DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details								
Code					**Academic Year**			**Semester**
EBT323					4			7
Title					**T**	**A**	**L**	**ECTS**
Sustainable Biofuel Technologies					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**		**Elective**					
Objectives	Within the scope of the sustainable biofuel technologies course, it is aimed to teach the students biofuels and biofuel technologies in detail by conveying the place and importance of biomass among renewable energy sources. In addition, information on sustainability, environmental impact assessment methods, and life cycle assessment is provided. Biomass conversion technologies, various solid, liquid, and gas biofuels, cogeneration, trigeneration, and hybrid power systems are introduced, and it is aimed that the student taking the course will have a basic knowledge of both biofuels and environmental impact assessments with life cycle assessment examples.							
Content	The sustainable biofuel technologies course covers biomass conversion processes; introduction of solid, liquid, and gaseous biofuels, especially biodiesel, bioethanol, biogas, and biohydrogen, applications of cogeneration and trigeneration and hybrid power plants; It includes teaching different thermochemical transformation processes such as combustion, gasification, liquefaction and pyrolysis, and information that will form the basic infrastructure of environmental impact assessment so that all these topics can be handled from the perspective of sustainability management and life cycle assessment.							
Prerequisites	None							
Coordinator	Dr. Aslı İşler Kaya							
Lecturer(s)	Dr. Aslı İşler Kaya							
Assistant(s)								
Work Placement	None							

Recommended or Required Reading	
Books / Lecture Notes	Fischer, F., Lack, A., 2007. Biokraftstoffe. Vogel Buchverlag. ISBN 978-3-8343-3094-9. Bühler, T., 2010. Biokraftstoffe der ersten und zweiten Generation, Diplomica Verlag, ISBN:9783836682053. Böttcher, J., Hampf, N., Kügemann, M., Freund, F., 2014. Biokraftstoffe und Biokraftstoffprojekte, Springer. ISBN-13:978-3-642-55065-2. Klöpffer, W., Birgit, G., 2009. Ökobilanz (LCA), Wiley-VCH, ISBN:978-3-527-32043-1. Mulaj, D., 2016. Die Ökobilanz (LCA). Historische Entwicklung, Begriffserklärung und kritische Auseinandersetzung, ISBN-13:9783668282476. Curran, M.A., Life Cycle Assessment Handbook: A Guide for Environmentally Sustainable Products, Wiley-Scrivener, ISBN-13:978-1118099728.

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Other Sources	

Additional Course Material	
Documents	
Assignments	1 Project + 1 Assignment
Exams	1 Midterm + 1 Final

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

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	25
Quiz		
Assignments	1	10
Attendance		
Recitations		
Projects	1	20
Final Exam	1	45
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	2	28
Assignments	1	20	20
Presentation / Seminar Preparation	1	30	30
Midterm Exam	1	3	3
Recitations	14	2	28
Laboratory			
Projects	1	25	25
Final Exam	1	3	3

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Total Work Load	**165**
ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes	
1	The ability to have basic knowledge about biomass conversion technologies will be gained.
2	Information will be provided on sustainable production and consumption and life cycle assessment.
3	Basic knowledge about biofuels such as biodiesel, bioethanol, biogas and biohydrogen will be provided.
4	The ability to have basic knowledge about various applications such as cogeneration, trigeneration; hybrid power plants and thermochemical conversion processes will be gained.
5	The ability to interpret biofuels and biofuel technologies in terms of sustainability and life cycle assessment will be gained.

Weekly Content	
1	Presentation of course content. General energy outlook and the place of biomass among renewable energy sources
2	Overview of biofuels and biofuel technologies
3	Sustainability management and biofuels
4	Life cycle assessment and biofuels
5	Biodiesel and sustainable aviation and marine fuels
6	Bioethanol
7	Biogas
8	Midterm
9	Biohydrogen
10	Biohydrogen
11	Thermochemical conversion technologies (Combustion, gasification, liquefaction, pyrolysis)
12	Cogeneration/Trigeneration
13	Hybrid power plants
14	Life cycle assessment case studies
15	Project presentation

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

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

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

https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=EN&curSunit=5706

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Compiled by:	Dr. Aslı İşler Kaya
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