



COURSES IN ENGLISH FOR EXCHANGE STUDENTS  
Food Biology and Mechanics  
FBM

## Food Biology and Mechanics:

<b>NAME</b>	<b>ID</b>
Food/biology english	FB1-01
unit operation in food industry	FB3-01
bacterial stress and adaptation	FB3-02
bacterial stress and adaptation	FB3-03
internship / professional project in food / biology	FB5-01
culture of rat brain astrocytes	FB5-02
RNA interference and CRISPR-CAS	FB5-03
Analysis of organic compounds	FB2-01
Food / Biology English	FB2-02
Study of the enzymes, their class, kinetics, structure, and function, as well as their relation to each other	FB4-01
Packaging: material and process, an overview	FB4-02
Industrial microbiology and genetics	FB4-03
internship / professional project in food / biology	FB6-01
Material Properties	M1-01
Mechanical Machining (introduction)	M1-02
Mechanical Machining (introduction)	M1-03
Engineering English	M1-04
Mechanical Design	M1-05
Internship/ Professional project in Mechanical and Production Engineering	M5-01
Mechanical and Production Engineering English	M2-01
Special Machining (composite forming)	M2-02
Mechanical Design	M2-03
Internship/ Professional project in Mechanical and Production Engineering	M6-01

**ENGLISH**

Food / Biology English

FB1-01

**FOR NON-NATIVE SPEAKERS**

ECTS: 5

**FOOD PROCESSING AND SCIENCES**

Unit operations in food industry

FB3-01

Objectives:

Applied thermodynamics, Heat transfers theory and processes: heat exchangers, steam production, cold production, fluids and energies for food industry

Skills:

Understanding the mechanism of heat transfer, skill in calculation of heat/energy consumption during food processing

Prerequisite:

Basis in physics

Hours:

<u>Lecture:</u>	9
<u>Tutorial Classes:</u>	10

ECTS: 4



Spring



Autumn

**MICROBIOLOGY**

**Bacterial stress and adaptation**

FB3-02

Objectives:

Know how to develop experimental protocols from literature survey. Collaborative work will be required in designing protocols, in implementing the protocols in the lab and in data interpretation

Skills:

Scientific reading, design of experiments, manipulation of bacteria following good laboratory practice

Prerequisite:

Basic microbiology

Hours:

<u>Tutorial Classes:</u>	2
<u>Practical work:</u>	5

ECTS: 2

**MICROBIOLOGY**

**Bacterial stress and adaptation**

FB3-03

Objectives:

Scientific communication. Be able to construct a proper powerpoint slide show. Be able to make a scientific oral presentation

Skills:

Computing skills, communication

Hours:

<u>Tutorial Classes:</u>	2
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ECTS: 4



Spring



Autumn

**FOOD / BIOLOGY**

Internship/ Professional project in Food / Biology

FB5-01

ECTS: 6

**CELL CULTURE**

Culture of rat brain astrocytes

FB5-02

Objectives:

Generate a primary culture of glial cells from new born rat brains. Enrich cell culture in astrocytes. Visualize in response to injury induced by scratch the astrocytes migration in vitro by immunofluorescence technique

Skills:

Dissection of a new born rat brain. Establishment of primary cell culture. Plating cells, immunofluorescence technique, microscopic observations, purification procedures of mixed cells

Prerequisite:

Basics in cell culture techniques and cellular biology

Hours:

<u>Lecture:</u>	3
<u>Practical work:</u>	23

ECTS: 5



Spring



Autumn

**MOLECULAR BIOLOGY TOOLS**  
RNA interference and CRISPR-CAS

FB5-03

**Objectives:**

Know how to manipulate gene expression using two different approaches : RNAi and CRISPR-CAS. The student will attend the lectures and assist Practical works (demonstrations)

**Skills:**

Improvement of theoretical knowledge concerning modulation of gene expression. Validation tests of gene expression manipulation.

**Prerequisite:**

Basics in molecular and cellular biology

**Hours:**

<u>Lecture:</u>	7
<u>Practical work:</u>	20

ECTS: 5

**MATERIALS SCIENCE**  
Materials Properties

M1-01

**Objectives:**

Defining and selecting mechanical tests to identify materials. Linking material characterisation and mechanical behaviour.

**Skills:**

Perform destructive and non-destructive tests. Identify mechanical behaviour. Perform a test in the field of material structure.

**Prerequisite:**

Material properties

**Hours:**

<u>Practical work:</u>	12
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ECTS: 2



Spring



Autumn

**TURNING , MILLING , DRILLING , TAPPING**  
**Mechanical Machining (introduction)**

M1-02

**Objectives:**

Know how to shape a part by using machine-tools such as lathes or milling machines.

**Skills:**

Be able to choose a manufacturing process according to part specifications

**Prerequisite:**

Be able to read a design drawing. It is preferable for students to attend the two modules of mechanical machining in order to mix theory and practice

**Hours:**

Tutorial Classes: 10

**ECTS: 2**

**TURNING , MILLING , DRILLING , TAPPING**  
**Mechanical Machining (introduction)**

M1-03

**Objectives:**

Shape a part by using machine-tools such as lathes or milling machines.

**Skills:**

Use a manufacturing process according to part specifications

**Prerequisite:**

Be able to read a design drawing. It is preferable for students to attend the two modules of mechanical machining in order to mix theory and practice

**Hours:**

Practical work: 26

**ECTS: 3**



Spring



Autumn

**ENGLISH**

**Mechanical and Production Engineering English**

M1-04

Objectives:  
Communicative English for industry.

**FOR NON-NATIVE SPEAKERS**

Hours:

<u>Practical work:</u>	14
<u>Tutorial classes:</u>	14

**ECTS: 5**

**Mechanical design**

M1-05

Objectives:  
-CAD modelling methodology (revolving and extrusion parts, assemblies)

-Studies of different real mechanical systems (disassembly, technological solutions, mechanisms, materials,...)

-Detailed study and CAD-modelling of a system

Skills:  
-Use a CAD software programme for simple mechanical parts and assemblies

-Understand the behaviour of simple mechanical systems

Prerequisites:

-Basics technical drawing knowledge

-Mechanical notions (kinematics)

Hours:

<u>Practical work:</u>	40
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**ECTS: 5**



Spring



Autumn



**MATERIALS SCIENCE**  
**Materials Properties**

M3-01

**Objectives:**

Define and using a method to select materials in design product.

Justify the choice of an organic polymer, a ceramic, a metal alloy or a composite in relation to the required properties, the behaviour laws and the implementation possibilities for a given application.

**Skills:**

Select materials.

Link a scientific model to a work situation.

Identify the interactions at play in a system and between the system and the environment in which it is set.

Take materials properties and behaviours into account within a system.

**Prerequisite:**

-Material properties

**Hours:**

Tutorial classes: 14

ECTS: 2

**MECHANICAL AND PRODUCTION ENGINEERING**

M5-01

**Internship/ Professional project in Mechanical and Production Engineering**

ECTS: 6



Spring



Autumn

**ORGANIC CHEMISTRY**  
Analysis of organic compounds

FB2-01

Objectives:

Perform syntheses in organic chemistry while respecting the safety rules. Develop the basic knowledge in organic chemistry to master the successive reactions.

Skills:

Theoretical knowledge in the reaction mechanism. Use of various analysis tools.

Prerequisites:

Organic chemistry

Hours:

<u>Lecture:</u>	2
<u>Tutorial Classes:</u>	7
<u>Practical work:</u>	20

ECTS: 4

**ENGLISH**  
Food / Biology English

FB2-02

**FOR NON-NATIVE SPEAKERS**

ECTS: 5



Spring



Autumn

## ENZYMOLGY

Study of the enzymes, their class, kinetics, structure, and function, as well as their relation to each other

FB4-01

### Objectives:

Know the application of enzymes in food industry, the production and purification of enzymes and the different enzyme kinetics

### Skills:

Improvement of theoretical knowledge concerning the structure and fonction of enzyme uses in food industry. Mathematical description of enzyme action developed by Michaelis and Menten model and the determination of kinetics parameters of enzyme in presence or absence of effecteur

### Prerequisite:

Basics in chemistry and food biochemistry

### Hours:

<u>Lecture:</u>	8.5
<u>Practical work:</u>	16

ECTS: 5

## FOOD PROCESSING AND SCIENCES

Packaging: material and process, an overview

FB4-02

### Objectives:

An overview of packaging sciences and technologies: economy of packaging industries, how packaging material are produced (paper, glass, metal, plastics and biopackagings), material shaping, packaging functions, primary , secondary and tertiary packaging, ....

### Skills:

General knowledge and basic tools to choose the adequate packaging according the food product to pack

### Hours:

<u>Lecture:</u>	6
<u>Practical work:</u>	4

ECTS: 4



Spring



Autumn

**BIOPROCESS**  
Industrial microbiology and genetics

FB4-03

Objectives:  
 Know how to use the techniques dedicated to biotechnologies and genetic engineering.

Skills:  
 Improvement of practical knowledge concerning the tools used in bioprocess. Improvement of theoretical knowledge concerning gene manipulation in industries.

Prerequisite:  
 Basics in molecular biology and bioprocess

Hours:

<u>Lecture:</u>	20
<u>Tutorial Classes:</u>	12
<u>Practical work:</u>	28

ECTS: 5

**FOOD / BIOLOGY**  
Internship/ Professional project in Food / Biology

FB6-01

ECTS: 6



Spring



Autumn

**ENGLISH**  
Mechanical and Production  
Engineering English

M2-01

Objectives:  
 Communicative English for industry

**FOR NON-NATIVE SPEAKERS**

Hours:

<u>Tutorial Classes:</u>	14
<u>Practical work:</u>	12

**ECTS: 5**

**MATERIALS FORMING PRO-  
 CESSSES**  
Special Machining (compo-  
 site forming, injection molding,  
 gear cutting, electrical dis-  
 charge machining.)

M2-02

Objectives:  
 Introduction to special machining used  
 in order to shape a part.

Hours:

<u>Practical work:</u>	12
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**ECTS: 2**



Spring



Autumn

**Mechanical design**

M2-03

Objectives:  
CAD modelling methodology (advanced functions, 2D-drawings).

Detailed study and CAD modelling of advanced systems.

Skills:  
Use a CAD software programme for more complex mechanical parts and assemblies .  
2D-drawings.  
Understand the behaviour of mechanical systems.

Prerequisites:  
Autumn courses or equivalent.

Hours:

Practical work: 36

ECTS: 4

**MECHANICAL AND PRODUCTION ENGINEERING**

**Internship/ Professional project in Mechanical and Production Engineering**

M6-01

ECTS: 6



Spring



Autumn