

## Food Technology (0000104)

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** 5.0      **Study time** 150 h      **Contact hrs** 60.0 h

### Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Incheon	project	10.0 h
			lecture	20.0 h
			seminar: coached exercises	5.0 h
			practicum	25.0 h

### Lecturers in academic year 2020-2021

Van Haute, Sam      KR01      lecturer-in-charge

### Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Bachelor of Science in Food Technology</a>	5	A

### Teaching languages

English

### Keywords

Food, Technology, Unit operations, Processing, Quality, Safety, Shelf life, Sensorial properties, Nutritional value, Packaging

### Position of the course

The most important unit operations applied in the food industry are discussed. In particular attention is paid to the influence of applied unit operations on food quality in a wide sense.

### Contents

1. Processes based on heat transfer
  - 1.1. Introduction
  - 1.2. Heat production
  - 1.3. Heat transfer in food processing
  - 1.4. Influence of heat on foodstuff
  - 1.5. Blanching
  - 1.6. Pasteurization
  - 1.7. Sterilization/UHT
  - 1.8. Cooling
  - 1.9. Freezing
  
2. Processes based on heat and mass transfer
  - 2.1. Evaporation
  - 2.2. Drying
  - 2.3. Frying
  - 2.4. Baking
  - 2.5. Extrusion
  - 2.6. Agglomeration
  
3. Processes based on mechanical separation
  - 3.1. Centrifugation
  - 3.2. Filtration
  - 3.3. Membrane separation

#### 4. Processes based on electromagnetic radiation

- 4.1. Microwave and dielectric heating
- 4.2. Infrared heating
- 4.3. Irradiation

#### 5. Food packaging

- 5.1. Function of packaging: introduction
- 5.2. Types of Packaging
- 5.3. Packaging systems
- 5.4. Modified atmosphere packaging
- 5.5. Active and intelligent packaging
- 5.6. Safety aspects of packaging migration

#### 6. Nonthermal processing

- 6.1. Concept of nonthermal processing
- 6.2. Electromagnetic processes
  - 6.2.1. Pulsed electric field
  - 6.2.2. Oscillating magnetic fields
  - 6.2.3. UV light
  - 6.2.4. Pulsed light and pulsed UV
  - 6.2.5. Irradiation
  - 6.2.3. Cold plasma
- 6.3. Physical processes
  - 6.3.1. High pressure processing
  - 6.3.2. Ultrasound
- 6.4. Chemical oxidants
  - 6.4.1. liquid treatment
  - 6.4.2. gaseous treatment

#### Initial competences

Have taken Inorganic Chemistry I and II, Modern Aspects of Food (Introduction of Food Science), Organic Chemistry I and II

#### Final competences

- 1 Recall the properties of food raw materials and describe, select and apply different preparation techniques for raw materials prior to processing
- 2 Explain the principles of various unit operations including thermal processing, freezing, dehydration, aseptic processing, high pressure processing, microwave heating, irradiation...etc.
- 3 Perform calculations on heat inactivation of food associated microorganisms
- 4 Explain principles of fluid flow and rheology and their applications
- 5 Be aware of the impact of these unit operations on the quality of food products in a wide sense
- 6 Recall the different packaging materials (plastic, glass, metal, paper and paperboard) and their properties towards storing food, and understand MAP packaging, intelligent and active packaging
  
- 7 Understand alternatives to heat treatments in order to guard the microbial food safety and quality of food products

#### 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

Lecture, practicum, project, seminar: coached exercises

#### Extra information on the teaching methods

Theory lectures, lab practicals. exercises, project: paper + presentation  
Exercises on heat inactivation of food associated microorganisms  
Lab practicals: the student learns to use several unit operations  
Project: the student studies in detail a selected food technology and describes in a small paper the state of the art of said technology. Subsequently the student

communicates the findings through oral presentation

### **Learning materials and price**

Learning materials in English

### **References**

- HELDMAN D.R. & LUND D.B. (2007). Handbook of food engineering (second edition), Boca Raton, CRC Press, 1023p.
- PASSOS, M.L., RIBEIRO, C.P. (2010). Innovation in Food Engineering. New techniques and products. CRC Press, 721p. ISBN 978-1-4200-8606-5
- SINGH, R.P. & HELDMAN, D.R. (2001). Introduction to food engineering. San Diego, Academic Press Inc., 499 p. ISBN 0-12-646384-0
- VALENTAS, K.J., ROTSTEIN, E. & SINGH, R.P. (1997). Handbook of Food Engineering Practice. Boca Raton, CRC Press, 718 p. ISBN 0-8493-8694-2
- AHAVENAINEN, R. (2003). Novel Food Packaging Technologies. Woodhead Publishing Limited, Cambridge, ISBN 1-85573-675-6
- Air Products. A fresh approach to modified atmosphere packaging (MAP).
- BOSSET, J.O., GALLMAN, P.U., SIEBER, R. (1994) Influence of light transmittance of packaging materials on the shelf-life of milk and dairy products - a review. In: Mathlouthi, M. Food Packaging and preservation. Blackie Academic & Professional, London. ISBN 0-7514-0182-X
- COLES, R., McDOWELL, D., KIRWAN, M.J. (2003). Food Packaging Technology, Blackwell Publishing, Oxford. ISBN 1-84127-220-5.
- KERRY, J.P., O'GRADY, M.N., HOGAN, S.A. (2006). Past, current and potential utilisation of active and intelligent packaging systems for meat and muscle-based products: a review. Meat Science 74, 113-130.
- OZDEMIR, M. & FLOROS, J.D. (2004). Active Food Packaging Technologies. Critical Review in Food Science and Nutrition, 44, 185-193.
- Packaging Europe, 2007. Volume 2.2, 2.3 and 2.5.
- ROBERTSON, G.L. (2006). Food Packaging. Principles and Practice. Second Edition. Taylor & Francis, Boca Raton. ISBN 0-8493-3775-5
- Soft Drinks International. May 2007.
- VICKERS, F.G. & MEDLING, J. (2005). Filling equipment. In Senior, D. & DEGE, N. Technology of bottled water. Blackwell Publishing, Oxford, ISBN 1-4051-2038-X

### **Course content-related study coaching**

Interactive counselling through Minerva, Electronic appointment booking, weekly office hours

### **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, oral examination

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

Written examination with open questions, oral examination

### **Examination methods in case of permanent evaluation**

Participation, assignment, job performance 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**

Midterm: multiple choice plus open questions, written only

Final exam: multiple choice plus open questions, written + oral explanation

### **Calculation of the examination mark**

Midterm: 10 %

project: paper + presentation: 20 %

practicum: participation + report+ quiz: 20%

Final exam: written + oral: 50%