



DEPARTMENT OF MOLECULAR MEDICINE AND SURGERY

K1F5528, Translational Strategies in Cardiovascular Research, 1.5 credits (hec)

Translationsstrategier inom kardiovaskulär forskning, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2024-04-18, and is valid from spring semester 2025.

Responsible department

Department of Molecular Medicine and Surgery, Faculty of Medicine

Contributing department/s

Department of Medicine, Solna

Prerequisite courses, or equivalent

No prerequisite courses, or equivalent, demanded for this course.

Purpose & Intended learning outcomes

Purpose

The purpose of the course is to enable doctoral students and postdoctoral fellows to obtain in-depth knowledge on new scientific advancements in cardiovascular research, and hands-on experience on methodology/techniques of in vitro, ex vivo, in vivo approaches, as well as biobank data and sequencing data analysis.

Intended learning outcomes

At the end of the course the participant should:

- Be able to describe the novel clinical and basic strategies in cardiovascular research, including specific biobank definition and set up approaches, novel in vitro, ex vivo, and in vivo experimental methods.

- Be able to design a preliminary study to observe the pathological alterations in cardiovascular diseases, either as a biomarker or therapeutic targets.
- Have obtained knowledge on how to practically perform, analyze and interpret in vitro, ex vivo experiments for cardiovascular studies (eg. ISH, transfection, quantitative live-cell assays).
- Be able to show a basic understanding of how to analyze the data from Chip-seq, single-cell RNA-seq and RNA-seq data (via analytical assignments on example data).

Course content

The course is designed to enable the acquisition of theoretical knowledge about translational strategies in cardiovascular research, as well as about the applications of novel tools and models to investigate the development of various cardiovascular diseases, how to set up and interpret biobank data. There is also a significant practical component where students will get hands-on bench work experience in the most common models used including quantitative live-cell assays, in situ hybridization, FISH staining, vascular function evaluation, and different sequencing data analysis.

Forms of teaching and learning

The course is a combination of theoretical and practical training, where lectures/group discussions and laboratory/practical demonstrations are integrated. Time is also allocated for discussing laboratory results and lectures.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Full attendance is required to both theoretical and practical lessons in order to understand the course content and to pass the course. The students who have missed the group work sessions can book extra session time within four weeks to compensate for the absence.

Forms of assessment

All the learning outcomes of the course have to be reached to pass the course. The final grade (pass or fail) will be based on:

- Summative assessment of the contributions during the discussions that are part of the course.
- Group presentation at the final seminar where different research topics regarding epigenetic modifications will be discussed, i.e. disease aspect to be investigated, and how the results of

appropriate experiments are analyzed and interpreted.

Course literature

The publications listed below can be obtained via Pubmed search (<https://www.ncbi.nlm.nih.gov.proxy.kib.ki.se/pubmed>) and are recommended for students to read before the course.

1. Cell. 2019 Jun 27;178(1):242-260.e29. doi: 10.1016/j.cell.2019.05.010. Epub 2019 May 30.
PMID: 31155234
2. J Am Coll Cardiol. 2018 Apr 10;71(14):1584-1589. doi: 10.1016/j.jacc.2018.01.073.
PMID: 29622166
3. J Mol Cell Cardiol. 2019 Aug;133:148-163. doi: 10.1016/j.yjmcc.2019.06.010. Epub 2019 Jun 15.
PMID: 31211956
4. Circ Res. 2018 Apr 27;122(9):1221-1237. doi: 10.1161/CIRCRESAHA.118.310966.
PMID: 29700069
5. Adv Exp Med Biol. 2020;1229:121-132. doi: 10.1007/978-981-15-1671-9_6.
PMID: 32285408