

Packaging Technology (I002673)

Wegens Covid19 kan mogelijk afgeweken worden van de onderwijs- en evaluatievormen. Dergelijke afwijkingen zullen via Ufora worden gecommuniceerd.

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

Studiepunten 5.0 **Studietijd** 150 u **Contacturen** 50.0 u

Aanbodsessies en werkvormen in academiejaar 2021-2022

| | | | | |
|----------------|--------|------|---------------------------------|--------|
| A (semester 2) | Engels | Gent | begeleide zelfstudie | 2.5 u |
| | | | werkcollege: geleide oefeningen | 5.0 u |
| | | | hoorcollege | 30.0 u |
| | | | groepswerk | 5.0 u |
| | | | excursie | 7.5 u |

Lesgevers in academiejaar 2021-2022

Ragaert, Peter LA23 Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2021-2022

| | stptn | aanbodssessie |
|--------------------------------------------------------------------------------------------------------------------------------|-------|---------------|
| Master of Science in de bio-ingenieurswetenschappen: chemie en bioprocestechnologie | 5 | A |
| Master of Science in de bio-ingenieurswetenschappen: levensmiddelenwetenschappen en voeding | 5 | A |
| Master of Science in de biowetenschappen: voedingsindustrie | 5 | A |
| Uitwisselingsprogramma bio-ingenieurswetenschappen: chemie en bioprocestechnologie (niveau master-na-bachelor) | 5 | A |
| Uitwisselingsprogramma bio-ingenieurswetenschappen: Food Science and Nutrition (niveau master-na-bachelor) | 5 | A |

Onderwijstalen

Engels

Trefwoorden

Packaging engineering, sealing technology, active and intelligent packaging, bioplastics, circular packaging

Situering

This course gives an overview of important engineering techniques to enhance functionality of packaging materials focusing on barrier technology, temperature resistance, sealing technology and active and intelligent packaging systems. Both conventional packaging materials as well as re-usable, recyclable or renewable packaging materials (e.g. bioplastics) are considered, also elaborating on different sustainable and safety aspects.

Inhoud

1. Introduction

1.1. Role of packaging in today's society

1.2. Overview packaging materials

1.2.1. Metal packaging

1.2.2. Glass packaging

1.2.3. Paper - paperboard

1.2.4. Plastics

1.3. The packaging chain: many stakeholders

2. Packaging engineering

- 2.1. Introduction
- 2.2. Barrier technology
 - 2.2.1. *Factors affecting barrier capacities*
 - 2.2.2. *Case: PredOxyPack*
 - 2.2.3. *High barrier technology*
 - 2.2.4. *Low barrier technology*
- 2.3. Temperature resistance technology
 - 2.3.1. *Crystallisation technology*
 - 2.3.2. *Susceptor technology*
- 2.4. Nucleating and clarifying agents
- 2.5. Anti-fog coatings
- 3. Adhesive and printing processes**
- 3.1. Adhesive processes
- 3.2. Printing processes
- 3.3. Shrink sleeves
- 3.4. In Mould Labelling
- 4. Sealing technology**
- 4.1. Introduction
- 4.2. Seal behaviour of plastics
- 4.3. Sealing systems
- 4.4. Seal behaviour
- 4.5. Closures for plastic bottles and tubs
- 4.6. Tamper-evident and safety closures
- 4.7. Leak detection technology
- 5. Active and intelligent packaging**
- 5.1. Active packaging
 - 5.1.1. *Oxygen scavengers*
 - 5.1.2. *Carbon dioxide scavengers/emitters*
 - 5.1.3. *Water absorbers*
 - 5.1.4. *Ethylene absorbers*
 - 5.1.5. *Antimicrobial packaging*
 - 5.1.6. *Self-heating cans and containers*
- 5.2. Intelligent packaging
 - 5.2.1. *Time-temperature indicators (TTI's)*
 - 5.2.2. *Gas indicators*
 - 5.2.3. *Thermochromic inks*
 - 5.2.4. *Quality indicators*
 - 5.2.5. *Radio Frequency Identification (RFID)*
 - 5.2.6. *Provide protection against theft, counterfeiting and tampering*
 - 5.2.7. *Provide improved sorting instructions in the recycling sector*
- 6. Sustainability and packaging**
- 6.1. Circular economy & packaging
- 6.2. Bioplastics
 - 6.2.1. *Classes*
 - 6.2.2. *Bioplastics materials*
 - 6.2.3. *Resources and availability*
 - 6.2.4. *Functionality of bioplastics*
 - 6.2.5. *Waste management options*
 - 6.2.6. *Commercial applications of bioplastics as packaging materials*
 - 6.2.7. *Challenges*
- 7. Quality control of packaging materials**
- 7.1 Performance
- 7.2 Safety of packaging materials
 - 7.2.1. *Factors influencing migration*
 - 7.2.2. *Legislation*
- 8. Packaging design and logistics**
- 9. References**

Begincompetenties

Basic knowledge organic chemistry is recommended.

Eindcompetenties

- 1 Gain insight in processes which are used to improve the barrier properties, thermal properties and seal properties of packaging materials for food and non-food products

- 2 Analyse and evaluate the impact of the composition of packaging materials on the quality and shelf-life of packaged food and non-food products
- 3 Perform calculations to determine the appropriate packaging configuration towards gas barrier
- 4 Critically evaluate the safety of packaging materials towards food contact by means of legislation and simulations
- 5 Collect information on the structure, processing and usage of packaging materials both for food and non-food products
- 6 Gain insight on the one hand in the multidisciplinary framework of food and non-food packaging and on the other hand in the complexity and interactions within the packaging chain
- 7 Critically evaluate the functionality, convenience and sustainability of the packaging of a selected product and communicate this clearly both in a written and oral format
- 8 Gain insight in the various factors determining the sustainability of packaging materials both from a resource level, usage level and waste processing level
- 9 Situate the impact of both food and non-food packaging in a broader social framework, taking into account the needs/requirements of various stakeholders within the packaging chain

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

Begeleide zelfstudie, excursie, groepswerk, hoorcollege, werkcollege: geleide oefeningen

Leermateriaal

A syllabus is available in English (EUR 5,00).

Referenties

- Ahvenainen, R. (Ed.). (2003). Novel food packaging technologies. Woodhead Publishing Limited, Cambridge. ISBN 1-85573-675-6.
- Morris, S.A. (Ed.). (2011). Food and package engineering. Wiley-Blackwell, West Sussex. ISBN 978-0-8138-1479-7.
- Robertson, G.L. (Ed.) (2013). Food Packaging. Principles and Practice. Third Edition. Taylor & Francis, Boca Raton. ISBN 978-1-4398-6241-4.
- ten Klooster, K., Dirken, J.M., Lox, F., Schilperoord, A.A. (Ed.) (2008). Zakboek Verpakkingen. Reed Business, Doetinchem. ISBN 978-90-6228-605-8.
- Thielen, M. (Ed.) (2012). Bioplastics – Basics, applications, markets. Polymedia Publisher GmbH, Mönchengladbach. ISBN 978-3-9814981-1-0
- Yam, K.L. (Ed.) (2009). The Wiley Encyclopedia of Packaging Technology. Wiley, Hoboken. ISBN 978-0-470-08704-6.

Vakinhoudelijke studiebegeleiding

Student counseling is foreseen 1) during or after theoretical sessions, 2) during or after practical sessions and 3) by means of e-mail or personal meeting.

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

Mondeling examen, werkstuk

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is mogelijk

Toelichtingen bij de evaluatievormen

Oral examination: 40 minutes written preparation and 20 minutes oral examination

Group work: report + oral presentation of the project

Eindscoreberekening

Oral examination: 13 points

Group work: 7 points