					
Prerequisites						
Coordinator						
Lecturer(s)	Prof. Dr. Şafak Gökhan ÖZKAN					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Laskowski, J. (2001). Coal flotation and fine coal utilization. Elsevier., First Edition ISBN: 0-444-50537-7
Other Sources	Ateşok, G. (2004). Kömür hazırlama ve teknolojisi. YMGV, 375s

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%20

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

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

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	25
Quiz		
Assignments	5	15
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	12	2	24
Self-Study	14	5	70
Assignments	6	6	36
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory	2	3	6
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**8**

Learning Outcomes

1	Basic Principles of Characterization of Energy Raw Materials
2	Energy Raw Materials Characterization Laboratory
3	Importance of Caharacterization for Energy Raw Material Industries

Weekly Content

1	Introduction to Characterization of Energy Raw Materials

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

2	Classification of Energy Raw Materials
3	Introduction Sampling and Physical Characterization Methods
4	Particle Size Analysis Methods
5	Laboratory-Particle Size Analysis
6	Mid-term Exam
7	Basic Principles of Instrumental Analysis
8	Optical and Sesor-based Characterization
9	XRF and XRD Methods
10	Laboratory-Sensor-based Analysis
11	Wet-type Chemical Analysis
12	Thermal Characterization Methods
13	Laboratory-TGA-DTA
14	Other Modern Chemical Analysis Methods

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

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	Prof. Dr. Şafak Gökhan ÖZKAN
Date of Compilation:	14.04.2021

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Course Details

Code	Academic Year			Semester
EBT415	4			8
Title	**T**	**A**	**L**	**ECTS**
Clean Combustion Technologies	3	2	0	6

Language	German
Level	**Undergraduate** x **Graduate** **Postgraduate**
Department / Program	Energy Science and Technology
Forms of Teaching and Learning	Formal
Course Type	**Compulsory** **X** **Elective**
Objectives	1. Explaining that fossil fuels can be used without harming the environment. 2. Introduction of clean combustion technologies for fuels. 3. To train human resources who can carry out R&D studies aiming to realize the transformation of energy resources in an efficient way in terms of total benefit.
Content	It is aimed to introduce different technologies that will enable the use of fossil fuels in a way that causes the least harm to the environment. By considering these technologies separately, zero emission power cycles, catalytic combustion techniques and fluidized bed systems will be explained. Technologies related to the reduction of post-combustion emissions will also be given in the course.
Prerequisites	
Coordinator	
Lecturer(s)	
Assistant(s)	
Work Placement	No

Recommended or Required Reading

Books / Lecture Notes	1) Yantovski, E, P. Gorski, Shokotov, M, Zero Emission PowerPlants, Taylor and Francis, 2009. 2) Jaccard, M., Sustainable Fossil Fuels, Cambridge University Press, 2006. 3) Simeon, NO, E.J. Anthony, Fluidized Bed Combustion, Marcell Dekker Inc., 2004) Hayes, R.E., S.T. Kolaczkowski, Introduction to Cathalytic Combustion,, Gordon and Breach Science Publishers, 1997.
Other Sources	

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm exam-1 Final

Course Composition

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

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

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

Learning Outcomes

1	To be able to use basic knowledge about thermodynamics, power cycles and combustion.
2	To be able to express the problems related to the transformation of energy sources.
3	Understand systems such as zero emission power cycles, techniques such as catalytic combustion and fluidized bed.
4	To be able to follow basic researches on designs that provide efficient conversion of energy resources in terms of total utility.

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Weekly Content	
1	Definitions of sustainability, efficiency, effectiveness.
2	Fossil Fuel Types
3	Basics of combustion
4	Combustion kinetics
5	Power cycles
6	Limitation of contaminants during incineration
7	Control of air/fuel ratio
8	Temperature control
9	Catalytic combustion
10	Zero emission power cycle examples
11	Development of fluidized bed boilers
12	Fundamentals of gas-solid fluidization
13	Heat and mass transfer in fluidized beds
14	Comparison of energy conversions in terms of total efficiency

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

	P1	P2	P3	P4	P5	P6	P7
1	2	3	2	2		3	3
2	3	3	3	2		3	3
3	3	3	3	2		3	3
4	3	3	3	3		3	3

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	24.08.2022

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Course Details				
Code	**Academic Year**			**Semester**
EBT413	4			7
Title	**T**	**A**	**L**	**ECTS**
Coal Processing and Technology	2	0	2	4

Language	English					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**		**Elective**	X		
Objectives	It is aimed to teach the detailed scientific and engineering knowledge of coal processing and technology for the graduate level students enrolled in TAU FBE programs aiming to work in the fields of energy, materials, metallurgical, mining, mineralogical and chemical industries and academy.					
Content	The Concept of Coal Processing and Technology, Basic Principles and Methods, Laboratory Characterization and Tests, Scientific Thought Method, Research Types and Data Collection Methods, Using Computer in Text Creation and Using Internet Resources.					
Prerequisites						
Coordinator						
Lecturer(s)	Prof. Dr. Şafak Gökhan ÖZKAN					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Laskowski, J. (2001). Coal flotation and fine coal utilization. Elsevier., First Edition ISBN: 0-444-50537-7
Other Sources	Ateşok, G. (2004). Kömür hazırlama ve teknolojisi. YMGV, 375s.

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%20

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

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

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	25
Quiz		
Assignments	5	15
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	12	2	24
Self-Study	14	5	70
Assignments	6	6	36
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory	2	3	6
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**8**

Learning Outcomes

1	Basic Principles of Coal Processing
2	Coal Processing Laboratory
3	Coal Processing Design

Weekly Content

1	Introduction to Coal Preparation and Processing

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

2	Introduction to Coal Characterization
3	Sampling and Ore Handling
4	Communition, Crushing, Sizing and Grinding
5	Laboratory-Communition and Sieving
6	Mid-term Exam
7	Basic Principles of Coal Washing
8	Introduction to Coal Gravity Separation
9	Coal Gravity Separation Methods
10	Laboratory-Coal Washing
11	Coal Surface Properties and Floatability
12	Laboratory-Froth Flotation
13	Coal Flotation Technolgy and Reagents
14	Fine Coal Utilization

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

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	Prof. Dr. Şafak Gökhan ÖZKAN
Date of Compilation:	14.02.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MAT201	2			3
Title	**T**	**A**	**L**	**ECTS**
Differential Equations	2	2	1	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The students should • understand the essential mathematical concepts of differential equations •have the methodical foundations for the mathematical foundation of natural and engineering sciences, • have a sound knowledge of scientific and mathematical content, principles and methods, • Master basic concepts and techniques and apply them to various (physical) problems. Knowledge & Understanding: 70% Analysis & Methodology: 30%					
Content	• Differential equations 1st order • Linear differential equations of 2nd order, in particular with constant coefficients • Separation solutions • Integrating factor • indefinite coefficients and variation of the constants, • sinusoidal and exponential disturbance functions, • Nonlinear autonomous systems, critical points and phase diagrams • existence and uniqueness, stability • modeling • Numerical and graphical solution methods • systems of linear differential equations; Eigenvalues, eigenvectors, fundamental matrices • Laplace transformation, solution of the linear differential equations with Laplace transformation • Delta function, convolution					
Prerequisites						
Coordinator						
Lecturer(s)	Asist Prof.Dr. Neşe Aral					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Şanal Ziya, Mathematik für Ingenieure Papula Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Band 2
Other Sources	Gilbert Strang, Differential Equations and Linear Algebra George Simmons, Differential Equations with Applications and Historical Notes P. Furlan, Das Gelbe Rechenbuch 3

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

	Skriptum „Integraltransformationen und partielle Differentialgleichungen für Ingenieure“, Prof. Dr. Dirk Ferus MIT Open Courseware – Differential Equations MIT Mathlets – Interactive Mathematics
Additional Course Material	
Documents	
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		30
Quiz		
Assignments		10
Attendance		
Recitations		10
Projects		
Final Exam		50
	Total	**100**

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	28	1	28
Self-Study	60	1	60
Assignments	1	8	8
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	28	1	28
Laboratory	14	1	14
Projects			

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Final Exam	1	2	2
		Total Work Load	**142**
		ECTS Points (Total Work Load / Hours)	**5**

Learning Outcomes	
1	Model a simple, physical system in the form of a first-degree DE.
2	To test the plausibility of a solution of a DE (analyzing extreme cases, graphic analysis, reality check, control of units ...).
3	Visualize solutions of a DE using directional fields and approximate them using the Eulerian method.
4	Find and classify critical points of an autonomous DE, and describe with them the qualitative behavior of the solutions.
5	Know basic types of DEs and use them to model exponential growth / decay, spring-mass systems, LRC circles, etc.
6	Solve DEs with different interfering functions (zero, constant, exponential, sinusoidal, step function, impulse, superpositions of these).
7	Understand and use the following properties of linear systems: Solution, Stability, Transient, Steady State, Phase Response, Amplitude Response, Amplitude Phase Shape, Weight and Transfer Functions, Pole Diagram, Resonance, Fundamental Matrix.
8	Use the following techniques to solve DEs: characteristic equation, exponential response formula, laplace transformation, convolution integral, Fourier series, complex arithmetic, parameter variation, elimination and anti-elimination, matrix eigenvalue method.
9	Know the basic concepts of linearity, superposition, existence, and uniqueness of solutions and use them to solve DEs.

Weekly Content	
1	Intro
2	1. order DE
3	2. Order, const. coeff. LDE
4	Separation of variables
5	Integrating factor
6	undetermined coeff and variation of constants Unbestimmte Koeffizienten und Variation der Konstanten
7	Sine and exponantial forcing functions
8	Nonlinear Autonomous Systems, Critical Points and Phase Diagrams
9	Existence and uniqueness, stability
10	Modeling
11	Numerical and graphical solutions
12	System of LDEs
13	Eigenvalues, eigenvectors, fundamental matrices
14	Laplace transformation, solution of the linear differential equations with Laplace transformation

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
EBT412	3			5
Title	**T**	**A**	**L**	**ECTS**
Electrical Machines	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**			**Elective**	X		
Objectives	To learn how Electrical Machines work.						
Content	Physical principles of electromechanical energy conversion; Three-phase systems and rotating magnetic fields; Structure, operation and performance of DC machines, Transformers, Asynchronous machines, Synchronous machines, AC motors; Scope of application; Structure and basics of drivers; Power electronics fundamentals, Motor control with drives.						
Prerequisites	None						
Coordinator							
Lecturer(s)							
Assistant(s)							
Work Placement	None						

Recommended or Required Reading

Books / Lecture Notes	Elektrische Maschinen, R. Fischer, Springer Verlag, Berlin, 2013. Elektrische Maschienen und Antriebe, K. Fuest, P. Döring, Springer Verlag, Berlin, 2007 Elektrische Antriebe, D. Schröder, Regelung von Antriebssystemen, Springer Verlag, Berlin, 2015.
Other Sources	Elektrische Antriebe in der Fahrzeugstechnik, G. Babiel, Vieweg/Teubner, 2009.

Additional Course Material

Documents	
Assignments	
Exams	Midterm + Final

Course Composition

Mathematics und Basic Sciences		%
Engineering	30	%
Engineering Design	30	%

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COURSE SYLLABUS

Social Sciences		%
Educational Sciences		%
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	14	3	42
Self-Study	14	3	42
Assignments	5	8	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	5	6	30
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**158**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	To understand how electrical machines work.

Weekly Content

1	Physical principles of electromechanical energy conversion
2	Three-phase systems and rotating magnetic fields
3	Construction, operation and performance of DC machines
4	Transformers
5	AC motors; Scope of application

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

6	Structure and basics of drivers; Power electronics fundamentals, Motor control with drives.
7	Direct Current Machines
8	Direct Current Machines
9	Midterm
10	Basic Laws
11	Basic Laws
12	Synchronous machines
13	Asynchronous machines
14	Asynchronous machines

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

	P1	P2	P3	P4	P5	P6	P7
1	3	3	3	3	3	3	3

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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT203	2			3
Title	**T**	**A**	**L**	**ECTS**
Electrochemistry	3	1	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	To introduce the basic concepts of electrochemistry					
Content	Electrochemical terms and concepts: Electrical Conductivity.Electric charge. Current strength Ionic Conductivity: Equivalent Conductivity. Limit Equivalent Conductivity. Electrolytic Equilibria: Acids and Bases. Degree of Dissociation. Hydrolysis. Electrochemical Cells: Electrode Potentials. Electrode Types. Electrolysis: Overvoltage. Decomposition Voltage. Corrosion. Cathodic Protection.					
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	30	%
Engineering	40	%
Engineering Design	10	%
Social Sciences	-	%
Educational Sciences	-	%

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COURSE SYLLABUS

Natural Sciences	20	%
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	3	42
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation	1	20	20
Midterm Exam	1	3	3
Recitations	14	3	42
Laboratory			
Projects	1	20	20
Final Exam	1	3	3
		Total Work Load	**172**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Electrochemical concepts and their application
2	
3	
4	
5	

Weekly Content

1	Electrochemical Terms and Concepts
2	Ionic Conductivity

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COURSE SYLLABUS

3	Electrolyte Balances
4	Electrolyte Balances
5	Electrochemical Cells
6	Electrochemical Cells
7	Electrochemical Cells
8	Electrolysis
9	Electrolysis
10	Corrosion and Corrosion Protection Methods
11	Fuel Cells
12	Electrochemical Treatment Basis
13	Electrochemical Treatment Basis
14	Student Presentations
15	

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

	P1	P2	P3	P4	P5	P6	P7
1	5	5	5	5	5	5	5
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.

Compiled by:	
Date of Compilation:	25.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
NWI206	2			**3**
Title	**T**	**A**	**L**	**ECTS**
Electrotechnik	2	1	2	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The student can master the administration of electrotechnical units and quantities, calculate constant electric and magnetic fields, and analyze linear direct current networks. Vector diagrams, three-phase current and basic semiconductor circuits will be calculated, as well as trip operations and complex alternating current networks.					
Content	Electrical fundamentals: Charging, electrical current, electrical voltage, electrical work and power DC currents: Ohm's law, terms in electrical networks, Kirchhoff's theorems, linear DC circuits, ideal and real sources, Superposition, alternative sources. Electric field: capacitor, forces in the capacitor Magnetic field: force in current-carrying conductors, Ohm's law magnetic circuit, law of flow, ferromagnetism, law of induction, self-induction, inductances in the electric grid, forces in the magnetic field Switching operations: First order differential equations, switching RC and LR elements on and off AC currents: voltage generation, definition of mean and effective value, complex calculation, Kirchhoff's laws for AC circuits, complex impedances, apparent power, active power, reactive power, filter networks, three-phase current. Transformer electronics: line mechanisms, semiconductor components, integrated circuits, electrically powered converters					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Hagmann, Gert: Grundlagen der Elektrotechnik. AULA-Verl., 2006
Other Sources	Hagmann, Gert: Aufgabensammlung zu den Grundlagen der Elektrotechnik. AULA-Ver., 2006 Frohne, Heinrich; Moeller, Franz: Grundlagen der Elektrotechnik. Teubner, 2005

Additional Course Material	
Documents	

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COURSE SYLLABUS

Assignments		
Exams		

Course Composition		
Mathematics und Basic Sciences		20%
Engineering		30%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		40%
Health Sciences		%
Expert Knowledge		10%

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

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	15	2	30
Self-Study	15	4	60
Assignments	4	10	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	1	15
Laboratory	15	2	30
Projects			
Final Exam	1	2	2
		Total Work Load	**179**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

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COURSE SYLLABUS

1	Formulate and analyze a problem by examining the current status.
2	Develop applicable suggestions and/or solution methods for the problem dealt with, considering theoretical knowledge.
3	Gain the ability to implement a solution method to an existing problem and will be able to evaluate the results.
4	Learn to express himself/herself by reporting and presenting the work.
5	Learn to defend the idea that underlines the results of the study.
6	
7	
8	
9	
10	
11	
12	
Weekly Content	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

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

	P1	P2	P3	P4	P5	P6	P7
1							
2							
3							

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COURSE SYLLABUS

4							
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
PRK400	4			8
Title	**T**	**A**	**L**	**ECTS**
Internship	2	0	0	4

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Gathering knowledge and experience in the application fields of Energy Science.					
Content	Selected study topics in the application areas of Material Science - Product development / R&D - Materials and process development - Automation - Production / production planning - Assembly - Maintenance and overhaul - Project planning - Design and analysis - Test and verification - Quality control and quality management					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Engineering		30%
Engineering Design		30%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		40%

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	8	12	96
Assignments			
Presentation / Seminar Preparation			
Midterm Exam			
Recitations			
Laboratory			
Projects	1	20	20
Final Exam			
		Total Work Load	
		ECTS Points (Total Work Load / Hours)	

Learning Outcomes

1	Gathering experience in the application areas of Energy Science
2	Gathering experience in work flow and work processes
3	Gathering experience in planning and timing
4	Taking responsibility in working environment
5	Getting experience in team work

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

6	Getting experience about work safety
7	
8	
9	
10	
11	
12	
Weekly Content	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

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

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

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COURSE SYLLABUS

11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT103	1			1
Title	**T**	**A**	**L**	**ECTS**
Introduction to Energy Science and Technology	2	0	0	2

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	The aim of this course is; to provide students with information about energy and energy resources in general, to introduce students to energy conversion systems, to create awareness of energy use and energy efficiency.					
Content	Introduction to Energy Science, Energy Sources, Fossil Fuels, Renewable Energy Sources, Nuclear Energy, Energy Efficiency, Nuclear Energy, Energy Storage, Hydrogen Energy, Sustainable Energy, Environmental Policies, SWOT Analysis					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Archie, W. ve Culp, Jr., Principle of Energy Conversion Second Edition, McGraw-Hill, 1991. Cassedy, Edward S., and Peter Z. Grossman. Introduction to Energy: Resources, Technology, and Society. 2nd ed. Cambridge U.P., 1998.
Other Sources	

Additional Course Material	
Documents	-
Assignments	-
Exams	-

Course Composition		
Mathematics und Basic Sciences		%
Engineering	30	%
Engineering Design		%
Social Sciences	10	%

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COURSE SYLLABUS

Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge	60	%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	%40
Quiz	-	
Assignments	1	%20
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			
Assignments	1	8	8
Presentation / Seminar Preparation	1	4	4
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**44**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students taking this course will have general knowledge about Energy Science and Technologies, will be able to understand and analyze the concepts of unit and dimension, will recognize energy resources, will have energy efficiency awareness and will have information about the field.
2	
3	
4	
5	

Weekly Content

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

1	Definition of Energy and Energy Technologies, Basic Units and Dimensions Used in Energy Field
2	Classification of energy resources, current situation in the world in energy, SWOT Analysis
3	Fossil resources (coal, oil, natural gas)
4	Renewable energy sources (wind)
5	Renewable energy sources (hydraulic, wave, tidal)
6	Renewable energy sources (photovoltaic, thermal solar systems))
7	Renewable energy sources (biomass, geothermal)
8	Hydrogen energy
9	Nuclear energy
10	Energy transmission and storage
11	Energy efficiency
12	Sustainable Energy and Environmental Policies
13	Final project presentations
14	Final project presentations
15	

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

	P1	P2	P3	P4	P5	P6	P7
1	5	4	3	4	4	5	
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.

Compiled by:	
Date of Compilation:	25.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIE
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT403	4			7
Title	**T**	**A**	**L**	**ECTS**
Energy Storage Systems	2	1	1	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To give information on conventional and new energy storage methods and systems.					
Content	Modeling, analyzing and designing of electrical, electromechanical, thermal and chemical storage systems.					
Prerequisites						
Coordinator	Assoc. Prof. Dr. Şahin Uyaver					
Lecturer(s)						
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Energy Storage, Robert Huggins, Springer
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering	30	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	40	%
Health Sciences		%

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COURSE SYLLABUS

Expert Knowledge	30	%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz	0	0
Assignments	2	20
Attendance	0	0
Recitations	0	0
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	13	4	52
Assignments	5	10	50
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	2	28
Projects	1	2	2
Final Exam			
		Total Work Load	**176**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	The Students will be able to have Knowledge and ability to apply knowledge of mathematics, science and engineering Learning design.
2	The Students will be able to have knowledge of and ability to use modern engineering tools and techniques
3	The Students will be able to design and conduct a desired electrical engineering experiment, as well as to analyze and interpret data

Weekly Content

1	Requirement of energy storing
2	Conventional energy storing systems
3	Constraints for storage type
4	Thermal storage systems
5	Thermal storage systems

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COURSE SYLLABUS

6	Electromechanical storage systems
7	Flyweel
8	Midterm
9	Hydro based storage systems
10	Compressed air based energy storage systems
11	Batteries
12	Batteries
13	Super capacitors
14	Fuel cells

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

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT401	4			7
Title	**T**	**A**	**L**	**ECTS**
Energy Economy and Policy	2	2	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The students learn the complex relationships between technical, economic and political aspects of energy supply. You can understand the effects of industrial companies on the energy supply, determine practical degrees of freedom and economic determinants of operational energy supply and evaluate the effects of dynamic political framework conditions.					
Content	Introduction to the energy industry, energy law, introduction to energy policy, energy markets, use and regulation of energy networks, properties of electricity and natural gas supply, potential and importance of Demand Side Management (DSM), technical and economic aspects of industrial energy supply.					
Prerequisites						
Coordinator	Assoc. Prof. Dr. Şahin Uyaver					
Lecturer(s)						
Assistant(s)						
Work Placement	No					

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

Additional Course Material	
Documents	-
Assignments	-
Exams	-

Course Composition		
Mathematics und Basic Sciences		%
Engineering	60	%
Engineering Design		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Social Sciences		%
Educational Sciences		%
Natural Sciences	40	%
Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	13	4	52
Assignments	5	10	50
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	2	28
Projects	1	2	2
Final Exam			
		Total Work Load	**176**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	The students learn the complex relationships between technical, economic and political aspects of energy supply. You can understand the effects of industrial companies on the energy supply, determine practical degrees of freedom and economic determinants of operational energy supply and evaluate the effects of dynamic political framework conditions.

Weekly Content

1	Introduction to the energy industry, energy law, introduction to energy policy, energy markets, use and regulation of energy networks, properties of electricity and natural gas supply, potential and importance of Demand Side Management (DSM), technical and economic aspects of industrial energy supply.

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY

COURSE SYLLABUS

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT411	4			**8**
Title	**T**	**A**	**L**	**ECTS**
Energy Systems Modeling and Simulation	2	1	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Students who successfully complete this course; Successful students will be able to apply basic principles for modeling and simulation. Successful students will be able to apply statistical and theoretical modeling techniques. Successful students will be able to use various computer programs for modeling and simulation. Successful students will be able to create models using concepts of heat transfer, mass transfer, fluid mechanics and thermodynamics. Successful students will be able to use various optimization techniques for engineering problems.					
Content	An introduction to modeling, simulation and optimization issues in this course; to cover various statistical and theoretical modeling techniques; modeling and simulation with various computer programs; Modeling and simulation of energy systems problems is aimed. Topics covered in the course: statistical methods; simple linear regression; polynomial regression; multiple linear regression; Theoretical models based on concepts of heat transfer, mass transfer, fluid mechanics and thermodynamics; various optimization techniques.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Probability & Statistics for Engineers & Scientists (9th Edition) – Walpole, ISBN 978-0-321-62911-1 Data Mining Methods and Models, Daniel T. Larose, Wiley, ISBN-13 978-0-471-66656-1 Discovering Knowledge in Data, Daniel T. Larose, Wiley, ISBN 0-471-66657-2
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Composition		
Mathematics und Basic Sciences		%
Engineering		40%
Engineering Design		40%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		20%

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

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	15	2	30
Self-Study	15	4	60
Assignments	4	10	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	1	15
Laboratory	15	2	30
Projects			
Final Exam	1	2	2
		Total Work Load	**179**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes	
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DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT402	2			4
Title	**T**	**A**	**L**	**ECTS**
Optimization in Energy Systems	2	1	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**		**Elective**	**X**		
Objectives	To provide students with analysis knowledge and skills of different energy conversion plants To gain optimization skills in energy system issues					
Content	Basic concepts of optimization, optimization methods of energy systems, Objective function (thermodynamic, economic, thermoeconomic), optimization methods, Linear Programming, Nonlinear programming, Simplex method, Optimization Application Methods in energy conversion plants					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Design Analysis of Thermal Systems", W.F. Stoecker. (McGraw Hill,1989) Introduction to Optimum Design", F.S.Arora (McGraw Hill, 1989) Optimization of Chemical Presses", T.F. Edger (McGraw Hill, 1989)
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		% 30
Engineering		% 30
Engineering Design		% 40
Social Sciences		% 0

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COURSE SYLLABUS

Educational Sciences		% 0
Natural Sciences		% 0
Health Sciences		% 0
Expert Knowledge		% 0

Assessment

Activity	Count	Percentage (%)
Midterm Exam	2	% 50
Quiz	0	% 0
Assignments	2	% 10
Attendance	0	% 0
Recitations	0	% 0
Projects	0	% 0
Final Exam	1	% 40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	13	3	26
Self-Study			
Assignments	2	13	26
Presentation / Seminar Preparation			
Midterm Exam	2	12	24
Recitations			
Laboratory			
Projects			
Final Exam	1	14	14
		Total Work Load	**90**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Knows the concepts of optimization problem.
2	It can turn energy systems problems into optimization problems.
3	Can solve optimization problems.
4	The computer can be used in solving optimization problems.
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

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Weekly Content	
1	Optimization Basic Concepts
2	Optimization methods in energy systems
3	Optimization Concept and Its Elements (Purpose, Function, Constraint etc.)
4	One-Dimensional Unconstrained Optimization
5	One Dimensional Constraint Optimization
6	Multidimensional Constraint Optimization
7	Linear and Non-Linear Equation Solutions
8	Midterm Exam 1
9	Optimization in Energy Systems - Example
10	Optimization in Energy Systems
11	Optimization Application in Energy Systems
12	Linear Programming
13	2nd Midterm Exam / Linear Programming and Graphic Solution
14	Simplex Algorithm
15	Final

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

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Compiled by:	
Date of Compilation:	08.03.2021

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT311	2			4
Title	**T**	**A**	**L**	**ECTS**
Measurement Techniques in Energy Systems	2	1	0	4

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**		**Elective**	**X**		
Objectives	1. To gain the necessary formation by providing in-depth information on the measurement of many different physical sizes that can be encountered in energy technologies, as well as theoretical knowledge on subjects such as evaluation of measured data, determination of measurement errors. 2. It is aimed to develop the skills of the students in these subjects in line with the needs of the sector and to provide an infrastructure that will provide advantage in both thesis studies and post-graduation, domestic and international job applications.					
Content	This course covers measurement technique, sensors and measuring instruments in energy technologies. For this purpose, measurement technique, error analysis and methods used in processing experimental data will be explained. After focusing on the calibration of measuring sensors and instruments, in-depth information will be given about the measurement techniques of physical quantities that can be encountered in energy technologies.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		% 0

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Engineering		% 60
Engineering Design		% 40
Social Sciences		% 0
Educational Sciences		% 0
Natural Sciences		% 0
Health Sciences		% 0
Expert Knowledge		% 0

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	% 40
Quiz	0	% 0
Assignments	0	% 0
Attendance	0	% 0
Recitations	1	% 20
Projects	0	% 0
Final Exam	1	% 40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	3	45
Self-Study	15	1	15
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**64**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will learn measurement technique, sensors and measuring instruments in energy technologies.
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Weekly Content	
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Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

11							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	08.03.2021

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT406	4			8
Title	**T**	**A**	**L**	**ECTS**
Energy Management	3	2	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The students obtain a deep knowledge about the legal framework of energy supply. They learn political decision making as well as energy policy in national and international levels. They learn the processes and procedures about the applications of infrastructure measures and the important social processes on energy supply.					
Content	National and international level of law and politics of energy, Energy Management Regulations and Systems, National and International Energy Markets, Infrastructure Measures, Power Plant Construction and Connections, Social Issues Related to Energy.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

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

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Natural Sciences		20%
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	15	2	30
Self-Study	15	6	90
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	2	30
Laboratory			
Projects	1	30	30
Final Exam	1	2	2
		Total Work Load	**184**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

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DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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12							

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

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COURSE SYLLABUS

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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MWT405	4			7
Title	**T**	**A**	**L**	**ECTS**
Functional Materials	2	1	1	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To get knowledge about the basics of dielectric, magnetic and superconducting behavior of materials.					
Content	Dielectric and ferroelectric properties, optical properties, magnetism					
Prerequisites						
Coordinator	Asist Prof.Dr. Sibel Özenler					
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	1. K.Nitzsche, H.-J.Ullrich, „Funktionswerkstoffe der Elektrotechnik und Elektronik“ 2. O. Kasap, “Principles of Electronic Materials and Devices” 3. W.Buckel, R.Kleiner „Supraleitung“
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences	100	%
Educational Sciences		%
Natural Sciences		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	13	4	52
Assignments	5	10	50
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	2	28
Projects			
Final Exam	1	2	2
		Total Work Load	**176**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	To get knowledge about the basics of dielectric, magnetic and superconducting behavior of materials.

Weekly Content

1	Dielectric and Ferroelectric Properties: Phenomenology; Polarizability of Atoms and solids, temperature and frequency dependence; ferroelectric Phase transition, ferroelectric properties
2	Optical properties: Solid state excitations: Electromagnetic waves in the Matter; Dielectric function; Optical transitions; Solid state excitations (excitons, Polaritons etc.); Solid State Spectroscopy
3	Magnetism: dia- and paramagnetism; Collective magnetism; Magnetism in the Solid (Hund's rules, crystal field); Magnetic resonance

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

	P1	P2	P3	P4	P5	P6	P7
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COURSE SYLLABUS

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Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT301	3			Fall
Title	**T**	**A**	**L**	**ECTS**
Solar energy systems	2	1	1	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						
Content	Solar energy potential, physical principles of photovoltaics, photovoltaic energy conversion with solar cells, components, properties, structure and operating behavior of photovoltaic systems, design and calculation of photovoltaic systems, microinverters for solar modules, applications of electrical energy generation from photovoltaics, new developments					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Course sheets
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%

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COURSE SYLLABUS

Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam		
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
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			
Final Exam			
		Total Work Load	
		ECTS Points (Total Work Load / Hours)	**4**

Learning Outcomes

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COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
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DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY

COURSE SYLLABUS

Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details								
Code				**Academic Year**			**Semester**	
EBT315				3			5	
Title				**T**	**A**	**L**	**ECTS**	
Physics of Solar Cells				3	0	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	To explain the structures of solar cells, interactions, electron-hole production methods and mechanisms in solar cells, parameters of solar cells in electrical energy production; to teach semiconductor properties and efficiency calculation of solar cells.							
Content	Solar cell types, structures and materials used. Electron-hole formation mechanisms and electricity generation in solar cells. Doping types and calculations, physical interactions and operating principles in solar cells. Power calculations in cell-to-array and array-to-module transition.							
Prerequisites	None							
Coordinator								
Lecturer(s)								
Assistant(s)								
Work Placement	None							
Recommended or Required Reading								
Books / Lecture Notes	Würfer, P., Physik der Solarzellen, Spektrum Akademischer Verlag,Darmstadt, 2000. Wagemann, H.G., Escrich, H. (2010). Photovoltaik: Solarstrahlung und Halbleitereigenschaften, Solarzellenkonzepte und Aufgaben, Springer Verlag.							
Other Sources	Markvart, T., Castaner, L., 2003, Practical Handbook of Photovoltaics: Fundamentals and Applications, Elsevier, Oxford, Uk. Meissner, D. 2013, Solarzellen: Physikalische Grundlagen und Anwendungen in der Photovoltaic, Springer-Verlag,							
Additional Course Material								
Documents	-							
Assignments	-							
Exams	-							
Course Composition								
Mathematics und Basic Sciences	20						%	

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COURSE SYLLABUS

Engineering	40	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	40	%
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	3	42
Self-Study	14	2	28
Assignments			
Presentation / Seminar Preparation	2	1	2
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**76**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	To be able to use basic knowledge about solar radiation, photoelectric effect and energy conversion
2	To be able to express and analyze the structure of semiconductors and electron-vacancy transport in semiconductors physically and mathematically
3	Understanding the structure of solar cells, basic mechanisms, p-n junction characteristics and semiconductor-metal contacts

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

4	To be able to model energy conversion in solar cells, the dependence of conversion efficiency on material and operating parameters, to be able to follow basic research on solar cells
Weekly Content	
1	Solar cells, photoelectric effect and photovoltaic energy conversion principles
2	Photon, blackbody radiation, photon density, photon energy distribution, solar spectrum, absorption and emission, atmospheric effects on the spectrum
3	Energy flux, Stefan-Boltzmann radiation law, Kirchoff's law for materials other than blackbody, concentration of solar radiation, Abbe sine condition, geometric optics
4	Electron behavior in semiconductors, distribution function, density of states, vacancies, doping, Fermi energy, energy bands, work function
5	Interactions of radiation with semiconductors, absorption of photons in semiconductor structures, generation of electrons and vacancies, direct and indirect transitions, radiative and non-radiative recombinations, lifetime of electron-vacancy pairs
6	Electron-vacancy transport, field current, diffusion current, diffusion length, relaxation
7	Diffusion length of minority carriers, dielectric relaxation, ambipolar diffusion, Dember effect
8	Basic mechanisms in a solar cell, pn-junction, electrochemical equilibrium of electrons in a pn-junction in the dark, potential distribution across the pn-junction and current-voltage characteristics of the pn-junction
9	Derivation of saturation and short-circuit currents, semiconductor-metal contacts, Schottky contact, MIS contact, role of electric field in solar cells
10	Limits of energy conversion in solar cells, maximum efficiency, efficiency as a function of energy gap, optimal silicon solar cells
11	Thin film solar cells, equivalent circuits, temperature dependence of open circuit voltage, dependence of efficiency on radiation intensity, efficiencies of energy conversion processes in solar cells
12	Concepts of efficiency enhancement in solar cells, tandem cells, electrical connections of tandem cells, concentrator cells, thermal-photovoltaic energy conversion
13	Energy conversion by collisional ionization, hot electron and vacancy
14	Two-stage excitation in three-level systems, impurity photoelectric effect, future of research in solar cells

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

	P1	P2	P3	P4	P5	P6	P7
1	3	4	4	5			
2	3	3	4	4			
3	5	5	4	4			
4	3	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.

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Compiled by:	Muhammed Cihat Mercan
Date of Compilation:	08.09.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT307	3			5
Title	**T**	**A**	**L**	**ECTS**
Introduction to Raw Materials and Energy	2	1	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	Teaching the raw materials and resources that provide heat, electricity and chemical energy production, transferring the process of extracting raw materials and resources as minerals, processing them and turning them into energy sources. Teaching the students all the stages of transformation of a raw material from its inception to its recycling and transformation into waste, by showing all the operational stages of energy systems using raw materials and resources. Giving information about thermal, hydroelectric, nuclear and geothermal systems.					
Content	Description of raw material, classification, mineral raw materials, raw materials for environmental protection, raw materials for energy field, zeolite. Determination of above-ground and underground energy resources, Extraction of energy resources and mining operations, Raw material usage methods, Systems that produce energy from raw materials, Thermal power plants, Geothermal and Hydroelectric Power Plants, Nuclear Power Plants, Recycling and use of waste in thermal power plants, Biogas and bio horses, Uranium ore mining					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	GAJEWSKI, W.: Werkstoffe für Katalysatoren im Umweltschutz. - cfi/Ber. DKG, Wiesbaden 68(1991)3. Pohl, W. (2005). Mineralische und Energie-Rohstoffe: eine Einführung zur Entstehung und nachhaltigen Nutzung von Lagerstätten. Schweizerbart.
Other Sources	LASCHKA, D.; STRIEBEL, T.; DAUB, J.: Platin im Regenabfluß einer Straße. - Umweltwissenschaften und Schadstoff-Forschung, 8(1996)3. HEINTZ, A.; REINHARDT, G.: Chemie und Umwelt. - Vieweg & Sohn, Braunschweig/ Wiesbaden RÖSLER, H. J.: Lehrbuch der Mineralogie. - VEB Deutscher Verlag für Grundstoffindustrie, Leipzig 197

Additional Course Material

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Documents		
Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences		%
Engineering		20%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		20%
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	15	2	30
Self-Study	15	6	90
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	2	30
Laboratory			
Projects	1	30	30
Final Exam	1	2	2
		Total Work Load	**184**
		ECTS Points (Total Work Load / Hour)	**6**

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
1							
2							

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

3							
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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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT303	4			8
Title	**T**	**A**	**L**	**ECTS**
Hydrogen Energy and Fuel Cells	2	2	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**		**Elective**	**X**		
Objectives	Principles of the modern hydrogen technolgy is given: material science, chemical and physical material data, hydrogen production by rearranging the hydrocarbons, hydrogen production from other sources, hydrogen deposition, hydrogen purification processes, liquefaction and technical use.					
Content	Hydrogen as an energy vector: Introduction to hydrogen technology; Fundamentals of fuel cells, fuel cell types and functionality; Fuel cell based CHP systems, Classification, mode of operation, application examples					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Vielstich, W., Lamm, A., Gasteiger, H. (Eds): Handbook of Fuel Cells: Fundamentals, Technology, Applications Willey, 2003
Other Sources	John Twidel, Tony Weir: Renewable Energy Resources. Edition , SPON, 1700 M. Kaltschnmidt, W.Streicher, A. Wiese: Erneuerbare Energien. Edition , Springer, 1700

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		20%
Engineering Design		20%
Social Sciences		%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Educational Sciences		%
Natural Sciences		20%
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	15	2	30
Self-Study	15	6	90
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	2	30
Laboratory			
Projects	1	30	30
Final Exam	1	2	2
		Total Work Load	**184**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	
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DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
1							
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10							
11							
12							

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

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ENG342	4			7
Title	**T**	**A**	**L**	**ECTS**
Advanced English I	3	0	0	2

Language	English					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The Students should have technical english B2 level knowledge in reading, writing, speaking and grammar.					
Content	Provide students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition) • Ensure that students improve their B1 level speaking skills (verbal presentation of self and others / directions / directions					
Prerequisites						
Coordinator						
Lecturer(s)	Okutman İlknur KARADAĞLI DİRİK					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Hutchinson, T. & Sherman, K. (2012). Network 3. Oxford University Press: New York
Other Sources	

Additional Course Material	
Documents	
Assignments	0
Exams	2

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences	100	%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
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			
Recitations			
Laboratory			
Projects			
Final Exam			
		Total Work Load	**45**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will have B1 level of English knowledge.
2	Students will develop their reading comprehension skills at B1 level.
3	Students will improve their ability to understand what they listen at B1.
4	Students will be informed at B1 level and will be able to use it effectively.
5	Students will learn vocabulary at B1 level and use them during reading, listening and speaking.
6	Students will improve their writing abilities at the baseline level (to promote themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail).
7	Students will improve their speaking skills at B1 (verbally introducing themselves / others / asking directions / making directions / telling them what they have done in a past time / describing their future plans)

Weekly Content

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

1	Introduction to the course and the course materials
2	Welcome to school! Introducing yourself/ Asking questions/ General introduction to English
3	Let's introduce ourselves/ Welcoming others/Personal information/Present simple and present continuous
4	Reading and writing: Ms Medina's Spanish Class/ The fashionable milliner
5	Things happen/ Describing unexpected events/Expressions with 'get'/ Present perfect with 'for' and 'since'
6	Reding and writing: The 90/10 Secret/ You can do it!
7	Describing a location/ Describing housing/ Articles
8	Reading and writing: Sofa Surfing/ The Alhambra
9	Midterm exams
10	Seeing old friends/ Talking about an old friend/ Phrasal verbs/ Separable and non-separable phrasal verbs/ reading and speaking: Lost Freind Finder
11	Finding a lost friend/Unit 5: Congratulations!/Discussing events in the past
12	Acheivements/Present perfect and past simple/ Reading and Speaking: Want to win? Get Lin!
13	Adventure seekers/Unit 6: Healthy Living: Planning to do something healthy/ Health and fitness/ Future/Reading and writing: Stay healthy-the easy way!
14	A healthy lifestyle/ Unit 7: What a pian!/Talking about being late/Transportation problems/Past perfect/Reading and writing: The Last Train
15	A New York City Taxi Driver/ Unit 8: Eat up! Making suggestions/Describing food/ Tag questions/Reading and Writing: 46 Reviews for The Good Table

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

	P1	P2	P3	P4	P5	P6	P7
1							
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12	3			5		5	4

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

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ENG302	4			8
Title	**T**	**A**	**L**	**ECTS**
Advanced English II	3	0	0	2

Language	English					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The Students should have technical english B2 level knowledge in reading, writing, speaking and grammar.					
Content	Provide students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition) Ensure that students improve their B1 level speaking skills (verbal presentation of self and others / directions / directions					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

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		100%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
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			
Recitations			
Laboratory			
Projects			
Final Exam			
		Total Work Load	**45**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will have B1 level of English knowledge.
2	Students will develop their reading comprehension skills at B1 level.
3	Students will improve their ability to understand what they listen at B1.
4	Students will be informed at B1 level and will be able to use it effectively.
5	Students will learn vocabulary at B1 level and use them during reading, listening and speaking.
6	Students will improve their writing abilities at the baseline level (to promote themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail).
7	Students will improve their speaking skills at B1 (verbally introducing themselves / others / asking directions / making directions / telling them what they have done in a past time / describing their future plans)
8	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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12							

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

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details								
Code				**Academic Year**			**Semester**	
ENG101				1			1	
Title				**T**	**A**	**L**	**ECTS**	
English 1				3	0	0	2	
Language	English							
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**			
Department / Program	Energy Science and Technologies							
Forms of Teaching and Learning	Formal							
Course Type	**Compulsory**	**X**	**Elective**					
Objectives	This course helps students build the technical English and business communication skills needed to succeed as scientists. The lessons and quizzes in this course will help them communicate effectively with co-workers, customers, or suppliers. Start with the technical language they need. Students will build vocabulary and grammar common to engineers, giving them the ability to talk about all parts of your job. They will also develop the business communication skills needed for anyone in the global economy. This includes topics like giving presentations, writing emails, and speaking in meetings. This gives them the ability to communicate across departments with strong reading, writing, speaking and listening skills. They also work on common English functions for engineers, such as giving instructions or explaining a process. You will be prepared for the next time you need to complete a task in English. You will develop not only the language, but also strategies for polite communication. You will learn how to work with others, including working in teams or managing conflict. It is especially important for engineers to learn how to communicate with non-technical people, which they will learn in this course.							
Content	This course will provide you with the language skills and strategies they need for professional success as an engineer. When finished, you will be more confident and better prepared to meet the challenges of the workplace. Providing students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition). Ensuring that students improve their A1/A2 level speaking skills (verbal presentation of self and others / directions)							
Prerequisites								
Coordinator	İlknur KARADAĞLI DİRİK							
Lecturer(s)	İlknur KARADAĞLI DİRİK							
Assistant(s)								
Work Placement	-							

Recommended or Required Reading	
Books / Lecture Notes	1) Brieger, N. & Comfort, J., 2000, Technical Contacts. 2) James K., Jordan R., Matthews A.J, 1998, Listening Comprehension & Note-taking, Collins ELT: London. 3) Johnson, K., 1991, Communicate in Writing, Longman. Michal H. Markel, 1992, Technical Writing: Situations and Strategies, St. Martin's Press: New York.. 4) Shelton, J.H, 1998, Elements of Technical Writing, NTC Business Books. Vince, M,

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

	1994, Advanced language practice, Heinemann.	
Other Sources		
Additional Course Material		
Documents		
Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
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	15	3	45
Self-Study			
Assignments			
Presentation / Seminar Preparation			
Midterm Exam			
Recitations			
Laboratory			
Projects			

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Final Exam			
		Total Work Load	**45**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes	
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Weekly Content	
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1							
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3							
4							
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9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ENG102	1			Spring
Title	**T**	**A**	**L**	**ECTS**
English II	3	0	0	2

Language	English					
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	The Students should have english B1 level knowledge in reading, writing, speaking and grammar.					
Content	Provide students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition) Ensure that students improve their B1 level speaking skills (verbal presentation of self and others / directions / directions					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Hutchinson, T. & Sherman, K. (2012). Network 3. Oxford University Press: New York
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences	100	%

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
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			
Recitations			
Laboratory			
Projects			
Final Exam			
		Total Work Load	**45**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will have B1 level of English knowledge.
2	Students will develop their reading comprehension skills at B1 level.
3	Students will improve their ability to understand what they listen at B1.
4	Students will be informed at B1 level and will be able to use it effectively.
5	Students will learn vocabulary at B1 level and use them during reading, listening and speaking.
6	Students will improve their writing abilities at the baseline level (to promote themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail).
7	Students will improve their speaking skills at B1 (verbally introducing themselves / others / asking directions / making directions / telling them what they have done in a past time / describing their future plans)
8	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

9	
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Weekly Content	
1	Introduction to the course and the course materials
2	Welcome to school! Introducing yourself/ Asking questions/ General introduction to English
3	Let's introduce ourselves/ Welcoming others/Personal information/Present simple and present continuous
4	Reading and writing: Ms Medina's Spanish Class/ The fashionable milliner
5	Things happen/ Describing unexpected events/Expressions with 'get'/ Present perfect with 'for' and 'since'
6	Reding and writing: The 90/10 Secret/ You can do it!
7	Describing a location/ Describing housing/ Articles
8	Reading and writing: Sofa Surfing/ The Alhambra
9	Midterm exams
10	Seeing old friends/ Talking about an old friend/ Phrasal verbs/ Separable and non-separable phrasal verbs/ reading and speaking: Lost Freind Finder
11	Finding a lost friend/Unit 5: Congratulations!/Discussing events in the past
12	Acheivements/Present perfect and past simple/ Reading and Speaking: Want to win? Get Lin!
13	Adventure seekers/Unit 6: Healthy Living: Planning to do something healthy/ Health and fitness/ Future/Reading and writing: Stay healthy-the easy way!
14	A healthy lifestyle/ Unit 7: What a pian!/Talking about being late/Transportation problems/Past perfect/Reading and writing: The Last Train
15	A New York City Taxi Driver/ Unit 8: Eat up! Making suggestions/Describing food/ Tag questions/Reading and Writing: 46 Reviews for The Good Table

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

	P1	P2	P3	P4	P5	P6	P7
1	3			5			5
2							
3							
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11							
12							

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

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

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Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ENG201	2			**3**
Title	**T**	**A**	**L**	**ECTS**
English III	3	0	0	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The Students should have english B1 level knowledge in reading, writing, speaking and grammar.					
Content	Provide students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition) • Ensure that students improve their B1 level speaking skills (verbal presentation of self and others / directions / directions					
Prerequisites						
Coordinator						
Lecturer(s)	İlknur KARADAĞLI DİRİK					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Hutchinson, T. & Sherman, K. (2012). Network 3. Oxford University Press: New York
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		100%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	10	2	20
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**66**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will have B1 level of English knowledge.
2	Students will develop their reading comprehension skills at B1 level.
3	Students will improve their ability to understand what they listen at B1.
4	Students will be informed at B1 level and will be able to use it effectively.
5	Students will learn vocabulary at B1 level and use them during reading, listening and speaking.
6	Students will improve their writing abilities at the baseline level (to promote themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail).
7	Students will improve their speaking skills at B1 (verbally introducing themselves / others / asking directions / making directions / telling them what they have done in a past time / describing their future plans)
8	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

9	
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Weekly Content	
1	Introduction to the course and the course materials
2	Welcome to school! Introducing yourself/ Asking questions/ General introduction to English
3	Let's introduce ourselves/ Welcoming others/Personal information/Present simple and present continuous
4	Reading and writing: Ms Medina's Spanish Class/ The fashionable milliner
5	Things happen/ Describing unexpected events/Expressions with 'get'/ Present perfect with 'for' and 'since'
6	Reding and writing: The 90/10 Secret/ You can do it!
7	Describing a location/ Describing housing/ Articles
8	Reading and writing: Sofa Surfing/ The Alhambra
9	Midterm exams
10	Seeing old friends/ Talking about an old friend/ Phrasal verbs/ Separable and non-separable phrasal verbs/ reading and speaking: Lost Freind Finder
11	Finding a lost friend/Unit 5: Congratulations!/Discussing events in the past
12	Acheivements/Present perfect and past simple/ Reading and Speaking: Want to win? Get Lin!
13	Adventure seekers/Unit 6: Healthy Living: Planning to do something healthy/ Health and fitness/ Future/Reading and writing: Stay healthy-the easy way!
14	A healthy lifestyle/ Unit 7: What a pian!/Talking about being late/Transportation problems/Past perfect/Reading and writing: The Last Train
15	

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
1							
2							
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12							

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

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

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Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ENG202	2			4
Title	**T**	**A**	**L**	**ECTS**
English IV	3	0	0	2

Language	English					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The Students should have english B1+ level knowledge in reading, writing, speaking and grammar.					
Content	Provide students with the ability to write at the basic level (to introduce themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail / composition) • Ensure that students improve their B1 level speaking skills (verbal presentation of self and others / directions / direction					
Prerequisites						
Coordinator						
Lecturer(s)	Okutman İlknur KARADAĞLI DİRİK					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Hutchinson, T. & Sherman, K. (2012). Network 3. Oxford University Press: New York
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		% 0
Engineering		% 0
Engineering Design		% 0
Social Sciences		% 0
Educational Sciences		% 100

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COURSE SYLLABUS

Natural Sciences		% 0
Health Sciences		% 0
Expert Knowledge		% 0

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	3	45
Self-Study	15	1	15
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**64**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students will have B1 level of English knowledge.
2	Students will develop their reading comprehension skills at B1 level.
3	Students will improve their ability to understand what they listen at B1.
4	Students will be informed at B1 level and will be able to use it effectively.
5	Students will learn vocabulary at B1 level and use them during reading, listening and speaking.
6	Students will improve their writing abilities at the baseline level (to promote themselves and others physically / introduce themselves and others as characters / write short stories / CV / e-mail).
7	Students will improve their speaking skills at B1 (verbally introducing themselves / others / asking directions / making directions / telling them what they have done in a past time / describing their future plans)
8	

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COURSE SYLLABUS

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Weekly Content	
1	Introduction to the course and the course materials
2	Welcome to school! Introducing yourself/ Asking questions/ General introduction to English
3	Let's introduce ourselves/ Welcoming others/Personal information/Present simple and present continuous
4	Reading and writing: Ms Medina's Spanish Class/ The fashionable milliner -mechanical approximation, atomic structure
5	Things happen/ Describing unexpected events/Expressions with 'get'/ Present perfect with 'for' and 'since'
6	Reding and writing: The 90/10 Secret/ You can do it!
7	Describing a location/ Describing housing/ Articles
8	Reading and writing: Sofa Surfing/ The Alhambra
9	Midterm exams
10	Seeing old friends/ Talking about an old friend/ Phrasal verbs/ Separable and non-separable phrasal verbs/ reading and speaking: Lost Freind Finder
11	Finding a lost friend/Unit 5: Congratulations!/Discussing events in the past
12	Acheivements/Present perfect and past simple/ Reading and Speaking: Want to win? Get Lin!
13	Adventure seekers/Unit 6: Healthy Living: Planning to do something healthy/ Health and fitness/ Future/Reading and writing: Stay healthy-the easy way!
14	A healthy lifestyle/ Unit 7: What a pian!/Talking about being late/Transportation problems/Past perfect/Reading and writing: The Last Train
15	A New York City Taxi Driver/ Unit 8: Eat up! Making suggestions/Describing food/ Tag questions/Reading and Writing: 46 Reviews for The Good Table

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

	P1	P2	P3	P4	P5	P6	P7
1	3		5				
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11							

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COURSE SYLLABUS

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	08.03.2021

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details						
Code				**Academic Year**		**Semester**
MAB312				3		6
Title				**T**	**A**	**L**	**ECTS**
Heat Transfer				3	1	1	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The main aim of the course is to teach the basic concepts of thermodynamics and the first and second laws of thermodynamics. demonstrate the fundamentals of thermal design of engineering systems. To improve students' analysis, application and communication skills in this field.					
Content	Thermodynamic systems and their properties. Thermodynamic processes; work and heat interactions. Pure substances and thermodynamic properties. First Law; closed and open systems, flow processes. The Second Law; Heat machines, heat pumps and coolers. Entropy.					
Prerequisites	-					
Coordinator	Asist Prof.Dr. Mete BUDAKLI					
Lecturer(s)	Asist Prof.Dr. Mete BUDAKLI					
Assistant(s)						
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	1) Incropera F.P., Bergman T.L., Lavine A.S., & Dewitt D.P., 1981, Isı ve Kütle Geçişini Temelleri, Literatür Yayıncılık. 2) Çengel, Y.A., & Ghajar, A.J., 2014, Isı ve Kütle Transferi (4. baskı)
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering	10	%
Engineering Design	80	%
Social Sciences		%

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COURSE SYLLABUS

Educational Sciences		%
Natural Sciences	10	%
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	3	42
Self-Study	14	6	84
Assignments	6	4	24
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	2	24
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**180**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

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COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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12							

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

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COURSE SYLLABUS

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT305	3			6
Title	**T**	**A**	**L**	**ECTS**
Statistics	2	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	The course participants are provided to plan and perform data collection and analyze the collected data, taking into account statistical principles, in a technical working environment. Based on data collection and analysis, basic methods applicable in operational practice for engineering problem identification and sustainable solution are taught.					
Content	1) Data analysis and problem solving as the foundation of Data Science. 2) Fundamentals of Descriptive Statistics 3) Introduction to R 4) Data Analysis Process 5) Model Data 6) Random Variables and Their Distributions 7) Deductive Statistics 8) Inductive Statistics 9) Engineering Methods					
Prerequisites	Basic mathematical knowledge					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	1. Sachs L., Hedderich J. (2006): Angewandte Statistik, 12.Auflage, Springer, Berlin. 2. Montgomery, Runger: Applied Statistics and Probability for Engineers, Wiley 2006
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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		
Assignments	5	20
Attendance		
Recitations		
Projects	1	10
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
Self-Study	15	5	75
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	2	30
Laboratory			
Projects	1	30	30
Final Exam	1	2	2
		Total Work Load	**169**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

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COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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2							
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6							
7							

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COURSE SYLLABUS

8							
9							
10							
11							
12							

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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
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Course Details				
Code	**Academic Year**			**Semester**
ISG001	4			7
Title	**T**	**A**	**L**	**ECTS**
Occupational Safety and Health I	2	0	0	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Teaching of basic theoretical information occupational health and safety field, basic legal arrangements on OHS law in Turkey; especially duties, competencies and responsibilities of the naval architects. To inform causes and effects of occupational accidents and illnesses and basic courses about preventive practices and basic legal arrangements in the shipyard industry.					
Content	Theoretical framework of occupational health and safety (OHS), national and international standards of the OHS; causes and effects of occupational accidents and illnesses and basic courses about preventive practices, basic legal arrangements on OHS law in Turkey, case studies and civil jurisdictions of Court of Appeals, analysis of the occupational accidents in shipyard industry.					
Prerequisites						
Coordinator						
Lecturer(s)	Mühendis Joachim Kuntze					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Yılmaz, F., Occupational Health and Safety Textbook" Yelekçi, M., "Worker Health and Safety" Esin, A., "Occupational Health and Safety" Çelebi, U.B., "Occupational Health and Safety in Shipyard Textbook"
Other Sources	Yılmaz, F., Occupational Health and Safety Textbook" Yelekçi, M., "Worker Health and Safety" Esin, A., "Occupational Health and Safety" Çelebi, U.B., "Occupational Health and Safety in Shipyard Textbook"

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Sciences		
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz	0	0
Assignments	0	0
Attendance	0	0
Recitations	0	0
Projects	0	0
Final Exam	1	1
	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 / Hours)	**2**

Learning Outcomes

1	Students shall learn the basic concepts related to occupational safety and health of workers
2	To learn the causes and measures to be taken to prevent accidents at work and occupational diseases
3	Students shall adopt risk, prevention, and safety culture

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COURSE SYLLABUS

4	To learn the causes of work-related accidents and the measures to be taken in Ship Building Industry
5	Students shall understand Engineer's responsibility the terms of occupational safety
Weekly Content	
1	Theoretical framework, definitions and scope of occupational health and safety. Cost of occupational accidents and illnesses
2	Economical dimensions of occupational accidents and illnesses, importance of OHS for he enterprises
3	Analysis of the risky fields-sectors of Turkey in OHS
4	Causes of occupational accidents and illnesses: physical, ergonomic, chemical, biological, individual and psycho-social risks
5	Components of preventive OHS approach: Risk Assessment and Management, Ergonomic Precautions, Organizing the OHS Activities
6	Components of preventive OHS approach: OHSAS 18001 Management System, Training, Regular Sanitary Control ve Occupational Physician, OHS on employing process
7	National and international standartds and conventions in OHS. The legal arrangements concerned with OHS in Turkey: OHS in Acts
8	Midterm Exam
9	The definitions, scope and juridical results of employer, employee, employer agent, workplace, subcontractor, occupational accident, occupational illness.
10	The regulations and guidelines on OHS: Occupational Health and Safety Regulation.
11	The Regulation on Heavy and Hazardous Work, The Regulation About OHS Training, The Regulation on Workplace Health and Safety Units and Common Health and Safety Units.
12	Responsibilities of employer and employer agent (engineer-OHS expert) about occupational accidents and illnesses; case studies.
13	Analysis of the statistics on occupational accidents and illnesses, the most frequent accidents and illnesses and precautions.
14	Case studies and court decisions of Court of Appeals.

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

	P1	P2	P3	P4	P5	P6	P7
1	5	5	5	5	5	5	5
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12							

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
ISG002	4			8
Title	**T**	**A**	**L**	**ECTS**
Occupational Safety and Health II	2	0	0	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Teaching of basic theoretical information occupational health and safety field, basic legal arrangements on OHS law in Turkey; especially duties, competencies and responsibilities of the naval architects. To inform causes and effects of occupational accidents and illnesses and basic courses about preventive practices and basic legal arrangements in the shipyard industry.					
Content	Theoretical framework of occupational health and safety (OHS), national and international standards of the OHS; causes and effects of occupational accidents and illnesses and basic courses about preventive practices, basic legal arrangements on OHS law in Turkey, case studies and civil jurisdictions of Court of Appeals, analysis of the occupational accidents in shipyard industry.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Yılmaz, F., Occupational Health and Safety Textbook” Yelekçi, M., “Worker Health and Safety” Esin, A., "Occupational Health and Safety" Çelebi, U.B., "Occupational Health and Safety in Shipyard Textbook"
Other Sources	Yılmaz, F., Occupational Health and Safety Textbook” Yelekçi, M., “Worker Health and Safety” Esin, A., "Occupational Health and Safety" Çelebi, U.B., "Occupational Health and Safety in Shipyard Textbook"

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic		%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Sciences		
Engineering		%
Engineering Design		%
Social Sciences		%
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	3	3
Recitations			
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**62**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students shall learn the basic concepts related to occupational safety and health of workers
2	To learn the causes and measures to be taken to prevent accidents at work and occupational diseases
3	Students shall adopt risk, prevention, and safety culture
4	To learn the causes of work-related accidents and the measures to be taken in Ship Building Industry

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

5	Students shall understand Engineer's responsibility the terms of occupational safety
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Weekly Content	
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14	
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Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1							
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9							

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COURSE SYLLABUS

10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT206	2			4
Title	**T**	**A**	**L**	**ECTS**
Solid State Physics	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	To teach the basics of solid state physics, to make them understand the physical properties of metals and insulating materials, and to make them comprehend the importance of technology.					
Content	Crystal structure of solids, Reverse lattice, X-ray diffraction, Crystal bonding, Phonons I: Crystal Vibrations, Phonons II: Thermal properties, Free Electron Fermi Gas.					
Prerequisites	None					
Coordinator	Doç. Dr. Şahin UYAVER					
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Katıhal Fiziğine Giriş (KITTEL), çeviri: B. Karaoğlu, ARTE-Bilgi Tk, 1996.
Other Sources	1. Katıhal Fiziğine Giriş, Prof.Dr. Tahsin Nuri Durlu, AÜ 2. Katıhal Fiziği, J.R. HOOK & H.E. Hall, çeviri: F. Köksal, M. Altunbaş, M. Dinçer. 3. Elementary Solid State Physics, M. Ali Omar, 1993.

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	30	%
Engineering		%
Engineering Design		%

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COURSE SYLLABUS

Social Sciences		%
Educational Sciences		%
Natural Sciences	30	%
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	14	2	28
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**74**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Sufficient knowledge of mathematics, science and Physics; Ability to apply theoretical and applied knowledge in these areas to model and solve Physics problems
2	Ability to identify, define, formulate and solve complex physics problems in physical science and related fields by selecting and applying appropriate analysis and modeling methods
3	The ability to design a complex system, device or product under realistic constraints and conditions, in line with a defined goal, by applying modern design methods.
4	Ability to develop, select and use modern techniques and tools required for physical science applications and to make effective use of information technologies
5	Ability to design and conduct experiments, collect data, analyze and interpret results for the study of physical science problems

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COURSE SYLLABUS

6	Ability to work individually and in interdisciplinary and interdisciplinary teams
7	Ability to communicate effectively in Turkish orally and in writing and the ability to use/improve foreign language knowledge
8	Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself
9	Professional and ethical responsibility awareness
10	Knowledge of project management and business practices such as risk management and change management; awareness of entrepreneurship, innovation and sustainable development
11	Internalizes grammar rules and uses them in daily life correspondence.
12	Knowledge of the effects of physics practices on health, environment and safety in universal and societal dimensions; awareness of national and international legal regulations and standards and the legal consequences of engineering solutions
Weekly Content	
1	Periodic arrangement of atoms, Symmetry operations, Mesh types
2	Occupancy ratio, Miller indices, Simple crystal structures, Non-ideal crystal structures
3	Diffraction of waves by crystals, X-ray diffraction, Electron diffraction, Neutron diffraction, Bragg's law
4	Reverse lattice, Diffraction condition, Laue equations and Ewald Sphere
5	Reverse lattice, Diffraction condition, Laue equations and Ewald Sphere
6	Brillouin zones and determination of the first Brillouin zone in cubic structures, Structure factor
7	Interatomic forces and bonds, noble gas crystals, ionic crystals, metallic crystals and covalent crystals
8	Lattice vibrations, monatomic and polyatomic lattices
9	State density, dielectric function, inelastic scattering by phonons
10	State density, dielectric function, inelastic scattering by phonons
11	Heat capacity of phonons, Einstein model, Debye model, Thermal conductivity, Umklapp effects
12	Free Electron Fermi Gas, One-dimensional energy levels, Fermi-Dirac distribution function
13	Free electron gas in three dimensions, Heat capacity of electron gas, Electrical conductivity and Ohm's law, Thermal conductivity of metals
14	Dielectric function of electron gas, Motion in magnetic field, Hall effect
15	Repetitions of Lectures

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

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

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COURSE SYLLABUS

9	4						
10	3						
11	4						
12	4						

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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details					
Code			**Academic Year**		**Semester**
CHE111			1		1
Title			**T**	**A**	**L**	**ECTS**
Chemistry 1			2	1	2	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Formal Education					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The objectives of this course are to learn the basics of Chemical Science and to have knowledge about the fields of study of chemical science. To know the basics of General Chemistry principles.					
Content	1) Atomic structure 2) Periodic table of the elements 3) Valence and bonding theories 4) Molecular structure 5) Crystal lattice/solids 6) solutions 7) Electrolytes 8) General laws 9) Chemical equilibrium 10) Redox reactions 11) Electrochemistry 12) Acid-base reactions 13) Thermochemistry 14) Thermodynamics and kinetics of reactions					
Prerequisites	-					
Coordinator	Asist Prof.Dr. Sibel Özenler					
Lecturer(s)	Asist Prof.Dr. Sibel Özenler					
Assistant(s)						
Work Placement	-					

Recommended or Required Reading

Books / Lecture Notes	1) R.H. Petrucci, W.S. Harwood, F.G. Herring, J.F. Madura, 2007, General (Textbook) Chemistry, Principles and Modern Applications, Pearson Prentice Hall, ISBN:0-13-198825-. 2) N.J.Tro, 2008, Chemistry-A Molecular Approach, Pearson Prentice Hall, ISBN:0-13-233250- 3) T.L. Brown, H.E. LeMay, B.E.Bursten, C.J. Murphy, 2009, Chemistry-The Central Science, Pearson Prentice Hall, ISBN:0-13-235849-.
Other Sources	1) C. E. Mortimer, U. Müller: Chemie, Thieme, Stuttgart 2003 (8. Aufl.), ISBN 3-13 484308-0

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

	2) E. Riedel: Allgemeine und Anorganische Chemie, W. de Gruyter, Berlin 2008 (9. Aufl.), ISBN 978-3-11-020277-9 3) C. E. Housecroft, E. C. Constable, Chemistry, Pearson Prentice Hall, Harlow 2006, ISBN 0-13- 127567-4
Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics and Basic Sciences	50	%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	50	%
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	5	15	75
Assignments	1	30	30
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	2	28
Projects			

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COURSE SYLLABUS

Final Exam	1	2	2
		Total Work Load	**179**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes	
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Weekly Content	
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**
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10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
CHE112	1			Spring
Title	**T**	**A**	**L**	**ECTS**
Chemistry II	2	1	2	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	Students acquire the basic knowledge of organic chemistry. They have a good understanding of the common classes of substances, the linking of structure, binding and the classification of organic compounds. Here, in addition to a deeper understanding of the chemical principles, a good understanding of the standard organic-chemical reactions with mechanistic details, the influence of the framework conditions in an organic-chemical reaction and the most important analytical methods (eg mass spectrometry, IR and NMR spectroscopy) should be developed.					
Content	Structure and Binding of Organic Molecules, Structure and Reactivity: Introduction to Organic Molecule Reactions: Kinetics, Acidity / Basicity and Mechanisms, Functional Groups, Alkanes and Their Reactions, Nomenclature and Stereochemistry, Alcohols and Ethers and Their Reactions, Alkenes and Haloalkanes, Mass Spectrometry, IR and NMR spectroscopy for structure elucidation, alkynes and their reactions, aromatics and their reactions, reactions of carbonyl compounds, aldehydes, ketones and carboxylic acids, amines and thiols, carbohydrates, amino acids, peptides and proteins.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	K.P.C. Vollhardt, N.E. Schore, K. Peter. "Organische Chemie"
Other Sources	1. K.P.C. Vollhardt, N.E. Schore, K. Peter. "Organische Chemie" 2. N.E. Schore. "Arbeitsbuch Organische Chemie" 3. H.G.O Becker et al. "Organikum" 4. R. Brückner "Reaktionsmechanismen" 5. M. Hesse, H. Meier, B. Zeeh. "Spektroskopische Methoden in der organischen Chemie"

Additional Course Material	
Documents	
Assignments	

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COURSE SYLLABUS

Exams		
Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	100	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments		30
Attendance		
Recitations		
Projects		
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
Self-Study	15	5	75
Assignments	10	4	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory	10	2	20
Projects			
Final Exam	1	2	2
		Total Work Load	**184**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	basic principles of organic chemistry, organic molecular bonding, properties and reactivity; properties and behavior of organic compounds. Understanding organic synthesis and mechanisms

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COURSE SYLLABUS

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Weekly Content	
1	Atoms, molecules, bonding, polar and nonpolar molecules, intermolecular forces, solubilities, Lewis structures, resonance, acids and bases
2	Introduction to orbitals, molecular orbital description of bonding, hybridization, structure of methane
3	Alkanes- conformational analysis, structural isomerism and nomenclature, alkyl groups
4	Alkenes- structure and bonding, nomenclature, E-Z notation, hydrogenation, relative stabilities.
5	Stereochemistry
6	Ring systems
7	Alkyl halides, substitution reactions of alkyl halides- SN 2 and SN 1 mechanisms. Elimination reactions- E1 and E2 mechanisms
8	Overview of substitution and elimination reactions, oxidation of alcohols, rates and equilibria, syntheses
9	Functional Groups I
10	Functional Groups II
11	Functional Groups III
12	Functional Groups IV
13	Functional Groups V
14	Biological Compounds I
15	Biological Compounds II

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

	P1	P2	P3	P4	P5	P6	P7
1	3	3	3			3	
2							
3							
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COURSE SYLLABUS

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12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MWT302	4			7
Title	**T**	**A**	**L**	**ECTS**
Material Production and Processing Technologies	2	2	1	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	The student gets an initial insight into raw material extraction techniques and downstream processing techniques for the production of materials and components by melt or powder metallurgical methods. This includes addressing the relevant theoretical foundations. The student manages to draw parallels between the processing of materials and their properties. Gains an initial qualification to select material-specific machining routes for the design and manufacture of components. It also gains an expanded level of proficiency in selecting and applying appropriate coating and bonding processes. Along with the main topics mentioned above, resource conservation and recycling issues are introduced to the student.					
Content	1) Component design based on material properties 2) Raw material extraction and processing 3) Casting process 4) Sintering technology 5) Coating and thin film processes 6) Forming processes 7) Join processes 8) Recycling and resource efficiency					
Prerequisites	None					
Coordinator	Dr. -Ing. Çağatay ELİBOL					
Lecturer(s)	Dr. -Ing. Çağatay ELİBOL					
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Materials for Engineering, J. W. Martin. The Institute of Materials, London
Other Sources	1) B. Ilschner, R. Singer, Werkstoffwissenschaften und Fertigungs-technik, 5. Auflage, Springer, 2010 2) E. Hornbogen, G. Eggeler, E. Werner, Werkstoffe, 9. Auflage, Springer, 2008 3) W. D. Callister, Jr., Materials Science and Engineering, International Student Version,8th Edition, Wiley, 2010 4) Manufacturing with Materials, Edwards, Endean, Butterworth 5) Materials Science and Engineering, R. W. Cahn et al. VCH-Verlag

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COURSE SYLLABUS

	6) The Production of Inorganic Materials, J. W. Evans, L. C. DeJonghe, Mc Millan	
Additional Course Material		
Documents		
Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences	10	%
Engineering	70	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
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	3	42
Self-Study	14	7	98
Assignments	6	3	18
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations			
Laboratory			
Projects	3	6	18
Final Exam	1	3	3

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Total Work Load	**182**
ECTS Points (Total Work Load / Hour)	**6**

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

	P1	P2	P3	P4	P5	P6	P7
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12							

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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
NWI204	2			4
Title	**T**	**A**	**L**	**ECTS**
Measurement Techniques	2	0	2	6

Language						
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	Understand the theory of measurement, knowledge of sensors, Knowledge of methods of measuring different sizes, Group work ability for laboratory exercises					
Content	Introduction to metrology Measuring electrical quantities in theory and in practice Measuring non-electrical quantities in theory and in practice Understand the characteristics of transducers Digital metrology, Measurement error analysis and statistical evaluation, Static and dynamic behavior of measuring instruments					
Prerequisites						
Coordinator						
Lecturer(s)	Dr. Sungur Aytaç					
Assistant(s)	Sami Orçun Kortunay, Muhammed Cihat Mercan					
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	U. Kiencke, R. Eger: "Technique of measurement: Messtechnik“, 6. Aufl., Springer, 2005. J. Niebuhr, G. Lindner: „Physikalische Messtechnik mit Sensoren: Physical Measurement with Sensors “, 5. Aufl., Oldenbourg, 2005. E. Schrüfer: „Elektrische Messtechnik: Measurement of electrical and not electrical quantities: Messung elektrischer und nichtelektrischer Größen“, 7. Aufl., Hanser, 2001 J. Hoffmann: „Taschenbuch der Messtechnik: Pocketbook of Measuring“, 4. Aufl., Hanser, 2004
Other Sources	Heyne, Georg Elektronische Meßtechnik Eine Einführung für angehende Wissenschaftler, OLDENBOURG Wissenschaftsverlag GmbH, 1999 ISBN 3-486-24976-2 ISBN 978-3-486-24976-7 F. Puente León: Messtechnik, Springer-Verlag, Berlin Heidelberg, 2016, ISBN 978-3-662-44820-5

Additional Course Material	
Documents	

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COURSE SYLLABUS

Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences		% 30
Engineering		% 70
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	% 25
Quiz	0	% 0
Assignments	0	% 0
Attendance	0	% 0
Recitations	14	%15
Projects	0	% 0
Final Exam	1	% 60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	10	10	100
Assignments	4	8	32
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory	14	1	14
Projects	14	1	14
Final Exam	1	2	2
		Total Work Load	**192**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

1	Understand the theory of methodology
2	Knowledge of sensors
3	Ability of group work in the laboratory environment
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Weekly Content	
1	Introduction to measurement technology
2	Introduction to laboratory exercises and safety rules. Measuring devices
3	Metals and semiconductors
4	Measuring electrical quantities
5	Active and passive sensors
6	Measuring non-electrical quantities
7	Characteristics of the transducers
8	Measuring circuits
9	Digital measurement technology
10	Several examples from industry
11	Measurement error and statistical evaluation
12	Static and dynamic behavior of measuring instruments
13	
14	
15	

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

	P1	P2	P3	P4	P5	P6	P7
1	5	5	5	5	5	5	5
2							
3							
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

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12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	08.03.2021

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	-	%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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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COURSE SYLLABUS

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.

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT302	3			5
Title	**T**	**A**	**L**	**ECTS**
Numerical Analysis	2	1	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	This course aims to use computer programs to solve complex problems in different fields of study of students.					
Content	Computer Arithmetic, Error Analysis, Systems of Linear Equations, Matrix Factorization, Systems of Nonlinear Equations, Newton's Method, Banach Fixed Point Theorem, Ordinary Differential Equations, Eigenvalue Problems. After completing the course, students understand the concepts of numerical functions, optimization and theories of complex functions.					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Dahmen & Reusken: Numerik für Ingenieure und Naturwissenschaftler, Springer-Verlag, 2008. Schwarz & Köckler: Numerische Mathematik, Vieweg+Teubner, 8. Auflage, 2011.
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	70	%
Engineering	30	%
Engineering Design		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Social Sciences		%
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	3	15	45
Self-Study	15	3	45
Assignments	5	2	10
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	15	2	30
Laboratory			
Projects	1	15	15
Final Exam	1	3	3
		Total Work Load	**151**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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

	P1	P2	P3	P4	P5	P6	P7
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12							

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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.**	
Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
PHY111	1			1
Title	**T**	**A**	**L**	**ECTS**
Physics I	2	1	2	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	Understanding of fundamental concepts of classical mechanics to build a basis for upcoming courses. Motion in one, two and three dimensions. Application of Newton's Laws and energy conservation laws to dynamical systems.					
Content	Vectors, Motion in one, two and three Dimensions, Circular Motion, Newton's Laws, Work, Kinetic Energy, Potential Energy, Conservation of Energy, Momentum and its Conservation, Elastic and inelastic Collisions, Torque and Moment of Inertia, Motion of rigid Bodies, Harmonic Oscillations					
Prerequisites	None					
Coordinator	Assist. Prof. Dr. Gülsüm Gündoğdu Assist. Prof. Dr. Bünyamin Ümsür					
Lecturer(s)	Assist. Prof. Dr. Gülsüm Gündoğdu Assist. Prof. Dr. Bünyamin Ümsür					
Assistant(s)	Res. Assist. Muhammed Cihat Mercan Res. Assist. Berat Berkan Ünal Res. Assist. Yusuf Karakuş Res. Assist. Fuat Berke Gül					
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Physik, Lehr- und Übungsbuch, Douglas C. Giancoli, 3. Ed. Halliday, Physik, Wiley-VCH, 2016
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	60	%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Engineering	40	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz	1	10
Assignments		
Attendance		
Recitations	5	20
Projects		
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	45	1	45
Self-Study	14	5	70
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	5	10	50
Laboratory	5	2	10
Projects			
Final Exam	1	3	3
		Total Work Load	**181**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Working with Vectors
2	Definition of equations of motion in one, two and three dimensions and being able to solve and analyze them
3	Application of Newton's laws to dynamical systems
4	Connection of ideas of work and energy, solving mechanical problems with the help of conservation of energy

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

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Weekly Content	
1	Physical Quantities, SI Unit System
2	Dimensional Analysis
3	Vectors, Velocity, Acceleration
4	One dimensional motion, free fall
5	Motion in two and three dimensions, projectile and circular motion
6	Newton's Laws
7	Work, Power, Kinetic Energy
8	Motion in a force field
9	Potential Energy, Conservation of Energy
10	Momentum and Conservation of Momentum, Elastic and inelastic Collisions
11	Torque, Moment of Inertia
12	Moments of Inertia of Solid Bodies
13	Motion of Rigid Bodies
14	Harmonic Oscillations
15	

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	5				
4	5		5				
5							
6							
7							
8							
9							

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
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Compiled by:	Gülsüm Gündoğdu Bünyamin Ümsür
Date of Compilation:	27.04.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
PHY112	1			2
Title	**T**	**A**	**L**	**ECTS**
Physics II	2	1	2	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	The students have gained knowledge and understanding of the most important phenomena of electrodynamics and optics and can explain and interpret them. They can transfer the knowledge to related phenomena and bring it into connection with everyday and current phenomena. The students are also familiar with the methods of experimental physics and relevant mathematical tools and can use them to solve scientific questions.					
Content	Electrostatics (field, flux, potential, Gaussian theorem, capacity), currents (resistance, Ohm's law, Kirchhoff's rules), magnetostatics (Lorentz force, Amperes law), electrostatics and magnetostatics in the medium (dielectricity, paramagnetism), induction and alternating currents (Faraday's law of induction, resonant circuits), electromagnetic fields and Maxwell's equations					
Prerequisites	None					
Coordinator	Assist. Prof. Dr. Gülsüm Gündoğdu Assist. Prof. Dr. Bünyamin Ümsür					
Lecturer(s)	Assist. Prof. Dr. Gülsüm Gündoğdu Assist. Prof. Dr. Bünyamin Ümsür					
Assistant(s)	Res. Assist. Muhammed Cihat Mercan Res. Assist. Berat Berkan Ünal Res. Assist. Yusuf Karakuş Res. Assist. Fuat Berke Gül					
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Physik, Lehr- und Übungsbuch, Douglas C. Giancoli, 3. erweiterte Auflage Halliday, Physik, Wiley-VCH, 2016
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Mathematics und Basic Sciences	80	%
Engineering	10	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	10	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz	1	10
Assignments		
Attendance		
Recitations	5	20
Projects		
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	6	84
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations			
Laboratory	10	3	30
Projects			
Final Exam	1	3	3
		Total Work Load	**162**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Having a theoretical understanding of electric and magnetic fields and being able to solve practical problems.
2	Being able to model and solve problems in engineering and advanced physics applications.

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

3	Being able to find relations of electric and magnetic field concepts with other science disciplines and with the environment.
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Weekly Content	
1	Electrical charge, Electrostatics
2	Coulomb's Law, Electrical Field
3	Gauss Law
4	Voltage, Electric Potential
5	Capacitors, Dielectrics
6	Electrical Current, Resistors, Ohm's Law, Electromotive Force
7	Direct Current Ciurcuits, Kirchhoff's Law
8	Magnetic Field, Magnetic Forces
9	Sources of Magnetic Field
10	Electromagnetic Induction, Faraday's Law
11	Magnetic Materials
12	Inductivity
13	Alternating current circuits (RLC)
14	Electromagnetic waves
15	

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

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
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Compiled by:	Gülsüm Gündoğdu Bünyamin Ümsür
Date of Compilation:	27.04.2022

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Course Details

Code	Academic Year			Semester
NWI202	4			8
Title	**T**	**A**	**L**	**ECTS**
Physical Chemistry II	3	1	1	6

Language	German
Level	**Undergraduate** x **Graduate** **Postgraduate**
Department / Program	Energy Science and Technology
Forms of Teaching and Learning	Formal
Course Type	**Compulsory** **X** **Elective**
Objectives	In this course, students will deal with the phase behavior of real systems, the processes taking place at the electrodes and the molecular basis, and the laws of thermodynamics and chemical equilibrium calculations. They will understand chemical kinetics and reaction dynamics in a basic sense. They will acquire important experimental technical skills in measuring physico-chemical quantities and processes.
Content	Theory: Solution reactions, Electrochemistry, Reaction kinetics, Atmospheric chemistry, Quantum Mechanics Experimental: Phase Diagrams for Two Component Systems, pH effect in Solvoy reactions, Double diffraction of light in Nematic Fluids, Viscosity of liquids, Heat of vaporization, Inversion of sugar, Viscosity of gases, Decomposition of diacetonol alcohol, Charge transport in electrolyte solutions, pH-balance in buffer solutions, Object equation, Aqueous Solution Reactions
Prerequisites	
Coordinator	
Lecturer(s)	Asst. Prof Sibel Özenler
Assistant(s)	
Work Placement	No

Recommended or Required Reading

Books / Lecture Notes	G. Wedler: Lehrbuch der Physikalischen Chemie; VCH, 5. Aufl., 2004
Other Sources	P.W. Atkins: Physikalische Chemie; VCH-Wiley, 4. Aufl., 2006 T Engel/P. Reid; Physikalische Chemie

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm + 1 Final

Course Composition

Mathematics und Basic Sciences	60	%
Engineering	40	%

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz		
Assignments		
Attendance		
Recitations	1	30
Projects	1	10
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
Self-Study	15	5	75
Assignments	2	6	12
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	1	15
Laboratory	15	2	30
Projects			
Final Exam	1	2	2
		Total Work Load	**166**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	To determine the optimum conditions to obtain the highest efficiency from chemical processes.
2	To increase the efficiency of separation techniques.
3	To be able to explain the causes of real events and the properties of mixtures based on molecular properties and intermolecular forces.

Weekly Content

1	Fundamentals of reaction kinetics
2	Basic concepts, complex kinetics and approximation, activation energy and catalysis

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

3	Quantum mechanics postulates, Schrodinger equation, simple quantum models
4	Chemical bond
5	Electromagnetic spectrum
6	Isothermal and Fractional Distillation
7	Pressure-Composition, Temperature-Composition Graphs and Leverage Rule of Binary Solutions
8	Pressure-Composition, Temperature-Composition Graphs and Leverage Rule of Binary Solutions
9	Midterm
10	Complex Reactions
11	Complex Reactions
12	Temperature Effect on Reaction Rate, Arrhenius Equation
13	Reaction Rate and Reaction Orders
14	Reaction rate theories

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

	P1	P2	P3	P4	P5	P6	P7
1	3	3	3	3	3	4	3

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT413	4			7
Title	**T**	**A**	**L**	**ECTS**
Project I (Thesis Preparation and Seminar)	1	0	4	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To ensure that students develop their academic writing skills related to their profession, as well as paraphrase and abstract essay writing skills.					
Content	It aims to encourage students to write and classify their professional academic writing skills through brainstorming and use them directly in quotes, paraphrase and abstract essays by referring to resources as well as being organized. At the end of the course, the students are able to write two basic essay types based on the research results (Cause and Effect and Argumentative essays).					
Prerequisites						
Coordinator	Assoc. Prof. Dr. Şahin Uyaver					
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	• New Headway Pre-Intermediate • New English File Pre-Intermediate • Language Leader Pre-Intermediate
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Educational Sciences	100	%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	1	14
Self-Study	14	6	84
Assignments			
Presentation / Seminar Preparation			
Midterm Exam			
Recitations			
Laboratory	14	4	56
Projects	1	40	40
Final Exam			
		Total Work Load	**194**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

1	To ensure that students develop their academic writing skills related to their profession, as well as paraphrase and abstract essay writing skills.

Weekly Content

1	Literature review and performing prestudies for the thesis

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

	P1	P2	P3	P4	P5	P6	P7
1							3
2							
3							

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COURSE SYLLABUS

4							
5							
6							
7							
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9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT402	4			8
Title	**T**	**A**	**L**	**ECTS**
Project II (Bachelor Thesis)	1	7	0	12

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To provide the student with the ability to analyze the problem/system with which he/she is dealing and to develop solution ideas considering theoretical knowledge. To provide a useful experience through a self study to take the first step to his/her new career which will start after graduation. The student will communicate his/her study efficiently, verbal and written, so he/she will learn to express himself/herself better.					
Content	I. To provide the student with the ability to analyze the problem/system with which he/she is dealing and to develop solution ideas considering theoretical knowledge. II. To provide a useful experience through a self study to take the first step to his/her new career which will start after graduation. III. The student will communicate his/her study efficiently, verbal and written, so he/she will learn to express himself/herself better.					
Prerequisites	EWT401					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Scientific Journals and Books related to the field will be disseminated to the students in digital form.
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		40%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Engineering Design		40%
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	14	4	56
Self-Study	14	16	224
Assignments			
Presentation / Seminar Preparation	1	35	35
Midterm Exam			
Recitations			
Laboratory			
Projects			
Final Exam	1	40	40
		Total Work Load	**355**
		ECTS Points (Total Work Load / Hours)	**12**

Learning Outcomes

1	Formulate and analyze a problem by examining the current status.
2	Develop applicable suggestions and/or solution methods for the problem dealt with, considering theoretical knowledge.
3	Gain the ability to implement a solution method to an existing problem and will be able to evaluate the results.
4	Learn to express himself/herself by reporting and presenting the work.
5	Learn to defend the idea that underlines the results of the study.

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

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12	
Weekly Content	
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13	
14	
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Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1							
2							
3							
4							
5							
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8							
9							
10							

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
NWI106	1			Spring
Title	**T**	**A**	**L**	**ECTS**
Project Management	2	0	0	2

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	Students can learn how to begin with a new project, their organisation and planing, controlling and finishing					
Content	Basic information, organisation of a project, planing and controlling					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	• Projectmanager: Schelle, Heinz / Ottmann, Roland / Pfeiffer, Astrid • Projectmanagement: Guideline for Planing, Supervising and Controlling from Projectprogress. Burghardt, Manfred • Projectmanagement for Dummies. Portney, Stanley E. / Britta Kremke • Handbook of Project Management: J.Kuster, E.Huber, R. Lippman, A. Schmid, E. Schneider, U. Witschi, R. Wüst
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	40	%
Engineering	40	%
Engineering Design		%
Social Sciences		%

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Educational Sciences		%
Natural Sciences	20	%
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	1	2	2
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**62**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	How to begin with a project
2	What are the methodologies and a systematicaly improvement of a project?
3	Finding the risks of a project
4	Finalizing of project
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DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

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12	
Weekly Content	
1	Introduction, Basic Information
2	Introduction, Basic Information
3	Introduction, Basic Information
4	Project organisation and planing
5	Project organisation and planing
6	Project organisation and planing
7	Project Management
8	Project Management
9	Project Management
10	Project Management
11	Project Management
12	Phases of a project
13	Phases of a project
14	Project conrol and finishing
15	

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

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

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

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY

COURSE SYLLABUS

Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EWT404	4			8
Title	**T**	**A**	**L**	**ECTS**
Seminar	2	0	0	4

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The aim of the course is to develop an ability to communicate, explain, discuss and communicate in front of the group by preparing a study that will contribute to the contemporary and educational process related to a topic or thesis topic that the student has mastered, as appropriate to scientific research methods.					
Content	At the beginning of the semester, the students identify a seminar topic together with the lecturer who gives the seminar lecture by conducting a literature search on a topic or thesis studies they master. During the process of determining the seminar topic, books related to the subject, theses, articles etc. made at home and abroad. all scientific studies are examined. In the following weeks of the seminar, the work on the seminar topic is presented to the faculty member by the student. The instructor guides the student by reviewing the work presented with the student and making the necessary corrections.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		10%

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		10%
Health Sciences		%
Expert Knowledge		80%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
Self-Study	14	5	70
Assignments			
Presentation / Seminar Preparation	2	15	30
Midterm Exam			
Recitations			
Laboratory			
Projects			
Final Exam			
		Total Work Load	**130**
		ECTS Points (Total Work Load / Hours)	**4**

Learning Outcomes

1	The student will gain professional, academic and ethical responsibility and will be able to develop these values and practice them in business life.
2	The student will gain the skills of research, communication, presentation in the field of his/her expertise individually and/or as a team
3	The student will be able to define and apply the theoretical and practical management processes related to writing and presenting thesis.
4	The student will develop an ability to communicate, narrate, discuss, and communicate in front of the group by preparing a mastered topic or thesis topic related to a work that will contribute to the contemporary and educational process.

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

5	They will be able to follow and discuss conference and presentation techniques, and will gain efficiency in resource research and management.
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Weekly Content	
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Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1							
2							
3							
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8							
9							

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
MAT204	2			4
Title	**T**	**A**	**L**	**ECTS**
Statistical Methods of Data Analysis	2	2	1	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**		**Elective**	**X**			
Objectives	Introduction to probability and statistics						
Content	Fundamentals of probability, discrete and continuous random variables, multivariate random variables, basics of descriptive statistics, inductive statistics, point estimation, confidence intervals, hypothesis tests, pairwise tests, analysis of variance, regression analysis, compatibility tests, non-parametric tests.						
Prerequisites	None						
Coordinator							
Lecturer(s)	Asst.prof. dr. Esra Ataç Baş						
Assistant(s)							
Work Placement	None						

Recommended or Required Reading

Books / Lecture Notes	
Other Sources	

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm + 1 Final

Course Composition

Mathematics und Basic Sciences	70	%
Engineering	30	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz	1	20
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	14	2	28
Laboratory	14	1	14
Projects			
Final Exam	1	2	2
		Total Work Load	**102**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Learning the basics of probability
2	Learning about discrete and continuous random variables
3	Learning multivariate random variables and limit theorems in probability
4	Learning the basics of descriptive statistics
5	Learning the basics of point estimation, confidence intervals, and hypothesis testing
6	Learning the basics of analysis of variance, regression, compatibility tests, non-parametric tests

Weekly Content

1	Fundamentals of probability
2	Discrete random variables
3	Continuous random variables

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

4	Continuous random variables
5	Multivariate random variables
6	Multivariate random variables
7	Descriptive statistics
8	Point estimation, confidence intervals
9	Midterm
10	Confidence intervals
11	Hypothesis tests
12	Hypothesis tests, pairwise t-test
13	Analysis of variance, regression analysis
14	Compatibility tests
15	Non-parametric tests

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

	P1	P2	P3	P4	P5	P6	P7
1	4	4	4	4	4	5	4

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.

Compiled by:	
Date of Compilation:	29.08.2022

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Course Details

Code	Academic Year			Semester
EBT312	3			6
Title	**T**	**A**	**L**	**ECTS**
Sustainable Energy	3	0	0	6

Language	German
Level	**Undergraduate** x **Graduate** **Postgraduate**
Department / Program	Energy Science and Technology
Forms of Teaching and Learning	Formal
Course Type	**Compulsory** **X** **Elective**
Objectives	This course aims to teach the concept of energy, which is necessary for a sustainable life and is obtained from sustainable and renewable resources. It aims to raise awareness of global warming and climate change and to specify preventive factors. To explain the cycles, which are sustainable natural formations, information on recycling, waste management, carbon zero and energy zero concepts is desired.
Content	Causes, effects, and proposed solutions for global warming and climate change Water oxygen, carbon and nitrogen cycles. Fossil fuels, renewable and non-renewable energy systems. Sustainable energy sources. Recycling, zero waste, zero emissions and zero energy systems.
Prerequisites	
Coordinator	
Lecturer(s)	
Assistant(s)	
Work Placement	No

Recommended or Required Reading

Books / Lecture Notes	Watter, H. (2011). Regenerative Energiesysteme: Grundlagen, Systemtechnik und Anwendungsbeispiele aus der Praxis. Springer Verlag
Other Sources	De Haan, G. (2007). Studium und Forschung zur Nachhaltigkeit. W.Bertelsmann Verlag.

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm + 1 Final

Course Composition

Mathematics und Basic Sciences	20	%
Engineering		%

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Engineering Design		%
Social Sciences	40	%
Educational Sciences		%
Natural Sciences	40	%
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	3	42
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	3	42
Laboratory			
Projects	1	20	20
Final Exam	1	3	3
		Total Work Load	**172**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	To be informed about various topics related to fossil fuels and to be able to use this information for specific analyzes and designs.
2	To be aware of the importance of renewable energy sources and their use.
3	To be able to explain wind energy, potential and conversion systems.
4	To be able to explain solar energy, potential and conversion systems.
5	To be able to explain the environmental effects of renewable energy conversion systems.

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

Weekly Content	
1	Introduction to Renewable Energy: Introduction Course syllabus and logistics Force, energy, power Definition and types of energy Primary and secondary energy Energy cycle Units and conversion factors Advantages and disadvantages of renewable energy Energy storage systems.
2	Characteristics of Renewable Energy Resources, Global and National Situation in Renewable Energy.
3	Fossil Fuels and Renewable Energy: Definitions and classifications of fossil fuels Formation of coal, oil and natural gas Carbon cycle Composition of fossil fuels Exploration, production and consumption of fossil fuels Photosynthesis and combustion Exhaustibility and inexhaustibility Earth's reserves and R/P ratios Climate change and environmental degradation.
4	Wind: Characteristics and Power Potential as an Energy Source.
5	Wind Energy Conversion Systems and Applications.
6	Solar Energy, Potential and Conversion Systems.
7	Hydroelectric Energy, Resources and Potential
8	Solar Heat Energy: Introduction to solar systems History of solar energy Availability of solar radiation in nature Solar technologies Low temperature solar energy applications Active and passive solar heating Solar thermal machines and electricity production Economics of solar technology and R&D activities.
9	Midterm
10	Geothermal energy
11	Biomass and its use
12	Ocean, Tidal and Wave Energy: Introduction, Definitions and classifications Technical specifications Tribune technologies Environmental factors Earth potential Future and obstacles Physical properties of wave energy World resources Wave energy technology Economic and environmental considerations.
13	Hydrogen as a Renewable Energy Source.
14	Feasibility in Renewable Energy Systems.

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

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	29.08.2022

ENERGY SCIENCE AND TECHNOLOGY BACHELOR PROGRAM

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
DEU122	1			Spring
Title	**T**	**A**	**L**	**ECTS**
Technical German II	3	0	0	2

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	To introduce students to their professional terminology and improve their reading comprehension and pronunciation skills in German					
Content	To enable the students produce written work encompassing definition paragraphs summaries, descriptions (mechanism and process), and classification essays, maintaining unity and coherence.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Technical German for education and business. Several learning books Several books in material science and know-how from internet
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences	100	%
Natural Sciences		%

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

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	1	4	4
Midterm Exam	1	2	2
Recitations			
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**64**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Physics, material science and energy students can learn approximately 350 technical words
2	Presentations in several technical branches and improvement in presentation technique
3	Reading and hearing during teaching, corrections, explain with videos
4	.
5	
6	
7	
8	
9	

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY
COURSE SYLLABUS

10	
11	
12	
Weekly Content	
1	Introduction, To get To know, which subjects we learn, learning learning
2	Technical words about energy science
3	Technical words about energy science
4	Technical words about energy science
5	Technical words about energy science
6	Technical words about energy science
7	Technical words about energy science
8	Technical words about energy science
9	Technical words about energy science
10	Technical words about energy science
11	Technical words about energy science
12	Technical words about energy science
13	Technical words about energy science
14	Technical words about energy science
15	

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

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

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

DEPARTMENT OF ENERGY SCİENCE AND TECHNOLOGY

COURSE SYLLABUS

Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCES COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
DEU121	1			WiSe/ Spring
Title	**T**	**A**	**L**	**ECTS**
Technical German I	2	2	2	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Sciences					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	To introduce students to their professional terminology and improve their reading comprehension and pronunciation skills about Energy Sciences in German					
Content	To enable the students produce written work encompassing definition paragraphs summaries, descriptions (mechanism and process), and classification essays, maintaining unity and coherence.					
Prerequisites	B2/C1 Level German Knowledge					
Coordinator	Selahaddin Soyudoğru					
Lecturer(s)	Selahaddin Soyudoğru					
Assistant(s)	No					
Work Placement	No					

Recommended or Required Reading

Books / Lecture Notes	Technical German for education and business. Several learning boks, Several books in material science and know-how from internet, "Technisches Deutsch für Ausbildung und Beruf" Technical German for Education and Profession, Original Course Materials and Vocabulary Studies prepared by the Course Instructor.
Other Sources	Technical German for education and business. Several learning books Several books in material science and know-how from internet, "Technisches Deutsch für Ausbildung und Beruf" Technical German for Education and Profession, Original Course Materials and Vocabulary Studies prepared by the Course Instructor Current scientific articles and presentations in German, Deutsch für Energiewissenschaften, Deutsch für Naturwissenschaften, Bundeszentrale für Politische Bidung, Quarks & Co, Planet Wissen, Frankfurter Allgemeine Health Column, Wiener Zeitung , Duden Technical Dictionary dictionary

Additional Course Material

DEPARTMENT OF ENERGY SCIENCES COURSE SYLLABUS

Documents	Original Course Materials Prepared by the Instructor
Assignments	Practice assignments of weekly didacticized reading and listening texts, Vocabulary Assignments
Exams	1 Midterm Exam, 1 Final Exam

Course Composition		
Mathematics und Basic Sciences		%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		% 15
Health Sciences		% 15
Expert Knowledge		% 70

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz	12	
Assignments	1	20
Attendance	Continuation Obligation	-
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	12	2	24
Presentation / Seminar Preparation	1	4	4

DEPARTMENT OF ENERGY SCIENCES COURSE SYLLABUS

Midterm Exam	1	2	2
Recitations	-	-	-
Laboratory	-	-	-
Projects	-	-	-
Final Exam	1	2	2
		Total Work Load	**64**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes	
1	Physics, material science and energy students can learn approximately 1500 technical words
2	Presentations in several technical branches and improvement in presentation technique
3	Reading and hearing during teaching, corrections, explain with videos
4	Gaining the ability to express ideas and make presentations in German on different topics in General German, Professional German and other related subjects
5	Developing the basic cognitive skills of academic research discipline, scientific writing rules and critical thinking in a scientific context.
6	Strengthening students' communicative skills with various interactive exercises
7	Developing the country knowledge about the Geography of the Target Language and the Field Knowledge that students have learned in the Field of Professional German
8	Providing students with a preliminary idea and knowledge about how they are in Germany in the field of work they want to be active in the future with the Professional German Area,

9	
10	
11	
12	

Weekly Content	
1	Introduction, To get To know, which subjects we learn, learning learning
2	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
3	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
4	Technical words about Energy, Health, Natural Sciences, Basic Sciences science

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5	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
6	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
7	Technical words about Energy, Medicine, Health, Natural Sciences, Basic Sciences science
8	Technical words about Energy, Medicine, Health, Natural Sciences, Basic Sciences science
9	Technical words about Energy, Medicine, Health, Natural Sciences, Basic Sciences science
10	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
11	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
12	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
13	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
14	Technical words about Energy, Health, Natural Sciences, Basic Sciences science
15	

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

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

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

DEPARTMENT OF ENERGY SCIENCES
COURSE SYLLABUS

Compiled by:	Lecturer Selahaddin Soyudoğru
Date of Compilation:	07.09.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT105	1			1
Title	**T**	**A**	**L**	**ECTS**
Technical Drawing and Computer Aided Design	2	0	4	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	The knowledge that students will acquire: - Fundamentals of Technical Drawing as a Source of Information for Design and Manufacturing - Planar and Spatial Drawing - Creation and Dimensioning of Parts - Dimensional and Geometric Tolerances - Harmony - Technical Surfaces - Basic Rules of Design - Introduction to Three Dimensional Computer Aided Design - Methodical Approach and Process in the Construction of Simple Parts Skills students will acquire: - Basic Knowledge of the Application of the Engineering Approach and Working Techniques in the Creation of Simple Designs Skill - Ability to create design drawings independently according to given boundary conditions Qualifications - Solution and Analysis of a Simple Technical Problem - Problem Solving Competence in the Field of "Technical Drawings"					
Content	Lecture: • Fundamentals of technical drawing as a means of information for construction and manufacturing • Create lines, circles, hatching, dimensions and text. • Information about drawing formats, scale lines and drawing head • Representation and dimensioning of components • Representation of parts using view sand sections • Use of tolerance information and fits • Information about surface marks and hardness information • Standard series • Introduction to standards Exercises: • Creation of a construction drawing by hand from given standard parts taking into account boundary and connection conditions • Modeling with a CAD system Laboratory: • Elaboration of a simple construction with all necessary drawings					

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Prerequisites	None
Coordinator	Dr. Öğr. Üyesi Mehmet İPEKOĞLU
Lecturer(s)	Prof. Dr. Hulusi BOZKURT
Assistant(s)	
Work Placement	None

Recommended or Required Reading	
Books / Lecture Notes	Frey, H. Herrmann, A. Kuhn, V. (1996). Bautechnik Technisches Zeichnen, Deutschland.
Other Sources	Schlecht, Berthold: Maschinenelemente 1. Pearson Studium,München, 2007 Roloff/ Matek; Maschinenelemente; Vieweg-Verlag Decker; Maschinenelemente; Hanser-Verlag Haberhauer/ Bodenstein; Maschinenelemente; Springer-Verlag Hoischen; Technisches Zeichnen; Verlag Cornelsen-Giradet Klein, Einführung in die DIN-Normen; Teubner-Verlag DIN-Normen; “Tabellenbuch Metall”, Europa-Verlag 2014 Ders Notları elektronik ortamda mevcuttur. Çizim araçları, Autodesk Inventor

Additional Course Material	
Documents	-
Assignments	-
Exams	-

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

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COURSE SYLLABUS

ECTS Points and Work Load			
Activity	**Count**	**Duration**	**Work Load (Hours)**
Lectures	14	1	14
Self-Study	14	3	42
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	1	12
Recitations	14	2	28
Laboratory	14	1	14
Projects			
Final Exam	1	2	15
		Total Work Load	**125**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	To have knowledge about the basics of technical drawing.
2	To have knowledge about dimensioning of elements and standards
3	Introduction to 3D Computer Aided Design
4	Procedures and methods for creating simple components
5	Application of engineering approaches and basic working techniques to create simple designs
6	Use of tolerance information and harmonizations
7	Fundamentals of technical drawing as a source of information for design and manufacturing.
8	Ability to create and interpret technical drawings for simple designs.
9	Creation of an element drawing according to given boundary conditions.

Weekly Content	
1	Fundamentals of technical drawing as an information tool for construction and manufacturing
2	Fundamentals of technical drawing as an information tool for construction and manufacturing
3	Representation and dimensioning of elements
4	Representation and dimensioning of elements
5	Introduction to design hierarchy and design methodology in the manufacturing process
6	Introduction to design hierarchy and design methodology in the manufacturing process
7	Introduction to Standard / Norm Information
8	Introduction to Standard / Norm Information
9	Midterm Exam

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

10	Use of standards information and harmonizations
11	Use of standards information and harmonizations
12	Creation of manual technical drawings of the given elements considering the boundary and connection conditions
13	Detailing the design with all necessary drawings
14	Modeling with 3D computer-aided design
15	Modeling with 3D computer-aided design

Contribution of Learning 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: 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.

Compiled by:	
Date of Compilation:	24.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MAB202	2			4
Title	**T**	**A**	**L**	**ECTS**
Thermodynamics	3	2	0	6

Language						
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The main aim of the course is to teach the basic concepts of thermodynamics and the first and second laws of thermodynamics. demonstrate the fundamentals of thermal design of engineering systems. To improve students' analysis, application and communication skills in this field.					
Content	Thermodynamic systems and their properties. Thermodynamic processes; work and heat interactions. Pure substances and thermodynamic properties. First Law; closed and open systems, flow processes. The Second Law; Heat machines, heat pumps and coolers. Entropy.					
Prerequisites						
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	Y. A. Çengel: Thermodynamics: An Engineering Approach
Other Sources	P. Stephan, K.-H. Schaber, K. Stephan, F. Mayinger: Thermodynamik, Grundlagen und technische Anwendungen H. D. Baehr, S. Kabelac: Thermodynamik K. Lucas: Thermodynamik

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		% 10
Engineering		% 80

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Engineering Design		% 10
Social Sciences		% 0
Educational Sciences		% 0
Natural Sciences		% 0
Health Sciences		% 0
Expert Knowledge		% 0

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	% 40
Quiz	0	% 0
Assignments	0	% 0
Attendance	0	% 0
Recitations	0	% 0
Projects	0	% 0
Final Exam	1	% 60
	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			
Final Exam			
		Total Work Load	
		ECTS Points (Total Work Load / Hours)	

Learning Outcomes

1	To acquire sufficient knowledge about mathematics, science and mechanical engineering and to apply the theoretical and practical knowledge in these fields to model and solve engineering problems.
2	Ability to identify, define, formulate and solve complex engineering problems, and to select and apply appropriate analysis and modeling methods in mechanical engineering for this purpose.
3	Experiment design, experimentation, data collection, analysis and interpretation of results for engineering problems.
4	
5	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

6	
7	
8	
9	
10	
11	
12	
Weekly Content	
1	Systems
2	Change of state
3	Thermodynamic equilibrium,
4	0, 1 and 2 law of thermodynamics
5	Thermal and caloric equations of state of ideal gases
6	Thermodynamic properties
7	Calculation of cycles and their diagrams
8	Determination of the efficiency
9	
10	
11	
12	
13	
14	
15	

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

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

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES

COURSE SYLLABUS

11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	08.03.2021

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
TUR001	2			**3**
Title	**T**	**A**	**L**	**ECTS**
Turkish I	2	0	0	2

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The goal is to educate individuals who speak their mother tongue effectively, have effective speech, writing, reading and listening skills and strong communication skills.					
Content	Language-Culture-Communication-Grammer					
Prerequisites						
Coordinator	Asist Prof.Dr. Enis DİNÇ					
Lecturer(s)	Lecturer Gül Ayşe AKAR					
Assistant(s)						
Work Placement	No					

Recommended or Required Reading

Books / Lecture Notes

CORBALLIS, Michael. C., İşaretten Konuşmaya Dilin Kökeni ve Gelişimi, (Çev: Aybek Görey), Kitap Publishing House, İstanbul, 2003.
DEMİR, Nurettin, Türk Dili El Kitabı, Grafiker Publishing, Ankara, 2005
ERCİLASUN, Ahmet Bilge, Türk Dili Tarihi Başlangıçtan 20.Yüzyıla, Akçağ Publishing, Ankara, 2011
KARAHAN, Leyla, Türkçede Söz Dizimi, Akçağ Publishing, Ankara, 2011
LEVEND, Agâh Sırrı, Türk Dilinde Gelişme ve Sadeleşme Evreleri, Türk Dil Kurumu Publishing, Ankara, 1972
BANGUOĞLU, Tahsin, Türkçenin Grameri, Türk Dil Kurumu, Ankara, 2007
AKSAN, Doğan, Türkiye Türkçesinin Dünü, Bugünü, Yarını, Bilgi Yayınevi, Ankara, 2000.
AKSAN, Doğan,Türkçenin Gücü, Ankara: Türkiye İş Bankası Kültür Yayınları, 1987.
AKSAN, Doğan, Türkçenin Sözvarlığı, Engin Yayınevi, Ankara, 1996.
AKSAN, Doğan, Türkçeye Yansıyan Türk Kültürü, Bilgi Yayınevi, Ankara, 2008
AKSAN, Doğan, Her Yönüyle Dil, Ana Çizgileriyle Dil bilim. Ankara: Türk Dil Kurumu Yayınları, Ankara, 2015.
BANGUOĞLU, Tahsin, Dil Bahisleri, Kubbealtı Neşriyat, İstanbul, 1987.
ELİOT, T. S., Kültür Üzerine Düşünceler. (Çev. S. Kantarcı) Kültür ve Turizm Bakanlığı Publishing , Ankara, 1987.
ERGİN, Muharrem, Türk Dili, Boğaziçi Publishing, İstanbul, 2013.
GÜLENSOY, Tuncer, Türkçe El Kitabı, Akçağ Publishing, Ankara, 2010.
GÖKBERK, Macit, Değişen Dünya Değişen Dil, Yapı Kredi Publishing , İstanbul, 2008.
GÜLSEVİN, Gürer / BOZ, Erdoğan; Türk Dili ve Kompozisyon I-II., Tablet Publishing House, Konya, 2009.

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	KIRIMLI, Atilla, Türk Dili: Dil ve Anlatım, Bilgi Üniversitesi Publishing, İstanbul, 2006. KORKMAZ, Zeynep, Türkiye Türkçesi Grameri: Şekil Bilgisi, Türk Dil Kurumu Publishing, Ankara, 2014. KORKMAZ, Zeynep, Türk Dili Üzerine Araştırmalar, Türk Dil Kurumu Publishing, Ankara, 1995. USLU, Mustafa, Ansiklopedik Türk Dili ve Edebiyatı Terimleri Sözlüğü, Yağmur Yayınları, İstanbul, 2007. ÖZLEM, Doğan, Kültür Bilimleri ve Kültür Felsefesi, Notos Yayınevi, İstanbul, 2012. USER, Hatice Şirin, Başlangıcından Günümüze Türk Yazı Sistemleri, Akçağ Yayınları, Ankara, 2006.
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	2	28
Self-Study			
Assignments			
Presentation / Seminar			

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Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**60**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes	
1	Students understand the language in all aspects and are familiar with language universes.
2	Students can categorize the languages from the aspect of origin and structure.
3	Students can list the characteristics of the languages and explain the types of languages.
4	Students understand the differences between terms such as "dialect, accent etc.".
5	Students think of terms like "mother tongue, original language, artificial language, lingua franca, official language"
6	Students determine the position of the Turkish language between the world languages.
7	Students think about culture and analyze the relationships between cultures. They analyze the references of culture to language.
8	Students understand the connection between culture and language.
9	Students understand the grammar rules of the Turkish language.
10	Students analyze the grammar rules.
11	Students internalize the rules of grammar and use in daily life correspondence.
12	

Weekly Content	
1	The language and the language universals
2	The language and the place of the Turkish language between the world languages
3	The alphabets used in Turkish writing
4	The relationship between the language and the culture
5	Phonetics and phonetic events
6	The theory of forms (the endings in Turkish, the word construction)
7	Word structure
8	word types
9	Components of Sentence
10	Types of sentence
11	The vocabulary of Turkish

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12	The interaction between languages and the influence of Turkish on world languages
13	Current problems of the Turkish language
14	The influence of the mass media on the language
15	

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

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

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
TUR002	2			4
Title	**T**	**A**	**L**	**ECTS**
Turkish II	2	0	0	2

Language	Turkish					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Department of Energy Science and Technology (German)					
Forms of Teaching and Learning	Face to Face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The aim of the course is to educate individuals about using their native language effectively and to have effective speaking, writing, reading and listening skills.					
Content	Composition Plan / Article Types / Writing Rules / Punctuation Marks					
Prerequisites						
Coordinator	Asist Prof.Dr. Enis DİNÇ					
Lecturer(s)	Lecturer Gül Ayşe AKAR					
Assistant(s)						
Work Placement						

Recommended or Required Reading	
Books / Lecture Notes	TÜRK DİLİ DİL VE ANLATIM, Atilla ÖZKIRIMLI
Other Sources	TÜRK DİLİ DİL VE KOMPOZİSYON, Zeynep KORKMAZ vd.

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences		% 0
Engineering		% 0
Engineering Design		% 0
Social Sciences		% 0
Educational Sciences		% 100
Natural Sciences		% 0
Health Sciences		% 0

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COURSE SYLLABUS

Expert Knowledge		% 0

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
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	**62**
		ECTS Points (Total Work Load / Hours)	**2**

Learning Outcomes

1	Students by comprehending the functions of narrative forms in writing, construct a composition.
2	Students understands the uses of punctuation marks and use them correctly.
3	Students understand the rules of writing in Turkish language and uses the rules in daily life.
4	Students explain the features of opinion essays and gets ideas about how to develop the opinion in these articles.
5	Students distinguish the types of opinion essays. They learn about these types of essays and examine this kind of texts in Turkish Literature.
6	Students realize the characteristics of artistic writing. Stıdents distinguish this type of writing from opinion essays and recognize the examples of artistic writing from Turkish Literature.
7	Students distinguish the types of poetry. They examine examples of different poetry types.
8	Students analyze the elements of the story. They distinguish the story types.
9	Students examine how the genre of the novel develops in world literature and Turkish literature. They evaluates the differences of novel types.

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10	Students have information about the types of theater. They evaluate the differences of theater types in World Literature and Turkish Literature.
11	Students learn how to do scientific research. They examines the examples on how to show resources in a scientific research. They understand that writing a scientific paper is a scientific code of ethics.
12	Students analyzes correspondence types. They understand the characteristics of these species.
13	They examine effective reading methods. They determines which methods are used in terms of their own learning strategy. They apply reading methods in daily life and develop a strategy of self-reading.
14	Students analyzes the types of listening and makes a synthesis about which listening methods to use in communicating with people in daily life.
15	Understands the basic principles of effective conversation. They thinks about how this kind of speech should be done and valuate the impact of body language on speech. They analyzes speech types.
16	Students explain the rules of speech that should be considered when talking in an effective presentation. They understand how to make the presentation more effective by paying attention to pronunciation features such as accent, intonation etc.

Weekly Content	
1	General Written Composition Information / Expression Forms
2	Punctuation Marks
3	Writing Rules
4	Written Expression Disorders
5	Opinion Writings (Articles, Critiques, Essays etc.)
6	Opinion Writings (Interview, Diary, Biography, Autobiography)
7	Literary Writings (Poetry, Story)
8	Literary Writings (Novel, Theater)
9	Scholar Articles
10	Formal Correspondences (Petitions, Minutes, Decrees, Reports)
11	Official Correspondence (Curriculum Vitae, Letter, Business Letter, Official Letter, Open Letter)
12	Effective and Critical Reading
13	Effective Listening and Listening Types
14	Oratory
15	

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

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

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9	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1
11	3	4	5	1	3	1	1
12	1	1	1	1	1	1	1
13	1	2	1	1	1	1	4
14	1	2	5	1	3	3	4
15	1	1	1	1	1	3	1
16	1	1	1	1	1	1	1

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	
Date of Compilation:	08.03.2021

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT308	3			6
Title	**T**	**A**	**L**	**ECTS**
Applied Energy Science Laboratory	1	0	5	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	With the help of the experiments at the undergraduate level, it is aimed to give the students a laboratory habit and to carry out the lessons in the field of energy practically.					
Content	The content of this course covers the synthesis and characterization studies of materials used in the field of energy, electrode material synthesis for systems that convert chemical energy to electrical energy and performance analysis of these materials.					
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	30	%
Engineering	40	%
Engineering Design	10	%
Social Sciences		%
Educational Sciences		%

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COURSE SYLLABUS

Natural Sciences	20	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam		
Quiz		
Assignments		
Attendance		
Recitations	14	40
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures			
Self-Study	14	3	42
Assignments	2	20	40
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	3	42
Laboratory	14	3	42
Projects			
Final Exam	1	3	3
		Total Work Load	**172**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students will gain the ability to work alone in the laboratory.
2	Students will be able to familiarize themselves with experimental systems and set up their own when necessary.
3	Students will acquire the ability to read and analyze technical writing.
4	Students will gain the ability to solve laboratory problems and system errors.

Weekly Content

1	Battery Tests
2	Battery Tests
3	Battery Tests

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4	Fuel Cell Tests
5	Fuel Cell Tests
6	Fuel Cell Tests
7	Supercapacitor Experiments
8	Supercapacitor Experiments
9	Biogas Experiments
10	Biogas Experiments
11	Biogas Experiments
12	Catalyst Synthesis and Characterization Experiments
13	Catalyst Synthesis and Characterization Experiments
14	Catalyst Synthesis and Characterization Experiments

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

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

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.

Compiled by:	Dr. Öğr. Üye. Meltem Karaismailoğlu
Date of Compilation:	29.08.2022

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COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
EBT304	3			6
Title	**T**	**A**	**L**	**ECTS**
Wind Energy	2	1	1	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	The students are taught how the wind occurs, its formation processes, and its effects. Information about the design, structure, production, and operation of wind turbines is given. It is aimed at teaching the power generation calculations of wind turbines, wind speed statistics, and the calculation of the loads on the turbine. The course aims to provide students with a basic understanding of wind energy economics, cost calculations, and deployment examples by applying wind energy economics, cost calculations, and deployment examples.
Content	Wind formation and sources, wind characteristics and wind potential, wind power calculation methods and statistics, turbine installation, structure, and aerodynamics, turbine structure and operational systems, turbine deployment, and wind energy economics are all covered.
Prerequisites	None
Coordinator	
Lecturer(s)	
Assistant(s)	
Work Placement	None

Recommended or Required Reading

Books / Lecture Notes	Burton, T., Sharpe, D., Jenkins, N., Bossanyi, E., 2001, Wind Energy Handbook, John Wiley & Sons. Jarass, L., Obermair, G., Voigt, W. (2009).Windenergie: Zuverlässige Integration in die Energieversorgung. Springer Science & Business Media.
Other Sources	

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm + 1 Final

Course Composition

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COURSE SYLLABUS

Mathematics und Basic Sciences	20	%
Engineering	40	%
Engineering Design	40	%
Social Sciences		%
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	3	42
Self-Study	14	3	42
Assignments	3	15	45
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations			
Laboratory			
Projects	1	20	20
Final Exam	1	3	3
		Total Work Load	**155**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students learn about alternative energy systems, wind energy and parameters of wind energy systems.

Weekly Content

1	Presentation of course content. General introduction
2	What is energy? Energy forms and sources

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3	What is wind and how is it formed? and measurement methods
4	Wind Energy and its applications. Historical development of wind energy in the world and in our country
5	The potential of wind energy
6	Wind turbines and their types
7	Wind turbines and elements
8	Wind energy basic concepts
9	Midterm
10	Aerodynamics of wind turbines
11	Generating power from wind turbines (Betz Theory)
12	Project planning and management of wind power plants
13	Project implementation of wind power plants
14	Environmental impact and other applications of wind power plants

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

	P1	P2	P3	P4	P5	P6	P7
1	4	4	4	4	4	5	4

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.

Compiled by:	
Date of Compilation:	29.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT201	2			3
Title	**T**	**A**	**L**	**ECTS**
Renewable Energy Technologies	3	1	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	To enable students to have an idea about energy management by improving their knowledge and skills about renewable energy and new technologies in this field.					
Content	Meteorology and geographical effects, Wind Turbines: Systematics, basic calculations, structure and behavior of components, Electricity generating wind turbines: Application areas, system examples, functional structures, Control methods, Storage, Economic evaluation, Legal aspects, Accumulators, Fundamentals of photovoltaic systems, Fuel Cells, Adaptation and application of DC voltage sources (solar panels, fuel cells, batteries, ...)					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Crastan, V. (2012): Elektrische Energieversorgung 1, Springer Verlag. Crastan, V.(2011): Elektrische Energieversorgung 2, Springer Verlag
Other Sources	

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	30	%
Engineering	40	%
Engineering Design	10	%
Social Sciences	-	%

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Educational Sciences	-	%
Natural Sciences	20	%
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	3	42
Self-Study	14	3	42
Assignments	2	20	40
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	3	42
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**172**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students know selected subfields of energy technology. They can apply basic knowledge to practical questions of technical energy conversion.
2	Students will be able to describe, compare and evaluate technical systems and components for generating energy from solar, wind, biomass, hydrogen, geothermal energy and water.
3	Defining the physical relationships and technical characteristics of energy production from solar, wind, biomass, hydrogen, geothermal and hydroelectric energy; storage of electricity and its connection with electricity grids distribution.
4	Students understand the principles of the energetic use of renewable energies, know the technical structure and efficiency of different energy systems and can evaluate the technical and economic potential of renewable energy use.
5	They can analyze and make recommendations on technical, energetic, economic and environmental systems for a defined location.

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6	Students understand renewable energy technologies so that they can understand the technology and framework conditions and apply them to new questions and evaluate various future options for improving the efficiency of energy supply. They will be able to identify advantages and disadvantages over conventional energy systems.

Weekly Content	
1	Introduction to energy systems and sources
2	Energy, sustainability and environment
3	Quantitative evaluation of energy and energy arithmetic
4	Solar Energy Technologies
5	Solar Energy Technologies
6	Geothermal Energy Technologies
7	Biomass Technologies
8	Biomass Technologies
9	Hydrogen
10	Fuel Cells
11	Fuel Cells
12	Next Generation Batteries
13	Wind Energy Technologies
14	Wind Energy Technologies
15	Hydrothermal Energy Technologies

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

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

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.

Compiled by:	
Date of Compilation:	24.08.2022

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT318	3			5
Title	**T**	**A**	**L**	**ECTS**
Operations Research	2	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	Operations research is a field of science that uses scientific methods such as mathematical modeling, algorithms and statistics to generate ideas for complex problems that arise within an organization or structure related to the coordination and execution of operations. The goal after using operations research to provide the most scientifically appropriate solution to the problem should be to improve and optimize the performance of the organization.					
Content	History and development of Operations Research, deterministic models, the art of model building and problem solving, the place of linear programming in mathematical programming, linear decision models, studies on the construction of linear decision models, solution of linear programming models, graphical, algebraic, simplex methods, computer software for solving linear programming models and their use, duality and dual simplex method, transportation models.					
Prerequisites	None					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Operations Research: An Introduction, Hamdy Taha, Ninth Ed., Pearson, 2011.
Other Sources	Introduction to Operations Research, Frederich S. Hillier, Gerald J. Lieberman, Ninth Ed. McGraw-Hill, 2010.

Additional Course Material	
Documents	-
Assignments	-
Exams	-

Course Composition		
Mathematics und Basic Sciences	30	%
Engineering	30	%

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COURSE SYLLABUS

Engineering Design	40	%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

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

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	19	6	114
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	28
Laboratory	5	2	10
Projects			
Final Exam	1	2	2
		Total Work Load	**184**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	
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DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Weekly Content	
1	History and development of Operations Research, its place and importance in industrial engineering. Introduction of Linear Programming model, expression in sum and matrix notations.
2	Sample problem studies for linear decision model setup.
3	Sample problem studies for linear decision model setup.
4	Solution of DP models, graphical and algebraic methods.
5	Solving DP models by simplex method. Typical maximization model and primal simplex method.
6	Two-stage general simplex method, big M method
7	Duality in DP models and dual simplex method
8	Midterm Exam
9	Transportation Problems
10	North West Corner Method
11	Least Cost Pancake Method
12	Row or Row Minimization Method
13	Stepping Stone Method
14	Modi Method

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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