INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

3rd YEAR CHEMICAL, BIOCHEMICAL AND ENVIRONMENTAL ENGENEERING

Practical info

Location(s)

Toulouse

Microbiology and statistics

ECTS
5 crédits

Hourly volume
61h

Practical info

Location(s)

Toulouse

Modelling and numerical solving in fluid mechanics

ECTS
6 crédits

Hourly volume
87h

Practical info

Location(s)

Toulouse

Hydraulics and dispersed systems

ECTS
5 crédits

Hourly volume
39h

Practical info

Location(s)

Toulouse

Engineering and ecological issues

ECTS
3 crédits

Hourly volume
30h

Practical info

Location(s)

Toulouse

[FRANCAIS] Remise à niveau 3A ICBE

ECTS
3 crédits

Hourly volume
68h

Practical info

Location(s)

Toulouse

Fluid Properties

ECTS
4 crédits

Hourly volume
37h

Toulouse

Introducing

Objectives

At the end of this module,
1) students will be able to write and use thermodynamic models and correlations leading to the determination of fluid properties as well as the calculation of enthalpy, entropy and fugacity in polyphase mixtures .
2) students will then be able to apply these concepts to the phase equilibria (liquid-vapor, liquid-liquid) necessary for the characterization of the main limitations and the efficiency of the different unit operations.
3) students know how to use Prophy software to determine fluid properties and equilibrium conditions for pure substances and mixtures.

Necessary prerequisites

I2BETH11: Thermodynamique approfondissement et application aux systèmes physico-chimiques

Practical info

Location(s)

Molecular biology

ECTS
4 crédits

Hourly volume
47h

Introducing

Objectives

Objectives:
At the end of this module, the student will have understood and be able to explain (main concepts):
- Nucleic acids properties, genome organization and DNA replication
- Gene transcription and messenger RNA translation leading from DNA to proteins
- RNA processing and modifications
- Proteins folding, modifications, interactions, secretion and turnover

The student will be able to:
- Define and describe the main molecular elements enabling genome organization and gene expression.

The aim of this UF is to provide the molecular biology knowledge that is absolutely required to master the biotechnology tools. The student must be able to formulate, interpret and solve a molecular problem around the basic molecular processes allowing gene expression in order to master biotechnological tools and for optimizing and/or modifying living organisms of industrial interest

Necessary prerequisites

Necessary knowledge :

Basics in biochemistry and microbiology

Practical info

Location(s)

Toulouse

Improving one's autonomy and building one's own professional project – level 3

ECTS
2 crédits

Hourly volume
44h

Practical info

Location(s)

Toulouse

Job search and language

ECTS
5 crédits

Hourly volume
37h

Introducing

Objectives

Job search modules in French and in English

By the end of these modules, the student is expected to understand how to successfully obtain an internship or job and will grasp the differences in the job-search process between France and English-speaking countries.
The student will be able to:
¿ make a personal statement, and start developing a career plan
¿ use current research tools (web, online networks, company websites) to conduct a documentary survey on recruitment
¿ seek work placements matching his/her objectives and profile
¿ find and analyze an English advert in his/her future field
¿ adapt his/her CV and cover letter to a specific job application
¿ write a CV in English following various country-relevant templates
¿ ensure his/her job application meets the company's requirements
¿ prepare for an interview (self-knowledge, company awareness, preparation of adequate questions)
¿ show adequate degree of proficiency in job search related technical English to be able to take a professional job interview

Second language course (optional ¿ commitment for years 3 and 4)

The objectives are defined according to European specifications for the five language skills and specific to the various languages proposed - German, Spanish, and Chinese ¿ and to students' levels.
Whenever his/her level is sufficient, the student will be able to:
¿ Synthesize and present professional documents
¿ give an oral presentation in front of a group
¿ take into account the various dimensions of interculturality
¿ Analyze a job ad
¿ simulate a job interview
¿ write a CV and a cover letter in the studies language

Remedial English (upon teachers¿ decision)

In some specific cases, a remedial English course is offered in replacement of the second language course with the objective of reinforcing the language skills useful for the TOEIC, i.e. reading and listening, grammar and vocabulary.

Necessary prerequisites

¿ TRE (in French): min. C1 level in French ¿ Course not open to exchange students

¿ Job Search (in English): min. B1 level in English ¿ Course open to exchange students

¿ LV2: min. A2 in the language studied ¿ Course not open to exchange students

Practical info

Location(s)

Toulouse

Political sciences semester 1

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
1 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
2 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
5 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Bioseparation, enzyme kinetic and gene regulation

ECTS
7 crédits

Hourly volume
116h

Introducing

Objectives

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

- the mechanisms of separation techniques usually used in biochemistry-biotechnology, more particularly in the case of biocatalysts: techniques of precipitation (proteins, nucleic acids), techniques of centrifugation and ultracentrifugation, membrane techniques (MF, UF, NF) and electrophoretic techniques;
- the bases of the measure of the reaction rate of an enzyme, the various models allowing the description of the behaviour of an enzyme, from the simplest to the most complex, the effect of physico-chemical parameters such as the pH or the temperature
- the main pathways of gene expression regulation

The student will be able to:

- choose the most suited method of bioseparation to a context by knowing correctly its functioning
- to use from a practical point of view the equipment and the techniques adapted in the purification of proteins and to the control of their purification (low and medium pressure chromatography, electrophoresis)
- to establish complex enzymatic equations of reaction rate by means of models.
- to determine experimentally the various kinetic parameters of an enzyme as well as its optimal conditions of functioning
- explain and analyse data concerning gene expression regulation in prokaryotic and eukaryotic organisms

Necessary prerequisites

Necessary knowledge:
Organic chemistry (I2BECH11), structural biochemistry (I2BEBC11), transport phenomena and reaction in fluids (I2BETF11). Analytical method (I2BEAN11). Molecular biology.

Practical info

Location(s)

Toulouse

Organic and structural chemistry

ECTS
6 crédits

Hourly volume
80h

Introducing

Objectives

Objectives:
At the end of this module, the student will have understood and be able to explain (main concepts):
- the theory and practice of the main analytical techniques used in chemistry and biochemistry.
- the main reaction mechanisms encountered in chemistry and biology.

The student must be able to:
- solving structure of chemical compounds and simple biochemistry molecule using analytical methods: NMR, MS, IR, UV.
-Understand and explain the reaction mechanisms.
- Achieve a multidisciplinary experimental project (bibliographical search, devise a schedule of manipulation, carry out manipulations, make a presentation of the main results)

Necessary prerequisites

Necessary knowledge:

UF Chemistry - Biotechnology (I1ANCH11)
UF Organic Chemistry (I2BECH11)
UF Structural Biochemistry (I2BEBC11)
UF Analytic Methods I (I2BEAN12)

Practical info

Location(s)

Toulouse

Production sectors

ECTS
3 crédits

Hourly volume
8h

Introducing

Objectives

Objectives:

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

the main actors in the sectors on which the "Biochemical Engineering" specialty leads in France and abroad, their relations and their market share
the structuring of the sector: is it made up of large national or international groups, SMEs, start-ups ... Are these multinationals, family businesses ...?
the evolution of this structuring: is the sector stable over time or does it know (or has it known in the recent past) changes (eg mergers)?
the location of the different activities (production, R & D ...). Are they done in France, in Europe ...?
the structuring the capital of these players (share of turnover devoted to R & D, communication ...)

Practical info

Location(s)

Toulouse

Analytical methods II

ECTS
3 crédits

Hourly volume
32h

Practical info

Location(s)

Toulouse

heat and mass Transfer

ECTS
4 crédits

Hourly volume
74h

Practical info

Location(s)

Toulouse

Chemical reaction engineering 2

ECTS
3 crédits

Hourly volume
37h

Practical info

Location(s)

Toulouse

Engineering thermodynamics

ECTS
3 crédits

Hourly volume
38h

Practical info

Location(s)

Toulouse

Processes for mass and energy transformation

ECTS
3 crédits

Hourly volume
30h

Practical info

Location(s)

Toulouse

Process Control

ECTS
4 crédits

Hourly volume
36h

Introducing

Objectives

Objectives ¿ Learning outcomes :
At the end of this module, the student will have understood and be able to explain (main concepts):
Dynamic (unsteady-state) modelling of processes and its approximation by simple transfer functions such as 1rst and 2nd order without or with time delay. Implementation of feedback control loop.

The student will be able to:

Establish unsteady state mass or energy balances, obtain transfer functions from linearization of these balances or from analysis of step of impulse responses, implement a feed-back control loop with PID type controllers and study the response of the whole closed-loop system to changes (set-point variations or disturbances) as function of these controllers tuning parameters and analyse its stability.

Necessary prerequisites

Necessary knowledge :

Resolution of Ordinary Differential Equations, Laplace-transform.

Practical info

Location(s)

Toulouse

Improving one's autonomy and building one's own professional project

ECTS
5 crédits

Hourly volume
48h

Practical info

Location(s)

Toulouse

Companies in their environments and languages

ECTS
5 crédits

Hourly volume
63h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
- An overall view of financial documents used by the company. Introduction to the calculation of costs in the industrial firm
- the interdependence of the functions of the company through decision making and results analysis
- Students will also be prepared for their careers by reviewing
and further developing both oral and written transversal communication skills.

The student will be able to:
- understand companies, their structure and their environment
- use newly-acquired Business English vocabulary
- develop financial statements used and calculate business costs for a company
- organise a group project : create their own company, hold meetings¿
- give an oral presentation of a documentary synthesis and a business report (in English), using presentation skills
- create basic management tools
- optimise resources to make the company profitable
- take ethical concerns into account
- take into account cultural differences in business
- appreciate the impact of the major parameters of the socio-economic and financial environment on a company
- write professional letters and emails

Second language course (optional ¿ commitment for years 3 and 4)
The objectives are defined according to European specifications for the five language skills and specific to the various languages proposed - German, Spanish, and Chinese, Italian or Sign language ¿ and to students' levels.

Whenever his/her level is sufficient, the student will be able to:
¿ synthesise and present professional documents
¿ give an oral presentation in front of a group
¿ take into account the various dimensions of interculturality
¿ analyse a job ad
¿ simulate a job interview
¿ write a CV and a cover letter

Remedial English (upon teachers¿ decision)
In some specific cases, a remedial English course is offered in replacement of the second language course with the objective of reinforcing the language skills useful for the TOEIC, i.e reading, listening, grammar and vocabulary

Necessary prerequisites

Management notions : non
Level : B2 in English (intermediate)

LV2 : A2 min. in the studied language German,

Spanish, Italian. A1 in Chinese ans Sign language ¿
Course not open to exchange students

Practical info

Location(s)

Toulouse

Engineering and ecological issues 2nd semester

ECTS
3 crédits

Hourly volume
26h

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
1 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
2 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
5 crédits

Hourly volume

Practical info

Location(s)

Toulouse