

BIO-464

Scientific project design in cell and developmental biology

Gönczy Pierre, Oates Andrew Charles

Cursus	Sem.	Type
Bioengineering	MA1, MA3	Opt.
Life Sciences Engineering	MA1, MA3	Opt.
Sciences du vivant	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Withdrawal	Unauthorized
Session	Winter
Semester	Fall
Exam	During the semester
Workload	150h
Weeks	14
Hours	5 weekly
Courses	2 weekly
Exercises	3 weekly
Number of positions	20

It is not allowed to withdraw from this subject after the registration deadline.

Remark

only one registration per student to a scientific thinking course

Summary

Students are lead to understand selected concepts in cell and developmental biology, primarily through the analysis of scientific literature, and then to apply these concepts to the design and execution of a group project in the Gönczy or Oates laboratory.

Content

Students are introduced to different model systems and experimental approaches that are used to address fundamental questions in cell and developmental biology; the importance of control experiments is emphasized. Students will read, analyze and discuss scientific literature (see Teaching Methods section below for more information).

Topics covered in 2019 include: cell cycle, spindle assembly, motor proteins, intraflagellar transport, asymmetric cell division, early embryonic development, cell death, signaling, organizer function, somite formation. During the last four weeks of the course, students will harness the knowledge acquired during the preceding weeks to design and execute a scientific group project in the Gönczy or Oates laboratory.

Learning Prerequisites**Required courses**

Bachelor, preferably in the Life Sciences, but motivated students from other disciplines are welcome, as are doctoral students.

Learning Outcomes

By the end of the course, the student must be able to:

- Recognize strengths and weaknesses of different experimental systems
- Realize the importance of control experiments
- Explain figures of a scientific paper
- Deduce conclusions from experimental data
- Distinguish key experiments from less important ones

- Propose next experiments to be conducted in a scientific study
- Use acquired knowledge to design and execute a scientific project

Teaching methods

The course is organized as follows in most weeks: in the first 60 minutes, scientific literature that has been read and analyzed by the students will be presented by them and discussed; in the last 30 minutes, the teacher introduces the topic of the following week and provides 1 or 2 (depending on the week) scientific paper(s) to read and analyze for the following week.

During the last four weeks of the course, students form groups and use the knowledge gained until then to design and execute a small scientific project embedded in the research conducted in the Gönczy and Oates laboratories.

Expected student activities

In addition to attending class, students are expected to thoroughly read and analyze the papers, so that they can participate actively in the presentations and discussions. Moreover, they are expected to show dedication during the project design and execution in the last four weeks. Four hours of personal study per week are expected on average.

Assessment methods

Students will be evaluated during the semester on the quality of the presentations and discussions in class (1/3 of the grade), on a continuous evaluation in the middle of the semester (1/3 of the grade), and on the scientific project design and execution component (1/3 of the grade).