Course Specifications

Valid as from the academic year 2024-2025

Food Safety and Risk Analysis (I002415)

Course size — *(nominal values; actual values may depend on programme)*

Credits 5.0 **Study time** 125 h

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	peer teaching
			lecture
			seminar
			independent work
			group work

Lecturers in academic year 2024-2025

Jacxsens, Liesbeth	LA23	lecturer-in-charge
De Meulenaer, Bruno	LA23	co-lecturer
Uyttendaele, Mieke	LA23	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Bachelor of Science in Food Technology	5	A
International Master of Science in Agro- and Environmental Nematology	5	A
Master of Science in Food Technology	5	A
Master of Science in Nutrition and Food Systems	5	A
Exchange Programme in Bioscience Engineering: Food Science and Nutrition (master's level)	5	A

Teaching languages

English

Keywords

Food safety, microbiological hazards, chemical hazards, toxicology, exposure assessment, risk analysis, risk management

Position of the course

Food safety is an emerging domain and microbiological, chemical (including allergens) and physical hazards are included. After detailed information of the different hazards, the shift towards potential risks on human health via food or drink exposure is explained in these lectures. Based on consumption patterns, exposure assessment can be calculated for the population towards a particular hazard, or combination of multiple hazards (i.e. in case of cumulative exposure assessment) or different sources of hazards (i.e. in case of aggregated exposure). The outcome of an exposure assessment will be further compared with toxicological or dose response information to calculate the effect on human health. Risk metrics as DALY, Margin of Exposure (MoE), ALARA (as low as reasonable achievable) will be explored. Potential mitigation strategies can be introduced via scenario analysis in order to evaluate potential routes to decrease the impact on human health and which can be explored for risk management decisions.

Contents

THEORY :
1. Introduction on food safety in the agri-food chain :
1.1. Farm-to-fork organization of food safety governance
1.2. Relation between food safety management & risk analysis

2. Food hygiene and microbiological aspects of food safety
2.1. Introduction: trends and sources of zoonoses, zoonotic agents and foodborne outbreaks

2.2. Food hygiene indicators

2.3. Food borne pathogens

2.3.1. Bacteria causing food infections (*Salmonella*, *Campylobacter*, pathogenic *Escherichia coli*, *Listeria monocytogenes*, etc.)

2.3.2. Bacteria causing food toxi-infections (*Staphylococcus aureus*, *Bacillus cereus*, *Clostridium perfringens*, *Clostridium botulinum*)

2.3.3 Food borne viruses

2.3.4 Food borne parasites

2.4 Natural toxins (marine biotoxins, biogenic amines, etc)

3. Chemical aspects of food safety

3.1 Basic principles about human toxicology

3.2. Food sensitivities (including allergens)

3.3. Food intoxications

3.3.1. Food additives

3.3.2. Residues (*Veterinary drugs*, *Crop protection agents*, *Desinfectants*, *Migration from food contact materials*, etc.)

3.3.3. Contaminants (*Environmental contaminants*, *Process contaminants*, *Mycotoxins*, *Marine and related toxins*)

3.3.4. Endogenous components

4. Physical hazards related to food safety

4.1. Nature and sources of physical hazards

4.2 Detection and elimination systems of physical hazards

5. Risk analysis in relation to food safety hazards and human health impact

5.1. Definitions

5.2. Risk assessment (*Hazard identification*, *Hazard characterization*, *Exposure assessment (deterministic and probabilistic approach)*, *Risk characterization*)

5.2.1. Chemical risk assessment in foods (including aggregated and cumulative assessment)

5.2.2. Microbial risk assessment in foods

5.3. Risk communication

5.4 Risk management and mitigation strategies (including risk benefit and multi criteria decision making)

PRACTICUM/EXERCISES :

1. Deterministic microbiological risk assessment (e.g. *Listeria* in vegetables)

2. Probabilistic microbiological risk assessment (e.g. *Salmonella* in poultry meat, farm-to-fork calculations)

3. Deterministic and probabilistic chemical risk assessment (e.g. acrylamide, mycotoxins)

4. Own exercise in groups (including report, presentation and discussion) : case study on risk assessment calculations and risk management decisions

5. Invited speaker on risk management in practice (EU, WHO/FAO)

Initial competences

Food technology, statistics (distributions), food microbiology and food chemistry.

Final competences

1 Students will be able to understand concepts and principles of risk analysis (risk assessment, risk management and risk communication)

2 Students will be able to perform risk assessment calculations and its interpretation on impact on human health (deterministic and probabilistic)

3 Students will be able to think critically on food safety issues, risk assessment calculations and potential risk management options

4 Students will be able to communicate on food safety hazards, the shift to food safety risks and risk analysis (written and oral)

Conditions for credit contract

Access to this course unit via a credit contract is unrestricted: the student takes into consideration the conditions mentioned in 'Starting Competences'

Conditions for exam contract

Access to this course unit via an exam contract is unrestricted

Teaching methods

Group work, Seminar, Lecture, Independent work, Peer teaching

Extra information on the teaching methods

In the theory part mainly plenary lectures are used, while in the exercises PC room classes (exercises on @Risk software), independent work is foreseen. The group work (risk assessment and risk management case study) will be presented for the other students (peer teaching).

Lecture : 22h
Independent work: 5h
Peer teaching : 2h
Group work: 3h
Seminar: practical PC room classes: 8h
Lecture: plenary exercises: 5h

Study material

Type: Syllabus

Name: Food safety and risk analysis
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes

Type: Slides

Name: Food safety and risk analysis
Indicative price: Free or paid by faculty
Optional: no

References

Course content-related study coaching

The students will be guided during the lectures and also in their own exercise on risk assessment and risk management case study

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Presentation, Peer and/or self assessment, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

The risk assessment and risk management case study will be a group work prepared as non-period evaluation. A report and presentation of the work is expected. Peer assessment from other students on the work will be organised and during the presentation (peer teaching), questions and a discussion (as oral exam) will be organised.
The theory and other exercise parts are as written exam with open questions (closed book exam).

Calculation of the examination mark

Written exam with open-ended questions : 60%
Assignment/presentation and peer assessment – risk assessment and risk management case study : 40%
The student needs to participate to all exercises and complete all assignments and exams that are part of the evaluation (period aligned and non-period aligned). Students who eschew participation to exercises or period aligned and/or non-period aligned evaluations for this course unit, or when one obtains a score lower than 8/20 (not rounded up) on one of both parts (period aligned or non-period aligned evaluation), they will fail for this course unit. In that case the end score is set to a max of 9/20 even when the calculation indicates a score of 10/20 or more.