

## SEMESTER 4\_2nd YEAR ICBE

### Practical info

---

#### Location(s)

 Toulouse

# Mathematics and transport phenomena



ECTS  
7 crédits



Hourly volume  
109h

## Introducing

### Objectives

Objectives:

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

Mathematics:

The concept of series, the different types of convergence, the power series and Fourier series, the solution of the heat equation, the use of Matlab.

Transport phenomena:

- The basics of continuum mechanics
- The concept of balance and the different scales of application

The student will be able to:

Mathematics:

Study the convergence of numerical series or function series, solve a differential equation with power series, compute a Fourier series, solve the mono-dimensional heat equation.

Apply the mathematical knowledge via the development of simple Matlab programs allowing to illustrate these concepts in examples taken from physics, biology and chemistry.

Transport phenomena:

- Define a system and its contours, and calculate inlet, outlet and transformation fluxes
- Write local and macroscopic balances of mass, energy

and momentum

- Solve analytically simple problems of Newtonian fluid mechanics

### Necessary prerequisites

Necessary knowledge:

First year mathematics, first year computing.

Unit « Thermodynamics - Fundamentals and applications »

(# I1ANTH11) of the INSA first year curriculum or equivalent.

## Practical info

### Location(s)

Toulouse

## Structural biochemistry

 ECTS  
4 crédits

 Hourly volume  
42h

## Practical info

---

### Location(s)

 Toulouse

## Basis of chemical reaction engineering



ECTS  
3 crédits



Hourly volume  
38h

### Introducing

---

### Objectives

Objectives:

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

- Mass balances applied to reactors
- Reaction progress parameters
- Kinetic law of a reaction, kinetic order and constant, activation energy
- Continuous and batch stirred reactors
- Continuous plug flow reactors

The student will be able to:

- define a system, its boundaries, for a defined purpose; calculate all the molar fluxes (inlet, outlet, transformation, variation);
- write mass balances by using reaction progress parameters
- determine kinetic law for a homogeneous reaction from experimental data
- determine a kinetic constant for a temperature (Arrhenius law)
- choose the best ideal reactor for a homogeneous isothermal chemical reaction and calculate it (reactor design)
- treat a general homogeneous isothermal problem of chemical reaction engineering

Necessary knowledge:

Have a good understanding of the concept of concentration. Integration. Linearity and linear regression

### Practical info

---

### Location(s)

 Toulouse

---

### Necessary prerequisites

# Analytical Methods 1



ECTS  
5 crédits



Hourly volume  
57h

## Introducing

### Objectives

Objectives:

At the end of this module, the student will have understood and be able to explain the principles of analytical techniques implemented currently in laboratories and the associated mechanisms using his/her knowledge in quantum physics and chemistry (chemical reactions, physical and chemical properties  $\lambda$ )

The student will be able to:

AA1 Choose the most relevant technique regarding the problem by explaining the relating theoretical concepts.

AA2 Carry out these analytical techniques

AA3 Analyse and discuss the results in a critical way

## Practical info

### Location(s)

Toulouse

### Necessary prerequisites

Necessary knowledge :

Thermodynamic 1Y (I1ANETTH) and 2Y (I2BETH11) /  
Chemistry 1Y (I1ANETCH) / Organic Chemistry 2Y icbe  
(I2BECH11)

## Communicating in Foreign Languages



ECTS  
5 crédits



Hourly volume  
57h

### Introducing

---

#### Objectives

LV2 Module (Spanish/ German / Chinese / Portugese / French Sign Language):

The objectives defined with reference to the CERL for the 5 language skills are specific to the language studied and the student's level.

The student will be able to :

- strengthen their listening, reading and note-taking skills
- analyse and synthesise information
- organise and efficiently communicate information
- speak in front of a group
- attend or lead a job interview
- interact with another person in the foreign language

Remedial English

A module can be proposed to students in certain very specific cases, as a substitute to LV2.

### Practical info

---

#### Location(s)

 Toulouse

---

#### Necessary prerequisites

Necessary knowledge:

First-year LV1, Expression and LV2 skills (D1ANHU01)

Second-year LV1 and Expression skills (I2CCGE31)

## Improving one's autonomy and building one's own professional project – level 2B



ECTS  
6 crédits



Hourly volume  
138h

## Introducing

---

### Objectives

To be able :

- deepen self-knowledge (analyze my strengths and weaknesses),
- self-assessment,
- take into account the skills (strengths and weaknesses) of its partners,
- to adjust and regulate their behavior according to others.

### Necessary prerequisites

1st year learning outcomes.

## Practical info

---

### Location(s)

 Toulouse

## Energetic thermodynamics



ECTS  
4 crédits



Hourly volume  
35h

## Practical info

---

### Location(s)

 Toulouse