

4th YEAR GPE INSA_SEMESTER 8

Practical info

Location(s)

 Toulouse

Heat exchangers with or without phase transition and simultaneous heat and mass transfer



ECTS
5 crédits



Hourly volume
70h

Practical info

Location(s)

 Toulouse

Energy and Processes



ECTS
5 crédits



Hourly volume
43h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the world context of power-generating systems, which produces a net power output from a fossil, nuclear or renewable energy source.
- the legal and technical context of the various forms of renewable energy (wind, solar photovoltaic, biomass ...),
- the different thermodynamic cycles associated to the power generation systems, the refrigeration and heat pump systems and the gas liquefaction.
- the use of energy and exergy balances for these thermodynamic systems in order to optimize their operation

The student will be able to:

- design a given steam power plant, including the choice of working fluid temperatures, pressures and the determination of fluid working flows plus the pre-sizing of compressors and turbines
- design a refrigeration system, including the choice of working fluid temperatures, pressures and the determination of fluid working flows plus the preliminary design of compressors and expansion devices,
- design a gas liquefaction plant
- participate in the implementation of a wind energy area development and a site photovoltaic,

- participate in the implementation of a biogas network.

Necessary prerequisites

Thermodynamic I3BETH11

Practical info

Location(s)

 Toulouse

Project for research introduction



ECTS
3 crédits



Hourly volume
29h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the approach and tools for a good literature and patent survey
- how to develop a scientific work
- the health and safety rules in a research laboratory
- the basic methods for project management
- principles of patent right

The student will be able to:

- to delimit and deepen a scientific research project
- to draw an up-to-date inventory of knowledge on this topic and to identify the international leading research teams
- to propose and to experimentally perform a scientific approach to address a problem based upon the previous literature survey with respect to health and safety rules
- to share and communicate the results with a common scientific formalism (paper, poster)
- to perform a project management approach

Practical info

Location(s)

 Toulouse

Necessary prerequisites

Literature survey basic knowledge

All scientific knowledge in relation with a research project

Biological reactor engineering



ECTS
2 crédits



Hourly volume
33h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the different types of biological catalysts and their working modes
- the stoichiometry, kinetic laws and their combination for the description of microbial cell behaviour for growth and production,
- the description and modelling of batch, fed-batch and continuous, single or multi stage biological reactors with or without recycling.

The student will be able to:

- identify the general metabolic scheme of microbial growth
- establish the stoichiometric equations and kinetic laws for biological reactions with respect to the environment conditions
- establish an intrinsic kinetic law
- integrate and prioritize the mechanisms in order to model homogenous and heterogeneous biological reactors

Practical info

Location(s)

 Toulouse

Necessary prerequisites

Microbiology and mass balances

Metrology Environment and Risks



ECTS
5 crédits



Hourly volume
76h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- the principles of environmental laws in France , and what tools to access legal informations
- the choice of suitable and argued measurements either for the analysis of environmental impacts or to process design
- what are the main environmental issues and principles of waste management
- the main risks in the process industry and mechanisms linked to accidents

The student will be able to:

- find and use legal informations (from legacy context) related to environmental law (ICPE , TGAP , environmental impacts, ...)
- choose and apply relevant method (s) in order to characterize the compounds and / or pollutants in complex environments or matrix doing a critical analysis of the methodology and the experimental results
- analyze a case of risk for Environment , to identify the categories of impacts, to describe pollution from the origin (=source) to the environmental targets
- analyze a situation of industrial risk, to identify and to calculate physico-chemical parameters of the involved phenomena and to propose technical solutions

Necessary prerequisites

General Chemistry
Biological reactors
Chemical engineering unit operations
Mass and energy balances

Practical info

Location(s)

 Toulouse

Communication in organisations with LV2



ECTS

6 crédits



Hourly volume

Introducing

Objectives

Objectives:

At the end of this module, the student will have understood and be able to explain (main concepts):

- How to answer the demand of the civil society for technical and scientific information
- How to carry out critical analysis in order to give appropriate answers when questioned about such issues
- How to consider the circulation and content of information within the organizations in which they will be hired

The classes given in English will focus on the specific linguistic characteristics of the English used in scientific contexts in order for the students to understand and master them.

The students will also be made aware of the specificities of scientific English as relates to publications in his specific field of research.

Module L 2

The objectives, defined in reference to the CEFR for the 5 language activities, are specific for the language studied (Chinese, German, Spanish) and the level of the student.

They can be consulted on :

<https://moodle.insa-toulouse.fr/course/view.php?id=44>

In certain cases, students may be authorised to follow an English module instead of another language

Necessary prerequisites

Necessary knowledge:

For classes in English : understanding of scientific English

Practical info

Location(s)

 Toulouse

Improving one's autonomy and building one's own professional project level 2 S



ECTS
4 crédits



Hourly volume
40h

Practical info

Location(s)

 Toulouse

Political sciences semestre 2



ECTS
3 crédits



Hourly volume

Practical info

Location(s)



Toulouse