

Food Microbiology and Analysis (I002759)

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 (nominal values; actual values may depend on programme)
Credits 7.0 Study time 210 h Contact hrs 70.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	guided self-study	2.5 h
			practicum	8.75 h
			lecture	45.0 h
			group work	6.25 h

Lecturers in academic year 2020-2021

Rajkovic, Andreja LA23 lecturer-in-charge

Offered in the following programmes in 2020-2021

	crdts	offering
Master of Science in Food Technology	7	A
Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)	7	A

Teaching languages

English

Keywords

Food preservation, food contamination, micro-organisms, microbial food safety, hygiene, spoilage

Position of the course

The object is to obtain a basic understanding of the microbial phenomena occurring in food products. The theoretical part deals with the contamination of raw materials, the factors affecting the growth of micro-organisms, the study of preservation methods, the spoilage patterns of different food products and food poisoning. The course focuses on food spoilage as well as on microbial food safety aspects, both from the angle of microorganisms and from the food product (and production) perspectives.

The practical part consists of an overview of microbiological analysis methods for food products. An insight into the composition of microbiological media is created and emphasis is laid on the interpretation of microbiological analysis. The students are trained in microbiological analysis in the laboratory. The students are made familiar with predictive modelling. The students perform a group task to evaluate the strengths and weaknesses of a rapid/alternative detection methods for the purpose of food analysis in a certain case.

Contents

THEORY

1. Microbial contamination of raw material
 - 1.1. Sources of contamination
 - 1.2. Contamination of various foods
2. Growth of micro-organisms in foods
Intrinsic, extrinsic and implicit factors
3. Microbial aspects of food preservation
 - 3.1. Lowering the degree of acidity
 - 3.2. Lowering the water activity
 - 3.3. Changing the redox potential
 - 3.4. Use of temperature
 - 3.5. Use of irradiation, chemical preservation
 - 3.6. Use of natural anti-microbial substances
4. Spoilage of foods

5. Food poisoning
 - 5.1. Food intoxications
 - 5.2. Food infections
6. Examples from the food industry - interactive discussion on real cases of food safety and food spoilage troubles and troubleshooting

PRACTICE

1. Introductory sessions are given on the following aspects: classic methodology for microbial food analysis, microbiological criteria, alternative methods (considerations and selection criteria), introduction to the lab practicals and group work

2. Lab practicals: The students are practically trained in microbiological analysis by performing analysis on several food products for different microbial parameters. By means of the practical work, insights are created in the factors influencing the microbial ecology of food products. Purification and confirmatory tests are performed and a demonstration of a molecular test is outlined. The use of selective (chromogenic) media for pathogen detection is illustrated.

3. Group work: the students perform a group task to evaluate the strengths and weaknesses of a rapid/alternative detection method for the purpose of food analysis based on real cases of food safety and food spoilage troubles and troubleshooting in different settings.

4. Predictive modelling: via an interactive case-driven PC-session, the students are made familiar with the basics of predictive modelling.

Initial competences

A basic knowledge of general microbiology is recommended

Final competences

- 1 Understanding the behaviour of micro-organisms in food products and the factors influencing this behaviour
- 2 Adapting food processes to extend the shelf life and to increase microbial safety through the obtained knowledge of the microbial aspects of food preservation
- 3 Relating specific spoilage phenomena or food poisoning scenario's with specific (groups of) micro-organisms.
- 4 Analysing a problem related with preservation of foods (in developing countries) and being able to offer a solution for this problem
- 5 Determining the microbial quality of food products through microbial analysis
- 6 Interpreting results from microbial analysis
- 7 Explaining the strengths and limitations of a microbial analysis method in a certain setting/context within the spectrum of possible microbial analysis.

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

Guided self-study, group work, lecture, PDE tutorial, practicum

Extra information on the teaching methods

Theory: lectures (including interactive sessions on case studies) + guided self-study
Practice: introduction sessions (lectures), lab practicals, group work, interactive PC session on PMP

Learning materials and price

A book is available: Food microbiology and analysis by Prof. dr. Frank Devlieghere (ed.), Andreja Rajkovic, Simbarashe Samapundo, Mieke Uyttendaele, An Vermeulen and Johan Debevere. Cost: 25 EUR

In addition there is a list of recommended standard books, all available in the Library of the Faculty or Library of the Laboratory.

References

Microbiological guidelines: support for interpretation of microbiological test results. Mieke Uyttendaele (Ed.). 2018, die Keure.
Modern food Microbiology. 2000. Edited by J.M. Jay, Aspen Publications, Inc
Microorganisms in foods. Part 5. Microbiological specifications of food pathogens 1996. ICMSF. Springer
Microorganisms in Foods. Part 6. Microbial ecology of food commodities. 2005. ICMSF. Springer

Course content-related study coaching

For the theory as well as for the theoretical exercises, the student has the possibility to ask extra information or explanation to the lecturer during contact hours or e-mail.

Several assistants are involved in the practical exercises and can be contacted during the provided sessions or via mail for extra information. Slides of the lectures are available via UFORA.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination, open book examination

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

Written examination, open book examination

Examination methods in case of permanent evaluation

Written examination with open questions, oral examination, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

First examination period:

- Theory: written examination (closed book) and case study (open book)
- Practice: written examination (closed book), lab report, group work: report + presentation

Resit examination period:

- Theory: written examination (closed book) and case study: written preparation with oral defense (open book).
- Practice: written examination (closed book)

Calculation of the examination mark

Theory (60%): written exam (closed book) accounts for 45%; case study (open book) accounts for 15%

Practice (40%): written exam (20%), group task (10%) and lab report (10%)

The final score is calculated based on the arithmetic division mentioned above.

The student needs to participate to all exams, assignments and related contact moments of the period-aligned and non-period aligned evaluation in order to be able to succeed the course unit.

Non-participation to one part of the evaluation (period-aligned or non-period aligned evaluation), or when a score of less than 8/20 (not rounded up) is obtained for one of the parts, the student cannot pass for the course unit. Instead, the final score is then set to 9/20, even when the calculated score is 10/20 or more.