UNIVERSITEIT GENT

Studiefiche

Academiejaar 2022-2023

Food Microbiology and Analysis (I002759)

Cursusomvang *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

Studiepunten 7.0 **Studietijd 210 u** **Contacturen** 70.0u

Aanbodsessies en werkvormen in academiejaar 2022-2023

A (semester 1)	Engels	Gent	werkcollege: geleide oefeningen	10.0u
			begeleide zelfstudie	2.5u
			practicum	8.75u
			groepswerk	8.75u
			hoorcollege	32.5u
			zelfstandig werk	7.5u

Lesgevers in academiejaar 2022-2023

Rajkovic, Andreja	LA23	Verantwoordelijk lesgever
De Vriendt, Tineke	LA23	Medewerker

Aangeboden in onderstaande opleidingen in 2022-2023	**stptn**	**aanbodsessie**
Master of Science in Food Technology	7	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: Food Science and Nutrition (niveau master-na-bachelor)	7	A

Onderwijstalen

Engels

Trefwoorden

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

Situering

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. Also, students will get brief introduction into molecular methods used in contemporary food microbiology, including methdos for detection, quantification, typing and characterization of foodborne microorganisms.
The practical part consists of an overview of microbiological analysis methods for food products. An insight into the conduction of classic quantitative and qualitative analysis is created and emphasis is laid on the interpretation of microbiological analysis and comparison with microbiological guidelines/criteria. The students are trained in classic microbiological analysis in the laboratory. The students are made familiar with basic concepts and tools of predictive microbiology and its roles in microbial safety and spoilage. The students perform a group task to evaluate the strengths and weaknesses of a rapid/alternative method for the purpose of food analysis in a certain case/setting.

Inhoud

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. Cleaning and desinfection
7. Examples from the food industry - interactive discussion on real cases of food safety and food spoilage troubles and troubleshooting
8. Overview of molecular techniques and other complementary analytical methods in food safety

PRACTICE

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

2. Lab practicals: The students are trained in microbiological analysis by performing classic analysis on several food products for different microbial parameters, interpretation of results and reporting on it. 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 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.

Begincompetenties

A basic knowledge of general microbiology is recommended

Eindcompetenties

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.

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Practicum, Groepswerk, Begeleide zelfstudie, Hoorcollege, Zelfstandig werk, Werkcollege: geleide oefeningen

Toelichtingen bij de didactische werkvormen

Theory: lectures, seminar: coached exercises (cases from the food industry), independent work (self-study)

Practice: lectures (introduction sessions), independent work (to prepare for lab practicals and group work), lab practicals, group work, guided self-study (for group work), seminar: coached exercises (PC-demo and exercises on PMP)

Leermateriaal

A theory course is available. Cost: 25 EUR
A practical course is available. Cost: 10 euro
In addition there is a list of recommended standard books (see references), all available in the Library of the Facuty or Library of the Laboratory.

Referenties

Microbiological guidelines: support for interpretation of microbiological test results. Mieke Uyttendaele (Ed.). 2018, die Keure.
Food Microbiology: Fundamentals and Frontiers, 5th Edition. Michael P. Doyle (Editor), Francisco Diez-Gonzalez (Editor), Colin Hill (Editor). ISBN: 978-1-683-67289-0 June 2019 ASM Press.
Encyclopedia of Food Microbiology, 2nd Edition. Carl Batt, Pradip Patel (Eds.). ISBN: 9780123847300.
Modern Food Microbiology 7th edition. James M. Jay, Martin J. Loessner, David A. Golden. ISBN: 978-0-387-23413-7.
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

Vakinhoudelijke studiebegeleiding

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.

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Mondeling examen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Mondeling examen

Evaluatievormen bij niet-periodegebonden evaluatie

Verslag, Mondeling examen, Schriftelijk examen met open vragen

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is enkel mogelijk in gewijzigde vorm

Toelichtingen bij de evaluatievormen

First examination period:

- Theory: oral examination with 2 parts. The first part deals with all aspects of the theory course. The second part of the exam is the defense of the students' approach to solve a particular case study and can result in a broader discussion pertinent to the course material and the case study topic. The student will get selected questions and a case study in a random manner and will have time to prepare the oral examination.
- Practice: written examination (closed book), lab report, group work: report + presentation

Resit examination period:

- Theory: same as first examination period
- Practice: written examination (closed book)

Eindscoreberekening

Theory (60%): part 1 accounts for 45%; part 2 (defense case study) accounts for 15%
Practice (40%): written exam (20%), group task (10%) and lab report (10%)
The final score is calculated based on the arithmic 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.