

## Food Safety and Risk Analysis (1002415)

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

Credits 5.0      Study time 125 h      Contact hrs 45.0 h

Course offerings and teaching methods in academic year 2019-2020

A (semester 1)	English	lecture	27.5 h
		microteaching	2.5 h
		seminar: practical PC	5.0 h
		room classes	
		group work	2.5 h
		guided self-study	2.5 h
		lecture: plenary	5.0 h
		exercises	

Lecturers in academic year 2019-2020

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

Offered in the following programmes in 2019-2020

	crdts	offering
<a href="#">Bachelor of Science in Food Technology</a>	5	A
<a href="#">Master of Science in Food Technology</a>	5	A
<a href="#">Master of Science in Nutrition and Rural Development</a>	5	A

Teaching languages

English

Keywords

Food safety, pathogens, contaminants, toxicology, exposure assessment, risk analysis

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 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). Outcome of 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

### **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

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

#### Initial competences

Education on food technology, process control, mathematic, food microbiology and food chemistry.

#### Final competences

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

#### 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

Guided self-study, group work, lecture, microteaching, lecture: plenary exercises, seminar: practical PC room classes

#### 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), plenary exercises and guided self-study is foreseen. The group work (risk assessment and risk management case study) will be presented for the other students (microteaching).

Lecture : 22h

Guided self-study: 5h

Microteaching : 2h

Group work: 3h

Seminar: practical PC room classes: 8h

Lecture: plenary exercises: 5h

## Learning materials and price

All learning materials will be provided and no additional costs are foreseen.

## 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

## Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, open book examination

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

Written examination with open questions, open book examination

## Examination methods in case of permanent evaluation

Oral examination, peer assessment, 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

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, questions and oral examination will be organised.

The theory and other exercise parts are as written exam with open questions and open book exam.

## Calculation of the examination mark

Theory : 50%

Exercises : 10%

Exercises - risk assessment and risk management case study : 40%

*Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.*