ENSIC

Chemical Engineering diploma syllabus : Courses taught in English

2016-2017

SEMESTER 9:
COURSE UNITS IN ENGLISH

Electives V	Unit coordinators	Taught hours	Lectures	Tutorials	Laboratory work	Project	Exams	ECTS
Polymer-based Processes and Products	Sandrine HOPPE	19	8	8		3		3
Materials and Nanomaterials for Catalysis	Halima ALEM-MARCHAND	19	8	8		3		3
Kinetics of Fuel Combustion	Olivier HERBINET	19	8	8		3		3
Biorefinery	Guillain MAUVIEL	19	8	8		3		3
Total		**76**						**12**

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NAME OF THE COURSE : POLYMER-BASED PROCESSES AND PRODUCTS	CODE: 9KUYYN08
	SEMESTER: 9
	CREDITS (ECTS): 2

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 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 teaching module, 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 programme — 2 hours
- Case examples (reinforced elastomers, polyurethanes for medical applications, masterbatches and compounds etc.) — 8 hours
- Supervision of project group work — 3 hours
- Oral presentations of project work — 2 hours

SUPERVISOR:	SANDRINE HOPPE
TEACHING STAFF:	
ALAIN DURAND	
SANDRINE HOPPE	

EVALUATION METHODS:

There will be two examinations. First, an individual written multiple choice questionnaires which will take 30 minutes at the end of a lesson. The date of this questionnaire will be given on the first day of the course. Secondly there will be an assessment of an oral presentation of the project groups' case study work.

USEFUL INFORMATION:

PREREQUISITES: None

NAME OF THE COURSE : **MATERIALS AND NANOMATERIALS FOR CATALYSIS**	CODE: 9KUYYN05
	SEMESTER: 9
	CREDITS (ECTS): 2

AIMS:

During the last years, the development of new (nano)materials has led also to significant improvements in catalysis. These materials allowed to enhance the efficiency of numerous chemical processes from fine synthesis to pollutant degradation (liquids or gas).

LEARNING OUTCOMES:

- Materials and associated characterizations techniques
- Organometallic complexes and nanoparticles used in homogeneous and heterogeneous catalysis
- Materials for photocatalysis

DESCRIPTION AND TEACHING METHODS:

SUPERVISOR:	HALIMA ALEM-MARCHAND
TEACHING STAFF:	TOPICS
HALIMA ALEM-MARCHAND	MATERIALS AND ASSOCIATED CHARACTERIZATIONS TECHNIQUES
RAPHAËL SCHNEIDER	ORGANOMETALLIC COMPLEXES AND NANOPARTICLES USED IN HOMOGENEOUS AND HETEROGENEOUS CATALYSIS
THIBAULD ROQUES-CARMES	MATERIALS FOR PHOTOCATALYSIS

EVALUATION METHODS:

1st session: project + oral presentation
2nd session: exam

USEFUL INFORMATION:

PREREQUISITES:

BASIC KNOWLEDGE IN CATALYSIS

NAME OF THE COURSE : **KINETICS OF FUEL COMBUSTION**	CODE: 9KUYYN06
	SEMESTER: 9
	CREDITS (ECTS): 2

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:

- Student will 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).
  - be capable of constructing a combustion mechanism for simple species (n-alkanes).
  - be able to carry out a kinetic analysis of a model to identify the main consumption pathways for reactives and the most sensitive reactions.
- They will learn 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.

SUPERVISOR:	O. Herbinet

EVALUATION METHODS:

- Individual assessment using multiple choice questionnaires and exercises.

USEFUL INFORMATION:

PREREQUISITES:
- Basic knowledge of Kinetics

BIBLIOGRAPHICAL REFERENCES:
Recommended: G. Scacchi, M. Bouchy, J.F. Foucaut, O. Zahraa, Cinétique et Catalyse, Lavoisier-Tec & Doc

NAME OF THE COURSE : **BIOREFINERY**	CODE: 9KUYYN08
	SEMESTER: 9
	CREDITS (ECTS): 2

AIMS:

- To present the different bio-refinery concepts
- To understand the difference between biomasses and the issue 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 teaching module, 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 & biological reactors)
- Be able to achieve preliminary computations for reactor sizing

DESCRIPTION AND TEACHING METHODS:

The teaching will be composed of lectures and projects.

SUPERVISOR:	GUILLAIN MAUVIEL
TEACHING STAFF:	DESCRIPTION
GUILLAIN MAUVIEL	LECTURE + PROJECTS
ANTHONY DUFOUR	LECTURE + PROJECTS
NICOLAS BROSSE	LECTURE + PROJECTS
JEAN-MARC ENGASSER	LECTURE

EVALUATION METHODS:

- One end-semester written examination (1 hour)
- One oral presentation of the project