ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ | DEMOCRITUS UNIVERSITY OF THRACE

Μ.Δ.Ι.Π.
ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ

COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
DEPARTMENT	Department of Chemistry		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	EN30	**SEMESTER**	7 or 8
COURSE TITLE	Chemistry and Technology of Biofuels		
TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
-		3	3
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		-	-
COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Specific Area		
PREREQUISITES:	No		
TEACHING & EXAMINATION LANGUAGE:	Greek		
COURSE OFFERED TO ERASMUS STUDENTS:	No		
COURSE URL:	https://chem.duth.gr/en/courses/chemical-process-modelling-and-simulation		

(2) LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

After the successful completion of the course, participants will be able to:

- Demonstrate advanced knowledge in the field of biofuels chemistry and technology.
- Possess advanced cognitive and practical skills for solving complex and unpredictable problems in the bioenergy industry.
- Apply complex techniques and methodologies for decision-making in highly demanding industrial environments.

Knowledge

- Understand the operation of biomass production units and biomass-to-bioenergy conversion facilities.
- Classify and evaluate biofuels (biodiesel, bioethanol, biobutanol, biohydrogen, biogas, sustainable aviation fuels).
- Understand the reactions and reaction mechanisms involved in the operation of the above-mentioned systems.

Skills

- Control the composition, quality, properties, and specifications of biofuels.

- Evaluate and classify biofuels according to their composition and properties.
- Operate specialized laboratory equipment.
- Interpret data and information from physical properties and chemical analyses of intermediate and final process samples.
- Determine and assess the combustion quality characteristics of biofuels.

Abilities

- Supervise and manage the operation of biofuel production and processing units.
- Manage facilities that directly or indirectly utilize bioenergy.
- Make decisions in complex problems related to biomass management, processing, and biofuel upgrading.
- Select appropriate instruments, analytical techniques, or combinations of methods for sample analysis, taking into account cost and measurement efficiency.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking
Promoting free, creative and inductive reasoning

The general skills that participants will have acquired upon successful completion of the module are:

- Search, analysis and synthesis of data and information, ICT use
- Adaptation to new situations
- Decision making
- Autonomous work
- Teamwork
- Working in an international environment
- Working in an interdisciplinary environment
- Production of new research ideas
- Project design and management
- Respect for the natural environment
- Sustainability
- Critical thinking
- Promoting free, creative and inductive reasoning

(3) COURSE CONTENT

THEORY

- Introduction to Biomass and Bioenergy
- Technologies for Converting Biomass into Biofuels
- Biofuels: Composition, Classification, and Evaluation of Biofuels
- Vegetable Oils and Animal Fats
- Biodiesel Production

- Bioethanol
- Biobutanol
- Biohydrogen
- Biogas
- Sustainable Aviation Fuels
- Determination of Biofuel Properties
- Biofuel Specification and Quality Control
- Biofuel Economics and Policy

(4) LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use ICT in teaching and in communication with students: • Digital slides • Scientific simulators • Videos • MS Teams / eclass, webmail
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	***Activity*** / ***Workload/semester*** Lectures: 39 Interactive learning: 30 Bibliographic research and analysis: 21 **Total: 90**
STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others* *Please indicate all relevant information about the course assessment and how students are informed*	Student assessment is conducted through a written examination. The final written examination includes multiple-choice questions, short-answer questions, critical thinking questions, matching exercises, true/false questions, and problem-solving tasks carried out both in written form and in silico. The language of assessment is Greek. The evaluation criteria are communicated from the beginning of the course and are accessible to students via eclass.

(5) SUGGESTED BIBLIOGRAPHY

- Recommended bibliography:

1. Κάρναβος Ν., Λάππας Α., Μαρνέλλος Γ., Βιοκαύσιμα: Αειφόρος Ενέργεια, 2014 [33155195]

- Relevant scientific journals:

1. Biofuels, Taylor and Francis Group.
2. Renewable Energy, Elsevier.