

Microbiomics (I002614)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size	<i>(nominal values; actual values may depend on programme)</i>		
Credits 4.0	Study time 120 h	Contact hrs	40.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	online lecture	3.75 h
			group work	13.75 h
			microteaching	20.0 h
			online seminar: coached exercises	2.5 h

Lecturers in academic year 2020-2021

Boon, Nico	LA25	lecturer-in-charge
Rajkovic, Andreja	LA23	co-lecturer

Offered in the following programmes in 2020-2021

	crdts	offering
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	4	A
Master of Science in Bioscience Engineering: Environmental Technology	4	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	4	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	4	A

Teaching languages

English

Keywords

juxtaposition, SWOT, molecular techniques, detection, monitoring, (sub)typing, quantitative approach, controls, sample preparation, interpretation

Position of the course

The lectures will relate to how molecular approaches can contribute to increase insights and solve issues related to specific case studies in bioscience engineering. This will cover a wide variety of applications (environmental bioengineering and plant biotechnology, food safety and (human) health) and matrices (e.g. soils, plants, water, food, the gastrointestinal tract, etc.). At the end of the course, the student will be knowledgeable to judge benefits and drawbacks of a diverse range of molecular techniques in a given context. The student should be able to select and argument the most appropriate techniques "fit for purpose" with a correct interpretation of results in the framework of a set research question

Contents

The course will introduce the concept of juxtaposition: by means of a number of case studies (research problems) the lecturer(s) will place two (or more) methodological approaches, molecular tools or alternative methods that might be used, parallel to another for problem solving. The purpose of **juxtaposing** two directly or indirectly related molecular (or other alternative) approaches to each other, is to highlight the contrast between the two and to compare them. Also, the concept of a SWOT analysis for support in 'fit for purpose' decision making of a particular approach for a defined research problem, will be introduced. Juxtaposition of molecular (or other alternative) approaches will relate to topics such as:

1. Fingerprinting of microbial communities
2. (over)interpretation of untargeted analysis versus targeted analysis
3. The (non)sense of relative versus absolute quantification
4. The usefulness of sequencing vs. culturomics
5. The relationship (or not) between phylogeny & activity
6. Augmentative biological control (bio-augmentation, probiotics, biological control agents in primary production)
7. Definition of pathogenicity of human pathogens
8. One-health: (sub)typing & source attribution
9. Online monitoring of water quality

Active learning will be stimulated during the lectures by involving the students in the discussion of various molecular approaches. The case studies discussed in the lectures will elaborate molecular approaches for one particular defined application in the area of bio-science engineering.

Besides, student groups will have to critically analyze a research paper of a similar research problem in another application area (other matrix). They will need to discuss the 'fitness' of the molecular approach taken and report on this to their peers (students & lecturers), both by means of 1) microteaching and 2) a written assignment.

The course notes will mainly serve as a reference book providing information on the principle and pitfalls of the molecular approaches introduced during the case studies. The lectures will be supported by online material on the electronic learning environment such as videos, articles and hand-outs of the presentations summarizing the key messages of the lessons learnt from the case studies.

Initial competences

basic level of molecular biology, microbiology and biochemistry is required.

Final competences

- 1 To discuss [the strengths, weaknesses, opportunities and threats \(SWOT analysis\) of the molecular approaches currently available for defined case studies.](#)
- 2 To select the appropriate molecular approach [and argument the methodology, including the use of appropriate controls in place, in applied biological sciences](#)
- 3 Interpret the [results generated taking into account the specific context.](#)
- 4 Critical reflection and communication on various sources of information.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Group work, microteaching, project, online lecture, online seminar: coached exercises

Extra information on the teaching methods

During the lectures, the several case studies are critically discussed in close interaction with the students to get familiar with the concept of juxtaposition.

During the group work, the students themselves analyze a research paper of a similar research problem in another application area (other matrix) and they discuss the 'fitness' of the molecular approach taken in order to prepare the report on this to their peers (students & lecturers).

During the microteaching, they will present the outcomes of their group work and discuss this with their peers.

Learning materials and price

Syllabus is available through UFORA UFORA will contain lots of supporting information for this course.

References

Course content-related study coaching

Coaching is available before or after lectures and on fixed moments for the task assignment (group work). The lecturers and assistants can also be contacted by mail.

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Oral examination

Examination methods in case of periodic evaluation during the second examination period

Oral examination

Examination methods in case of permanent evaluation

Oral examination, participation, assignment, peer assessment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

The course content of the lectures and microteachings is evaluated by means of an oral examination

The group work task is evaluated by means of the presentation and discussion (microteaching), the assignment and peer-evaluation of the group members.

Participation of the students during all the microteachings is also mandatory and is taken into account for the evaluation.

Calculation of the examination mark

The examination accounts for 50% of the evaluation, while the group work accounts for 50% of the evaluation. Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.