



Innovation of Molecular Biosensors

Innovation av molekylära biosensorer

15.0 hp

Course Code: 3MG049

Established: 1 October 2019

Established by: The Educational Board of Medicine

Syllabus applies from: 2019, week 27

Responsible Department: Department of Immunology, Genetics and Pathology

National Subject Category: Medicine

Main Field(s) of Study and In-Depth Level: Medical Science: Second cycle, has only first-cycle course/s as entry requirements (A1N)

Grading System: Fail (U), Pass (G)

Form of education: Higher education, study regulation of 2007

Education Cycle: Second cycle

Recommended prior knowledge: University studies required

Entry Requirements

At least 120 credits within medicine/engineering/life sciences/social sciences and admitted to a program at Uppsala University. English proficiency equivalent to English 6, normally attested by means of an internationally recognised test such as TOEFL or IELTS.

Decisions and Guidelines

The course includes a laboratory project and is given for participants in SensUs at Uppsala University.

The course is offered to students at basic and advanced level, admitted to programmes in all disciplines at Uppsala University.

Learning Outcomes

The aim of the project course is to train students to work in goal-oriented interdisciplinary teamwork within innovative molecular biosensors and new technological designs.

The students, by themselves, are trained to plan and carry out projects through cooperation with other researchers, companies and other groups in the society, as well as to procure funding for the project.

The students are expected to, through innovative thinking and problem-solving, generate designed products which are presented at an international competition.

On completion of the course, the student should be able to

- show an in-depth theoretical and practical knowledge within the field of the study
- work in international and interdisciplinary self-organized groups
- plan work, identify, formulate and solve problems with relevant methods as well as available resources, all within given time frames
- search, compile and critically evaluate scientific literature of relevance to the project
- develop, evaluate and present project ideas
- design a detailed project plan as well as reports
- critically evaluate, interpret and document experimental and theoretical results

- perform a goal-oriented laboratory project and theoretical work
- account for different strategies to procure financial support
- in proficient English present and discuss relevant research, projects and innovative ideas for and in different groups, orally and in writing, also for non-specialists
- consider the societal, sustainability and ethical aspects of research and projects including obtained results as well as the possible consequences the results might have

Content

The course consists of a project in the development of new molecular biosensors for the detection of diseases with the aim to be applicable within healthcare and is connected to the participation in SensUs, an international student-driven competition. The specific contents of the project vary but include implementation and development of methods in molecular biology, statistics or engineering. Theoretical components in innovation and entrepreneurship are included. Students from different disciplines work together in an interdisciplinary group in order to innovatively solve problems in the development of new molecular biosensing systems for the detection of e.g. biomarkers.

The project is performed in collaboration with and under supervision of different research groups and companies. The students are expected to identify and inquire expertise and sponsors as well as to procure financial support for the implementation of the project.

At the end of the course, the product is demonstrated and presented in public at a joint competition where teams from several international Universities participate.

Instruction

The teaching is given in form of laboratory work, lectures, seminars, group meetings and technical demonstration, as well as oral and written presentations, also in form of poster presentations, webpage or other marketing techniques. Meetings with and oral presentations to researchers, representatives of companies, healthcare and other specialists are included. Participation in presentations, meetings, seminars and laboratory sessions as well as the presentation of the product at the final competition is compulsory.

The study pace varies during the course period, but is expected to be intensive (up to 80%) during June-August. The course is given in English.

Assessment

The assessment is done by the course leader during oral and written idea and project presentations such as poster presentations, webpage, design of written project plan and reports. In addition, the course is assessed at a technical demonstration and public presentation of the product which is evaluated with regard to functional implementation, originality and innovation's potential.

The module **Theory (5 credits)** includes literature research, planning and design as well as oral and written presentation of the project ideas and detailed project plan. To pass, all above mentioned tasks including report and presentation must be approved.

The component **Laboratory work 1 (4 credits)** includes the development and testing of different parts of the biosensor, while the module **Laboratory work 2 (4 credits)** comprises the assembly, development and testing of the final biosensor. To pass Laboratory work 1 and 2, performed laboratory sessions according to plans are required.

To pass the module **Final report and presentation (2 credits)** all included parts; the practical, oral and written presentation of the completed product and an individually written final report must be approved. In case of prevented participation in the final competition, the possibility of a supplementary work will be given.

To pass, also active participation in all parts during the whole course period is required as well as equivalent accountability for the execution of the project.

If there are special reasons for doing so, an examiner may make an exception from the method of assessment indicated and allow a student to be assessed by another method. An example of special reasons might be a certificate regarding special pedagogical support from the University's disability coordinator.

Reading List

Reading list valid from: 2019, week 27

Scientific articles and product reports.