

ENSIC

Université de Lorraine

Courses taught in
English

2017-2018

Course units and their components	Unit coordinators	ECTS credits
Foreign Language V English and/or French as a Foreign Language - 1 Foreign language = 2 ECTS - 2 Foreign languages = 3 ECTS	Jude BOWDEN	3
Polymer-based Processes and Products	Sandrine HOPPE	3
Materials and Nanomaterials for Catalysis	Halima ALEM-MARCHAND	3
Kinetics of Fuel Combustion	Olivier HERBINET	3
Biorefinery	Guillain MAUVIEL	3
TOTAL		15

CORE CURRICULUM			
COURSE TITLE: FOREIGN LANGUAGE V			MANDATORY
TAUGHT HOURS 48	STUDENT WORKLOAD 70	ECTS CREDITS 3	SEMESTER 9

AIMS:

- To develop and consolidate linguistic and communicative skills B2/C1/C2 level. Minimum Toeic score of 785/990(See CEFR scales);
- To develop professional language and communication skills needed when working in industry and research laboratories abroad;
- Develop 21st C skills: learning skills, literacy skills and life skills.

LEARNING OUTCOMES:

At the end of the course, the student engineer should be able to

- Interact with a degree of fluency and spontaneity in a social, academic and professional context;
- Carry out an effective face to face job interview;
- Chair and take part in meetings;
- Understand how cultural differences impact on human interaction in both the workplace and social contexts and reflect on their own culture and its impact on intercultural interactions;
- Understand the need for defining more clearly problems encountered in the chemical industry and use creative solving problem tools;
- Working in teams using 21st C skills and soft skills.

COURSE CONTENT DESCRIPTION AND TEACHING METHODS:

Students have to follow 2 modules (12 hours each) and a 21-hour intensive session.

Plus one class on "Creativity for Chemical Engineers" (3h): a look at problem definition and use of creative solving problem tools.

MODULE 1: Meetings: compulsory module

- Study of types and purposes of meetings;
- Develop communication skills - how to chair a meeting effectively, analyze and give feedback to other participants in a meeting situation;
- Expressions for meetings: chairing, taking part – express ideas and opinions with precision, present and respond to arguments convincingly, take on role of chair/secretary (taking notes);
- How to write the minutes and agenda;
- Case studies and role play simulations.

MODULE 2: Students are given a choice of different courses, e.g.: TOEIC preparation /project work, Science and Science Fictions, Self-awareness and team building skills.

3 and ½ day Intensive Session: to develop professional and linguistic skills

- Working in small groups on a team project presented at the end of the session;
- Self assessment of linguistic and professional skills used in the project;
- A face to face job interview simulation, filmed and viewed for self assessment : analyzing body language, voice, quality of English, ability to give clear and full answers.

EVALUATION METHODS:

CERTIFICATION: Pass or fail

- 1) Meetings and written report
- 2) Option and written report
- 3) Session participation and presentation
- 4) Job interview

RESITS: personal work or PowerPoint presentation or written report or job interview

USEFUL INFORMATION:

PREREQUISITES: B2+

LANGUAGE: English

BIBLIOGRAPHICAL REFERENCES:

Needed: None

Advised: None

CORE CURRICULUM			
COURSE TITLE: POLYMER-BASED PROCESSES AND PRODUCTS			ELECTIVE
TAUGHT HOURS	STUDENT WORKLOAD	ECTS CREDITS	SEMESTER 9
19	58	3	

AIMS:

- To present the design methodology for the design of polymer-based speciality products and polymer production processes for specific properties;
- To provide students with a knowledge of the links between macromolecular structures, the morphology of materials, operating conditions for production processes and application properties;
- To present the specific features of the main application fields of formulated plastic materials.

LEARNING OUTCOMES:

At the end of the course, the student engineer should be able to:

- Write technical production specifications;
- Use software to design experiment plans;
- Use production process design software;
- Make the right links between certain usage properties, conditions for formulation and how the production process works.

DESCRIPTION AND TEACHING METHODS:

The course is made up of general and more specific lessons along with project groups working on case studies.

The course summary is as follows:

- Technical production specifications, multi-criteria experiment and optimization plans: 4 hours;
- Polymer formulation processes, the example of extrusion, presentation of an extrusion simulation software program: 2 hours;
- Case examples (reinforced elastomers, polyurethanes for medical applications, master batches and compounds etc.): 8 hours;
- Supervision of project group work: 3 hours;
- Oral presentations of project work: 2 hours.

EVALUATION METHODS:

A multiple choice questions test (30 minutes) at the end of a lesson. The date of this test is given on the first day of the course. Secondly an oral presentation of the case study work of the project group.

USEFUL INFORMATION:

PREREQUISITES: None

LANGUAGE: French

BIBLIOGRAPHICAL REFERENCES:

Needed: None

Advised: None

CORE CURRICULUM			
COURSE TITLE: MATERIALS AND NANOMATERIALS FOR CATALYSIS			ELECTIVE
TAUGHT HOURS	STUDENT WORKLOAD	ECTS CREDITS	SEMESTER 9
19	58	3	

AIMS:

The tremendous growth in the industrial usage of organometallic chemistry between 1950 and nowadays has resulted in marked improvements in the production of commodity chemicals. During the last years, the development of new (nano)materials has led also to significant improvements in catalysis, these materials allow the enhancement of the efficiency of numerous chemical processes from fine synthesis to pollutant degradation (liquids or gas).

Technical challenges encountered in scaling up the reactions from small quantities to production amounts will also be described.

LEARNING OUTCOMES:

At the end of the course, the student engineer should be able to:

- Associate the materials/organometallic complexes with their syntheses and characterizations;
- Develop organometallic complexes and nanoparticles used in homogeneous and heterogeneous catalysis;
- Study mechanisms of organometallic catalysis;
- Develop materials for photocatalysis.

DESCRIPTION AND TEACHING METHODS:

This course is composed of lectures and related small projects.

Four topics will be explored:

- Materials/Complexes and associated characterizations;
- Organometallic complexes and nanoparticles used in homogeneous and heterogeneous catalysis;
- Industrial applications of organometallic catalysis and future perspectives;
- Materials for photocatalysis.

EVALUATION METHODS:

Project and oral presentation.

Resits: written exam.

USEFUL INFORMATION:

PREREQUISITES: Basic knowledge of catalysis

LANGUAGE: French

BIBLIOGRAPHICAL REFERENCES:

Needed: None

Advised: None

CORE CURRICULUM			
COURSE TITLE: KINETICS OF FUEL COMBUSTION			ELECTIVE
TAUGHT HOURS 19	STUDENT WORKLOAD 58	ECTS CREDITS 3	SEMESTER 9

AIMS:

The aim of this course is to provide an introduction to experimental techniques for the kinetic study of combustion reactions and detailed kinetic modelling of these reactions.

LEARNING OUTCOMES:

At the end of the course, the student engineer should be able to:

- Master the nature of the elementary processes involved in combustion reactions and thus: Understand specific phenomena observed in these reactions (cool flame, negative temperature coefficient, auto-ignition);
- Construct a combustion mechanism for simple species (n-alkanes);
- Carry out a kinetic analysis of a model to identify the main consumption pathways for reactive and the most sensitive reactions.
- Use the various experimental techniques to carry out kinetic studies and thus be able to choose the most effective technique for a given problem (measuring auto-ignition times, flame speed, profiles of species, etc.).

DESCRIPTION AND TEACHING METHODS:

The fundamental subjects will be presented in lectures while exercises on real problems will be used to illustrate the main principles covered in lectures. The last exercise will consist of constructing a detailed kinetic mechanism for a small-scale alkane using systematic construction rules.

EVALUATION METHODS:

Individual assessment: using multiple choice question tests and exercises

USEFUL INFORMATION:

PREREQUISITES: Basic knowledge of Kinetics

LANGUAGE: French (English possible if there is a demand)

BIBLIOGRAPHICAL REFERENCES:

Needed: None

Advised:

- [1] SCACCHI, G., BOUCHY, M., FOUCAUT, J.F. and ZAHRAA, O., *Cinétique et Catalyse*, Lavoisier-Tec & Doc.

CORE CURRICULUM			
COURSE TITLE: BIREFINERY			ELECTIVE
TAUGHT HOURS	STUDENT WORKLOAD	ECTS CREDITS	SEMESTER 9
19	58	3	

AIMS:

- To present the different bio-refinery concepts;
- To understand the difference between biomasses and the issues related to their forest or agricultural production;
- To analyze the reactions, reactors and process involved in these bio-refineries.

LEARNING OUTCOMES:

At the end of the course, the student engineer should:

- Know the different bio-refinery concepts;
- Be able to determine the process with a given source of biomass;
- Understand the phenomena involved in the 3 types of reactors (chemical, thermo-chemical and biological reactors);
- Be able to achieve preliminary computations for reactor sizing.

DESCRIPTION AND TEACHING METHODS:

The teaching will be composed of lectures and projects.

EVALUATION METHODS:

Written examination (1h)

One oral presentation of the project

USEFUL INFORMATION:

PREREQUISITES: None

LANGUAGE: English

BIBLIOGRAPHICAL REFERENCES:

Needed: None

Advised: None