

CHEMICAL ENGINEERING AUTUMN SEMESTER 2017

Choose either 1. Nanotechnology Semester or 2. Sustainable Chemistry Semester

1. Future Materials and Processes: Nanotechnology Semester

Up to 30 ECTS for the autumn semester plus optional courses

Nanotechnology - Future Prospects and Business Opportunities, 15 ECTS

The study module consists of 3 units of 5 ECTS dealing each with how horizontal and multidisciplinary nanotechnology will revolutionize manufacturing techniques and enable new products, services and solutions, e.g., in the biotech, chemical and pharmaceutical industries, in electronics, ICT, production of energy, building materials, food products, cosmetics etc., and how nanotechnology combined with effective communication skills enables new business opportunities.

- What is Nanotechnology & Future Business Visions, 5 ECTS
- Nanomaterials: Products, Services, and Innovation Process, 5 ECTS
- Multidisciplinary Group Assignment on Nanotech Topic of Choice, 5 ECTS

After the course student is able to describe how nanotechnology will change manufacturing, materials, products and services in future. The student is also able to assess business opportunities related to nanotechnology and nanomaterials, as well as capable of communicating more effectively in different business situations and with actors from different fields.

Biomaterials, 5 ECTS

The participants are able to describe specific features of different biomaterials and their applications. The participants understand the basic principles of tissue engineering and they are able to describe specific features of biomaterials used in tissue engineering.

Food Engineering, 5 ECTS

Innovation project, 5 ECTS

Innovation project is typically a development project implemented in co-operation with a company or another external customer. However, the project may also be a part of Turku University of Applied Science's internal research and development activities or it can be based on a student's or student team's own project or business idea. Also development projects related to different student competitions are applicable. The final extent, detailed contents, student workload and learning outcomes of the course will be defined on a project basis.



INTERNATIONAL SEMESTER DESCRIPTIONS 2017-18

Turku University of Applied Sciences | Business, ICT & Chemical Engineering
Lemminkäisenkatu Campus | Chemical Engineering Unit

2. Future Materials and processes: Sustainable Chemistry Semester

Up to 30 ECTS for the autumn semester plus optional courses

Sustainable Packaging, 15 ECTS

The Sustainable Packaging course focuses on designing ecologically and economically sustainable packaging. The students familiarize themselves with the different functions of a packaging as a protecting necessity, an information and brand building media and as a logistical unit. They also learn about different packaging materials, their ecological footprint and recyclability from both marketing, ecological and functionality point of views. During the course, a packaging will be conceived and designed for a chosen product.

Circular Economy in Chemical Engineering, 5 ECTS

In the course the student will understand the possibilities of sustainable use of limited resources in the field of Chemical Engineering.

Literature study in Current Challenges of Circular Economy, 5 ECTS

Innovation project, 5 ECTS

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Additional Recommended Courses (Optional)

Get Finternational, 3 ECTS

The course aims to bring Finnish and international students together and improve their cultural awareness. Cultural awareness means that one has an ability to understand people from different cultures, and it makes the communication between people from different cultural backgrounds easier. The students take part in different kinds of events, which increase their knowledge in intercultural issues and the Finnish society.

Finnish for Exchange students, 3 ECTS

The course is a fun way for the exchange students to get to know Finnish language and Finnish everyday life. After the course students understand basic structures in the Finnish language and are able to cope in everyday situations. The student will be familiar with Finnish as a language (grammar, structure, basic features). He is able to introduce himself, able to ask simple questions and answer to them.

CHEMICAL ENGINEERING SPRING SEMESTER 2018

Future Materials and processes semester: Applied Materials Sciences Semester

Up to 30 ECTS for the spring semester plus optional courses

Innovation project, 10 ECTS

Innovation project is typically a development project implemented in co-operation with a company or another external customer. However, the project may also be a part of Turku University of Applied Science's internal research and development activities or it can be based on a student's or student team's own project or business idea. Also development projects related to different student competitions are applicable.

The final extent, detailed contents, student workload and learning outcomes of the course will be defined on a project basis.

Bioinformatics, 5 ECTS

After the course student can define the concept of bioinformatics. Student can apply internet based biological databases and data management tools.

Contents:

- Introduction to biochemistry, molecular biology and genomics
- DNA databases
- DNA sequence analysis
- Protein databases
- Protein sequence analysis
- Use of protein structure data
- Pair alignment
- Multiple alignment
- Theory and practice of the most common computational tools used in bioinformatics

The course will consist of three modules and two of them have to be taken. One of modules is obligatory for all participants and the other depends on previous studies.

The first module (2 ECTS) provides an introduction to the biochemistry and molecular biology to the student who doesn't have previous knowledge of this field. The student will learn basic concepts and facts of biochemistry and molecular biology which are essential to adopt the basics of bioinformatics.

The second module (3 ECTS, obligatory for all participants) provides an introduction to the emerging technology of Bioinformatics. The student will learn basic concepts and facts of Bioinformatics and its applications in food industry, health services and information technology, for example how microbe species can be identified by its genome sequence. The student will perceive the existence of different internet based tools and databases.

The third module (2 ECTS) is designed to provide deeper insight to the technology of Bioinformatics. This module is for student who has previous studies in biochemistry and molecular biology and has started the course from 2nd module.



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MODULE (A or B or C)

A. Biomaterials and Bioprocesses 1, 15 ECTS

Contents:

- Different biomaterials and their applications
- Basics of tissue engineering
- Basics and basic techniques of genetic engineering
- Essentials of diagnostics
- Concepts and methods in diagnostics

The participants are able to describe specific features of different biomaterials and their applications. The participants understand the basic principles of tissue engineering and they are able to describe specific features of biomaterials used in tissue engineering. The participants are able to describe the essentials of diagnostics and basic concepts and methods of diagnostics and genetic engineering. The participants know the basic principles and methods of genetic engineering.

If the participant enrolls only in the spring semester the first part of the module provided in the autumn (5 ECTS) is conducted by reading the text provided and passing an exam.

B. Materials Technology 1, 15 ECTS

The Materials Technology I Semester focus on understanding the structure of different materials and how it affects to properties. After completing the semester the participants are able to describe the micro and macro molecular structures' effect on material characteristics and behavior and are able to describe the special features of a material. The participants are also able to describe manufacturing techniques and are able to choose the appropriate technique. Furthermore, the participants are able to select the most suitable materials to each application from ecological and resource efficient aspects. The semester includes laboratory analyses and project work. If the participant enrolls only in the spring semester the first part of the module provided in the autumn (5 ECTS) is conducted by reading the text provided and passing an exam.

C. Food Engineering, 15 ECTS

Contents:

- Part 1: Food ingredients and raw materials
- Part 2: Food processes and manufacturing & hygiene in food processing
- Part 3: Laboratory works and analysis of food products

The participants are able to describe main ingredients and composition of food products. The participants know the legislation regarding the composition, serving, packaging and labelling of food.

The participants are able to describe food manufacturing processes from farm to fork. The participants are able to describe the requirements regarding the hygienic food processing. The participants are able to use different food processing equipment and are able to analyze the product using different analysis methods. The participants are to describe how different products stimulate senses and they are able to execute sensory evaluation tests.



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