

Omics approaches for Clinical Microbiology and Infectious Diseases, 2 credits

Omics för klinisk mikrobiologi och infektionssjukdomar, 2 högskolepoäng

Course Code/Codes	75MV014
Subject Area	Medical Science
School/equivalent	School of Medical Sciences
Valid from	2023-04-18
Approved	2023-08-01
Revised	
Approved by	Heaf of School
Translation to English, date and signature	2023-03-16 axpn

1 Course content

The main purpose of the course is to provide knowledge in omics methodologies (metagenomics, proteomics, metabolomics and basic data analysis) which are used partly in research but also applications of these methods for clinical questions and analysis of components essential to clinical questions. Furthermore, the design of the course will be such that the methods are presented and treated in a context to make them relevant to clinical researchers.

2 Outcomes

2.1 The course in relation to the doctoral programme

The course shall primarily refer to the following intended learning outcomes for third-cycle courses and study programmes as described in the Higher Education Ordinance, i.e. the doctoral student shall demonstrate:

Knowledge and understanding

- familiarity with research methodology in general (part of outcome 2)
- familiarity with the methods of the specific field of research in particular (part of outcome 2)

Competence and skills

- the capacity for scholarly analysis and synthesis (part of outcome 3)
- the ability to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames (part of outcome 4)

Judgement and approach

- intellectual autonomy and disciplinary rectitude (part of outcome 9)

The intended learning outcomes are listed in the same order as in the general syllabus for the programme.

2.2 Intended course learning outcomes

To obtain a passing grade, the doctoral student shall demonstrate:

familiarity with the methods of the specific research area in particular (part of outcome 2)
- understanding of the possibilities, limitations and feasibility of the various methods, e.g. sample handling and competency requirements

ability for scientific analysis and synthesis (part of outcome 3)
- Critically assess the suitability of methods for the questions posed
- Understand the basic steps in implementing a given method and compile the data obtained

3 Reading list and other teaching material

The following course readings and teaching material will be used on the course:

Enter text here. Dekkers KF, Sayols-Baixeras S, Baldanzi G, et al. An online atlas of human plasma metabolite signatures of gut microbiome composition. *Nat Commun.* 2022;13(1):5370. Published 2022 Sep 23. doi:10.1038/s41467-022-33050-0. PMID: 36151114

Flurin L, Wolf MJ, Mutchler MM, Daniels ML, Wengenack NL, Patel R. Targeted Metagenomic Sequencing-based Approach Applied to 2146 Tissue and Body Fluid Samples in Routine Clinical Practice. *Clin Infect Dis.* 2022;75(10):1800-1808. doi:10.1093/cid/ciac247. PMID: 35362534.

Araújo R, Bento LFN, Fonseca TAH, Von Rekowski CP, da Cunha BR, Calado CRC. Infection Biomarkers Based on Metabolomics. *Metabolites.* 2022;12(2):92. Published 2022 Jan 19. doi:10.3390/metabo12020092. PMID: 35208167

Torres-Sangiao E, Giddey AD, Leal Rodriguez C, Tang Z, Liu X, Soares NC. Proteomic Approaches to Unravel Mechanisms of Antibiotic Resistance and Immune Evasion of Bacterial Pathogens. *Front Med (Lausanne).* 2022;9:850374. Published 2022 May 2. doi:10.3389/fmed.2022.850374. PMID: 35586072

Additional literature and teaching materials might be added.

4 Teaching formats

Teaching on the course takes the following format:

Lectures
Individual self study

5 Examination

The course is assessed through an examination in the format of

written assignment
-Submitted examination assignment in which research questions must be answered by choosing the appropriate methodology identified during the course. The method choices must be discussed regarding pros and cons as well as any relevant other considerations.

For examinations consisting of several examination components, the following applies: If during the course it is concluded that a doctoral student is unable to complete a certain examination component, the examiner may set a substitute assignment provided that circumstances do not reasonably allow for the course component to be completed at a later date during the run of the course.

6 Grades

Examinations on third-cycle courses and study programmes are to be assessed according to a two-grade scale with either of the grades 'fail' or 'pass' (local regulations).

The grade shall be determined by a teacher specifically nominated by the higher education institution (the examiner) (Higher Education Ordinance).

To obtain a passing grade on examinations included in the course, the doctoral student is required to demonstrate that he/she attains the intended course learning outcomes as described in section 2.2. Alternatively, if the course consists of multiple examinations generating credit, the doctoral student is required to demonstrate that he/she attains the outcomes that the examination in question refers to in accordance with section 5.

A student who has failed an examination is entitled to a retake.

If an examination consists of several examination components, and a student fails an examination component, the examiner may, as an alternative to a retake, set a make-up assignment with regard to the examination component in question.

A doctoral student who has failed an examination twice for a specific course or course element is entitled, upon his/her request, to have another examiner appointed to determine the grade.

7 Admission to the course

7.1 Admission requirements

To gain access to the course and complete the examinations included in the course, the applicant must be admitted to a doctoral programme at Örebro University.

Furthermore, the applicant may be admitted to postgraduate education at another European university.

7.2 Selection

Selection between applicants who have been admitted to doctoral programmes at Örebro University and who otherwise meet the admission requirements as listed above is made according to the following order of precedence:

Selection between the applicants who are admitted to doctoral level education at Örebro University and who otherwise meet the admission requirements as above takes place according to the following ranking.

If no other selection criteria are specified in this section, priority is given to applicants with a smaller number of course credits remaining until graduation, over applicants with more course credits remaining. In case of equal points, selection is made by lottery. This also applies within any specified selection groups unless otherwise stated.

If no other selection criteria are specified in this section, priority shall be given to applicants with a lower number of course credits left before the award of their degree over applicants with a higher number of remaining course credits. Should two or more students have equal number of credits,

selection will be done through the drawing of lots. This also applies within any selection groups listed unless otherwise stated.

7.3 Other applicants than doctoral students admitted at Örebro University

Other applicants than doctoral students admitted at Örebro University may be given access to the course on the grounds of provisions for and/or agreements regarding contracted courses, joint degrees, national graduate schools or cooperation in other respects with other universities.

Any decisions on what such other applicants may be given access to the course are made separately and on the basis of the provisions and/or agreements that occasion the student to apply for the course.

For participation in the course in other respects, the same provisions shall apply as for doctoral students admitted to Örebro University.

8 Transfer of credits for courses, study programmes and other experience

Provisions on the transfer of credits can be found in the Higher Education Ordinance and on the university's webpage.

9 Other information

Transitional provisions