DEPARTMENT OF MEDICAL EPIDEMIOLOGY AND BIOSTATISTICS

C8F3077, An Introduction to Genetic and Molecular Epidemiology, 1.5 credits (hec)

En introduktion till genetisk och molekylär epidemiologi, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2023-11-23, and was last revised on 2024-09-12. The revised course syllabus is valid from autumn semester 2024.

Responsible department

Department of Medical Epidemiology and Biostatistics, Faculty of Medicine

Prerequisite courses, or equivalent

Knowledge in epidemiology equivalent to the course Epidemiology I: Introduction to Epidemiology or corresponding courses

Purpose & Intended learning outcomes

Purpose

The course focuses on basic concepts, methods, and study design in genetic and molecular epidemiology research.

Intended learning outcomes

After successfully completing this course you are expected to be able to:
- Describe the basic organization of the human genome, familial inheritance, and how genetic variation can influence complex traits.
- Explain specific genetic methods and argue for how these methods can be used in epidemiological studies.
- Explain different types of molecular omics techniques and argue for how these methods can be used in epidemiological studies.
- Describe the fundamentals of study design, sample randomization, and common biases in analyses of genetic and molecular epidemiological data to draw conclusions on how new sample

collections should be conducted.
- Critically reflect upon how genetic methods can be beneficial for research and for individuals, and of ethical issues that may arise in genetic research.

Intended learning outcomes are classified according to Bloom's taxonomy: knowledge, comprehension,
application, analysis, synthesis, and evaluation (Bloom, 1956, extended by Anderson and Krathwohl, 2001).

Course content

The course is about concepts and methods used in genetic and molecular epidemiology research. It will cover basic genetic inheritance and how genetic variation influences disease and other phenotypes. The course will introduce genetic methods such as twin studies and genome-wide association analyses, and methods based on results from genome-wide association studies (e.g. Mendelian randomization and polygenic score analyses). It will also cover common molecular methods applied in large-scale settings in epidemiology (epigenetics, transcriptomics, metabolomics, etc.).

Forms of teaching and learning

Blended learning approach with reading sessions, lectures, and group discussions with invited experts.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

The individual examination (summative assessment) is compulsory.

Forms of assessment

The student has to show that all the intended learning outcomes have been achieved. An individual assessment of the learning outcomes will be a written home examination. Students who do not obtain a passing grade in the first examination will be offered a second chance of submission of home examination within two months of the final day of the course. Students who do not obtain a passing grade at the first two examinations will be given top priority for admission the next time the course is offered.

Course literature

Recommended reading:
Scientific articles and handouts distributed before and during the course.