

# UE Strategies in experimental biology



- Teaching language(s): English
- Open to exchange students: No

## Presentation

### Description

#### *Course outline*

The aim of this course is to learn how to carry on an integrative experimental project, from the conception to realization, analyse and feed-back.

This can be considered as a first initiation to the management of a scientific project, and thus the course includes some aspects of collaborative work. Beyond this main learning objective, we also consider crucial to provide an integrated view of various aspects of biology. This is the reason why the SEB course is highly multidisciplinary and integrates cellular, physiological, biochemical aspects, as well as molecular biology, immunology and genetic aspects and is not focused on photosynthetic organisms.

Students will first address a question in the field of oxidative stress biology, rising at least 3 hypotheses they want to test. They will then design an experimental plan to test the different hypotheses. Three different approaches/biological models will be available: yeast physiology, enzymatic and analytic biochemistry and eukaryotic cell biology.

#### *Tutorials*

Tutorial sessions are organized in September, in order to refresh knowledges about **methodological** aspects of the **experimental techniques** that will be used in the course

- **List of the topics:**

TUT#1: Protein expression in heterologous biological systems

TUT#2: Detection of macromolecules (RNA and proteins): PCR, western-blot, ...

TUT#3: Cell culture & Fluorescent techniques

TUT#4 : Aspects of enzymology

• **Prerequisite for ↗ tutorials:**

Spectrophotometry, Beer law

Microbiology: plate and liquid cultures, growth curves, basics of genetics (for yeast)

Principle of DNA and protein electrophoresis

Principle of polymerase chain amplification (PCR)

*Meetings with teachers*

Periodic meetings (=Tutorat, in french) between the pair of students and 3 teachers) are organised to help you in your work, with two major periods: before (2 meetings) and after the practical work (1 meeting). The aim of these sessions is to assist you in the ↗ design of your project at the theoretical level. Technical problems will be resolved more easily during the experimental sessions. In total, you will have about two hours of interview per pair with the three teachers.

*Practicals*

The students spend **8** full days (9 hours/**day**) of experimental work during **three** weeks. The different approaches proposed are grouped into "workshops", according to the biological material and techniques available. More simply, the building E consists of 3 floors, each floor being more specifically dedicated to a workshop:

- on the 1<sup>st</sup> floor, you will find the "yeast" workshop with techniques adapted to studies on the yeast *S. cerevisiae*. Several mutants are available to you.
- on the 2<sup>nd</sup> floor, you will find the "biochemistry" workshop with the possibility of studying some characteristics of the proteins that you have previously purified.
- on the 3<sup>rd</sup> floor, you will find the "fibro" workshop with the possibility of working on fibroblast cultures and of studying some cellular functions.

In each workshop, work benches are booked for you according to the days specified in the schedule. On the extra days, you will be able to carry out experiments that you wish, within each workshop, to study a given subject in more depth or to repeat an experiment.

## Course parts

UE Strategies in experimental biology - TD	Tutorials (TD)	9h
UE Strategies in experimental biology - TP	Practical work (TP)	72h

## Recommended prerequisites

- Pre-requisites:

- Basic molecular and cellular methods in cell biology, molecular biology, genetics and biochemistry (microbiologic and eukaryotic cell culture in sterile synthetic media; sampling and biochemical analysis of macromolecules, including DNA and proteins; protein purification and enzymology; immunohistochemistry; transmission microscopy).
- Presentation and analysis of scientific data in a concise and precise manner; critical technical discussion; comparison to a theoretical model.

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## Skills

- Targeted skills:

### 1- Initiation to scientific project management

- Establishment of state-of-the-art by bibliographic analysis
- Design of experiments in an integrative and pluridisciplinary approach
- Co-working training (networking, self-organization)
- Redaction of progress and final reports

### 2- Technical abilities

- Consolidation of basic knowledge in biology
- Development of experimental skills in various fields (microscopy, flow cytometry, RT-PCR, spectrofluorometry,...)

In order to move closer to these objectives, these course requires high autonomy and many hours of personnel work, before, during and after the lab work.

## Useful info

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## Contacts

Program director

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## Campus

➤ Grenoble - University campus