

BIO-506

**Lab immersion in industry**

Profs divers \*

| Cursus                    | Sem.                  | Type |
|---------------------------|-----------------------|------|
| Bioengineering            | MA1, MA2,<br>MA3, MA4 | Opt. |
| Life Sciences Engineering | MA1, MA2,<br>MA3, MA4 | Opt. |
| Sciences du vivant        | MA1, MA2,<br>MA3, MA4 | Opt. |

|                            |                                   |
|----------------------------|-----------------------------------|
| Language of teaching       | English                           |
| Credits                    | 22                                |
| Withdrawal Session         | Unauthorized<br>Winter,<br>Summer |
| Semester Exam              | Fall<br>During the semester       |
| Workload                   | 660h                              |
| Weeks                      | 14                                |
| <b>Hours</b>               | <b>22 weekly</b>                  |
| Lab                        | 22 weekly                         |
| <b>Number of positions</b> |                                   |

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

**Summary**

The student will engage in a laboratory-based project in the field of life sciences engineering. Student projects will emphasize acquisition of practical skills in experimentation and data analysis.

**Content**

A typical project will involve "hands-on" wet-lab experimentation and data analysis, although theoretical and computationally-oriented projects are also possible. The students must carry out an original research project in the field of life sciences engineering. This project will allow the student to apply the domain and transversal skills acquired during her/his previous studies to concrete research problems.

**Remark**

The student must download and complete the form "Lab immersion in industry" (<https://www.epfl.ch/schools/sv/education/master-in-life-sciences-engineering/lab-immersion/>) and submit it to the SV Section (SSV). The form must be approved and signed by an EPFL supervising professor and the SSV section adjunct. The hosting laboratory may require the student and the supervising professor to sign a non-disclosure agreement (NDA). It is the student's responsibility to determine whether the host company requires an NDA and to ensure that it is signed and returned to the company before starting the lab immersion project.

A typical project will involve "hands-on" wet-lab experimentation and data analysis, although theoretical and computationally-oriented projects are also possible. The students must carry out an original research project in the field of molecular medicine, neuroscience, or bioengineering. This project will allow the student to apply the domain and transversal skills acquired during her/his previous studies to concrete research problems.

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1. Before you undertake a 22-credit lab immersion outside EPFL, you must identify an "EPFL mentor" who will approve your proposed project, follow your progress, and assign the grades for your work. The mentor must be an EPFL professor (PATT, PA, or PO) who is affiliated with the SV section (SSV).

2. Before you undertake a 22-credit lab immersion outside EPFL your project must be approved by the SSV section. The process is straightforward: first, download the project proposal form from [http://sv.epfl.ch/master\\_en](http://sv.epfl.ch/master_en) (under "FORMS"); second, fill out the form; third, have the form signed by the student and the EPFL mentor; fourth, submit the signed form to the EPFL-SSV section adjunct for approval. You may not leave EPFL until your project has been approved.

3. You may do either a 22-credit lab immersion in industry or a 22-credit lab immersion in academia but you may not do both. In other words: you may do only one 22-credit lab immersion outside EPFL.
4. The optional 22-credit lab immersion outside EPFL may be done in conjunction with the mandatory 8-credit internship in industry.
5. The optional 22-credit lab immersion in industry does not replace the mandatory 8-credit internship in industry.
6. The 22-credit lab immersion in industry must be focused on a *bona fide* scientific research project that is approved by the EPFL mentor and the SSV section director. This is in contrast to the 8-credit research internship, which may be focused on non-research activities (for example, training in project management).
7. If a 22-credit lab immersion outside EPFL is done in industry then the Master thesis must be done within an academic institution. In other words: you cannot do both a 22-credit lab immersion in industry and a 30-credit Master thesis project in industry.
8. The courses “SHS: Introduction to the project” (fall semester) and “SHS: Project” (spring semester) must be completed before beginning the Master thesis project. Thus, if a student does a 22-credit lab immersion outside EPFL before the second year of the Master cycle this will delay completion of the Master cycle by at least one semester.
9. External Master students must validate at least 90 ECTS credits within EPFL. This implies that external Master students may do a 22-credit lab immersion outside EPFL or a 30-credit Master thesis project outside EPFL but they may not do both.

### Learning Outcomes

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

- Manage an individual research project
- Develop expertise in a specific area of research
- Implement appropriate technologies to address the scientific or engineering problem being studied
- Conduct experiments appropriate to the specific problem being studied
- Assess / Evaluate data obtained in wet-lab and computational experiments
- Interpret data obtained in wet-lab and computational experiments
- Optimize experimental protocols and data presentation
- Plan experiments to test hypotheses based on obtained results

### Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use a work methodology appropriate to the task.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Keep appropriate documentation for group meetings.
- Demonstrate the capacity for critical thinking
- Demonstrate a capacity for creativity.
- Write a scientific or technical report.

### Expected student activities

Students will focus on hands-on experimentation, which may be wet-lab-based or computer-based, depending on the project. Students will read and discuss assigned papers from the original scientific literature.

Expected workload: one semester full time

### Assessment methods

### Continuous control

Students must produce **two written reports** ([http://sv.epfl.ch/masters\\_en](http://sv.epfl.ch/masters_en); see *Directives / Cover sheet - master lab immersion industry*) during the lab immersion outside EPFL to obtain 22 credits. The two reports should each be maximally 10-15 A4 pages in length, including illustrations, figures, and bibliography. These reports must be signed by the student and countersigned by the head of the host laboratory. The student is responsible for sending her/his written reports (in PDF format with a scan of the signature page) directly to the supervising EPFL professor, who will evaluate them on a pass-fail basis. The supervising professor must transmit the outcomes of these evaluations to the SSV ([master-stv@epfl.ch](mailto:master-stv@epfl.ch)) within one week of the indicated dates below. If validated by the supervising professor and the head of the host laboratory, the two reports are the basis for granting 22 credits "equivalence".

Additionally, the head of the host laboratory must complete a **confidential evaluation form** ([http://sv.epfl.ch/masters\\_en](http://sv.epfl.ch/masters_en); see *Directives*) and send it directly to the SSV ([master-stv@epfl.ch](mailto:master-stv@epfl.ch)) within two weeks after the student submits the second written report.

Dates for submission of the written reports:

1st report: mid-term (week 7)

2nd report: end of semester (week 14)

The second report describes the progress made towards the goals outlined in the first report, including: (1) a brief recapitulation of the scientific problem; (2) results obtained and what conclusions can be drawn; (3) whether the original research plan is being followed and what adaptations have been made, with justification; (4) timeline of research for the rest of the semester; (5) a brief paragraph of self-evaluation on the student's integration into the laboratory and progress in mastering the relevant techniques and technologies.

The deadline for submission of the written reports must be respected. Failure to submit a report, or late submission, may result in a "non-acquis" (NA), i.e., non-award of the credits corresponding to the period covered by the report.

### Supervision

Others                      Typically, the student will be matched with a secondary mentor in the host laboratory (this will usually be a senior PhD student or a postdoctoral fellow), who will take responsibility for the day-to-day supervision and training of the student.

### Resources

#### Bibliography

Appropriate reading materials will be assigned by the student's mentor, depending on the nature of the research project. The assigned reading material will usually comprise original research papers, review articles, and secondary sources (e.g., books).