Catalogue report

LUT School of Engineering Science

Master's Programme in Biorefineries

Master’s Programme in Biorefineries 2018-2019 (120 ECTS)

Facts

• Degree Master of Science in Technology (M.Sc. Tech.), (Diplomi-insinööri in Finnish)
• Higher university degree, gives eligibility to apply for scientific doctoral studies
• Extent 120 ECTS credits
• Duration two years, full-time studies of 60 ECTS per academic year
• MSc in Biorefineries is suitable for distance learning.

Learning Outcomes of the Programme

After completion of the MSc programme in Biorefineries the graduate
• has acquired comprehensive knowledge of the modern biorefining technology, products and raw materials
• has good knowledge of technologies integrated to biorefineries, e.g. waste water treatment
• is able to demonstrate a critical understanding of sustainable solutions and technologies, problem-solving skills and ability to design and develop practical biorefining applications
• has the courage to create innovations and new technical solutions
• possesses project working and communication skills needed in the modern networked environment.

Degree Structure

The Master's degree (120 ECTS) consists of core studies, specialisation studies, minor studies and elective studies. The students of the MSc in Biorefineries specialise in Biobased Process Engineering. The Master's Thesis and Seminar is included in the specialisation studies.

See Uni-portal:
Chemical Engineering

Degree structures

Degree Structure

The Master's degree (120 ECTS) consists of core studies, specialisation studies, minor studies and elective studies.

The students of the MSc in Biorefineries specialise in Biobased Process Engineering. The Master's Thesis and Seminar is included in the specialisation studies, and the Thesis must be written in English in the programmes taught in English.

The MSc in Biorefineries has recommendations on how the students should choose the minor. KeSoD400 Biobased Chemical Engineering or KeSoD500 Advanced Chemistry are not available for the students of this Msc programme. Otherwise, the minor can be selected freely from the minors provided by LUT, or can be studied in another university.
The following minors are suitable for distance learning:
EnDSOEDM Energiatekniikka digitaalisille maisteriohjelmille (minor in Energy Technology, taught in Finnish)
VAKASO Liiketoimintaosaaminen (basic business studies, can be taken in Finnish or in English).
If the total of specialisation studies exceeds 80 ECTS, no minor studies are required.

Electives can be any courses offered by LUT if the required prerequisites are fulfilled. Studies in other domestic or foreign higher education institutions, a max. of 10 ECTS of internship (BJ02A0031 Work Internship in Master's Degree, 2-10 ECTS) or the leadership training provided by the National Forces (Puolustusvoimien johtajakoulutus) may be included in the degree by application. The studies are approved by the Head of degree programme.

Master's Programme in Biorefineries 2018-2019

Degree structure status: accepted

Academic year: 2018-19

Beginning date of the academic year: 01.08.2018

Core Studies (11 - 12 cr)

KeDBiorefCore: Core Studies, 11 - 12 cr
- *Students admitted directly to this M.Sc. programme have to take Orientation to M.Sc. Studies, 1 ECTS, in addition to the other core studies. Accordingly, the amount of core studies is 12 ECTS. Students continuing from the B.Sc. of LUT to this M.Sc. programme take 11 ECTS of core studies.*
  - BJ02A1000: Research Methodology, 5 cr
  - BJ02A0031: Work Internship in Master's Degree, 2 - 10 cr
  - BL20A0910: Technology and Society, 4 cr
- *Choose Orientation to M.Sc. Studies, if you are admitted directly to this M.Sc. programme.*
  - BJ02A0050: Orientation to M.Sc. Studies, 1 cr

Specialisation Studies in Biobased Process Engineering (min 68 cr)

Specialisation in Biobased Process Engineering consists of obligatory specialisation studies (68 ECTS) and alternative specialisation studies (0-30 ECTS). Students may take alternative courses from the list to increase the extent of specialisation studies. The max. amount of specialisation studies is 95 ECTS.

KeDBPESpec: Specialisation in Biobased Process Engineering, 68 - 95 cr
- *Obligatory specialisation studies, 68 ECTS.*
  - BJ02A1081: Project Research Course, 10 cr
  - BJ02A1100: Biorefineries, 5 cr
  - BJ02A3030: Solid-Liquid Separation, 5 cr
  - BJ02A4070: Principles of Thermal Gas-Liquid Processes, 5 cr
  - BJ02A1600: Biobased Materials and Advanced Organic Chemistry, 5 cr
  - BJ02A1200: Bioeconomy, 5 cr
  - BJ02A0041: Master's Thesis and Seminar, 30 cr
  - BH61A060E: Bioenergy for EnTeDI, 3 cr

Courses from the following list can be included to increase the extent of specialisation studies.
BJ02A1090: Environmental and Industrial Analytics, 5 cr
BJ02A3010: Membrane Technology, 5 cr
BJ02A4051: Development of New Sustainable Products and Solutions, 5 cr
BJ02A1500: Current Issues in Enabling Technologies for Circular Economy, 5 cr
BJ03A1010: Introduction to Advanced Water Treatment, 5 cr
BJ03A1020: Biological Waste Water Treatment, 5 cr

Minor Studies (min 20 cr)

The minor studies can be selected freely from the minors provided by LUT, or they can be studied in another university. However, the minors in Advanced Chemistry or Biobased Chemical Engineering are not available for the students of this M.Sc. programme.

The following minors are suitable for distance learning:
EnDSOEDM Energiatekniikka digitaalisille maisteriohjelmille (minor in Energy Technology, in Finnish only)
VAKASO Liiketoimintaosaaminen (Basic business studies).

If the total of specialisation studies exceeds 80 ECTS, no minor studies are required.

Elective Studies

Choose enough courses to attain a min. of 120 ECTS in the M.Sc. degree. Electives can be any courses offered by LUT if the required prerequisites are fulfilled. Studies in other domestic or foreign higher education institutions, the leadership training provided by the National Defence Forces or internship (BJ02A0031 Work Internship in Master's Degree, a max. of 8 ECTS) can be included in the degree by application; the studies are approved by the Head of Degree Programme.

Courses and study modules not included in degree structures

The MSc in Biorefineries has recommendations on how the students should choose the minor.
KeSoD400 Biobased Chemical Engineering or KeSoD500 Advanced Chemistry are not available for the students of this Msc programme.
Otherwise, the minor can be selected freely from the minors provided by LUT, or can be studies in another university.

The following minors are suitable for distance learning:
EnDSOEDM Energiatekniikka digitaalisille maisteriohjelmille (minor in Energy Technology, taught in Finnish)
VAKASO Liiketoimintaosaaminen (basic business studies, can be taken in Finnish or in English).

If the total of specialisation studies exceeds 80 ECTS, no minor studies are required.

See all minors offered at LUT: a separate study guide "Minor studies, 2018-19"/"Sivuopintokokonaisuudet 2018-19".

VAKASO: Business Knowledge, online studies, 25 - 40 cr
If you wish to get a Minor package, Vibu is the obligatory course
VA10A1700: Understanding and Managing a Business as a Dunamic Whole - VIBU Business Simulation Game, 5 cr

Please see UNI-portal, Studies - Flexible studies, LITO for enrolment
VA10A1000: Basics of Management and Organisations, 5 cr
VA10A1100: Basics of Marketing and Sales, 5 cr
VA10A1200: Introduction to Accounting and Financial Management, 5 cr
VA10A1300: Introduction to Business Law, 5 cr
VA10A1400: Economics and the Business Environment, 5 cr
VA10A1500: Introduction to Entrepreneurship, 5 cr
VA10A1600: Introduction to Corporate social responsibility, 5 cr
EnDSOEDM: Energiatekniikka digitaalisille maisteriohjelmille, 21 cr
Sivuopintokokonaisuus 21 op. Tarkoitettu LESin ja LENSin digiohjelmien opiskelijoille.
BH40A0010: Introduction to Energy Technology for EnTeDI Students, 4 cr
BH40A0210: Energy-efficient Pumps, Fans and Compressors, 4 cr
BH40A0220: Efficient Power Plants and Waste Heat Recovery, 5 cr
BH61A020E: Energy Economics for EnTeDI, 5 cr
BH61A060E: Bioenergy for EnTeDI, 3 cr

Course descriptions

Descriptions of courses and study modules included in the degree structures

KeDBiorefCore: Core Studies, 11 - 12 cr

Validity: 01.08.2018 -
Form of study: Basic studies
Type: Study module
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

No course descriptions.

Students admitted directly to this M.Sc. programme have to take Orientation to M.Sc. Studies, 1 ECTS, in addition to the other core studies. Accordingly, the amount of core studies is 12 ECTS. Students continuing from the B.Sc. of LUT to this M.Sc. programme take 11 ECTS of core studies.

BJ02A1000: Research Methodology, 5 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:

This course prepares for the Master thesis.
This course is mainly directed to the students in the digital Master's Programme in Biorefineries.

Year:

M. Sc. (Tech.) 2

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.) Eeva Jernström

Aims:

By the end of the course, the student is expected to be able to
- search scientific knowledge
- assess the reliabilityof different sources of knowledge and data
- make a researchplan in order to reach the objectives
- write a scientific report or article.

Contents:

This course includes the use of scientific databases to find research results and knowledge including critical source assessment. The students will make individual or group workshops on selected research topics where they find knowledge of what is known today and based on that formulate the knowledge gap and relevant objectives for the research they have in mind, identify the relevant scientific methods, make their own research plan to study a pre-selected topic. They understand how to process the results in order to find the facts. The presentation of the research results in a scientifically credible way is part of the course.

Teaching Methods:

Moodle assignments,personal assignments. Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Numerical 0-5

Course Materials:

To be announced later.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

max 5

BJ02A0031: Work Internship in Master's Degree, 2 - 10 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:

Application and report forms available in UNI.

Year:

M.Sc. (Tech.) 1-2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ritva Tuunila

Aims:

After the module a student - has become acquainted with an industrial working environment in the field of chemical or process industry - has obtained experience in practical application of his/her knowledge and skills - has seen operation of production processes and equipment
of his field in practice - can analyze the practical role of knowledge and skills he/she has learned in his /her studies.

Contents:

Practical operating, research, design or quality control work in chemical or process industry, laboratory or engineering company.

Teaching Methods:

Practical training of 4 – 7 weeks in industry. Written report including a description of working environment, tasks of the student and their contribution to the goals and operation of the company. First 2 ECTS credits: applying for a job and recruiting 10 h, tasks connected to
starting an employment relationship (e.g. orientation, the rules of the employment relationship and the work place) 15 h, observing (while working) how the working community operates (e.g. how work /production is organized, supervision, the working manners of the working community/teams, the social environment of the work place) 22 h, a written internship report 5 h (2-3 pages), total 52 h. 3-10 ECTS credits: having different tasks in a company 26-208 h (1 ECTS credit/26 h).

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Pass/Fail, internship report 100%.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BL20A0910: Technology and Society, 4 cr

Validity: 01.08.2017 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Johanna Naukkarinen

Note:

Course is taught fully on-line and continuously rolling (no tie to the LUT periods)
Enrolment by e-mail to post-doctoral researcher Johanna Naukkarinen.

Year:

M.Sc. (Tech.) 1-2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Johanna Naukkarinen, D.Sc. (Tech.), Post-doctoral researcher

Aims:

Upon completion of the course the student will be able to:
1. understand and explain the general interplay between technology and society
2. analyze the possible effects of different technologies on society
3. evaluate how the societal factors may affect the development and dissemination of different technologies.

Contents:

Social and economic factors affecting the development and adoption of technologies, mechanisms of interplay between society and technology, predicting the potential impact of technology.

Teaching Methods:

The completion of the course consist of completing the learning tasks in a topic related massive open online -course (MOOC) of teacher's choice and keeping a learning diary. The MOOC will be announced at the beginning of the academic year. Formal passing or a certificate on completion of the MOOC is not required, but student has to proof that all the required assignments have been sufficiently done.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Grading on a scale 0-5
50 % of the assessment is based on the quality of MOOC learning assignment and 50 % on the quality of the learning diary. More exact assessment matrix can be found on course Moodle-area.

Course Materials:

The content of the chosen MOOC, article(s) provided in the Moodle-area

Limitation for students? (Yes, number, priorities/Leave empty):

Primarily for M.Sc students in electrical engineering, energy technology and circular economy.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

Choose Orientation to M.Sc. Studies, if you are admitted directly to this M.Sc. programme.

BJ02A0050: Orientation to M.Sc. Studies, 1 cr

Validity: 01.01.2017 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Ritva Tuunila

Note:

Teaching is organized jointly for all Master's Programmes in Chemical Engineering.

Year:

M.Sc. (Tech.) 1

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech) Ritva Tuunila

Aims:

After completing the course, the student - is familiar with the formal requirements of his/her studies and with the campus services and their appropriate use during his/her studies - is aware of information security issues - possesses good practices for safe laboratory working.

Contents:

During the course the student will learn about the relevant instructions affecting his/her studies and how to generate a personal study plan. The student will familiarize him/herself with the relevant staff of his /her degree programme and with the services provided by e.g. the Library and Study Services. The student will learn about the relevant laboratory safety instructions.

Teaching Methods:

Lectures 6 h, independent assignments 10 h, self-study 10 h. Total workload 26 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Pass/fail. After completing the course assignments acceptably, the student passes the course.

Course Materials:

Moodle material

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

max 5

KeDBPESpec: Specialisation in Biobased Process Engineering, 68 - 95 cr

Validity: 01.08.2018 -

Form of study:
Type: Study module
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

No course descriptions.

Obligatory specialisation studies, 68 ECTS.

BJ02A1081: Project Research Course, 10 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:
Starting from the academic year 2019-2020.
Year:
M.Sc. (Tech.) 2
Period:
1-2
Teaching Language:
English
Teacher(s) in Charge:
Mikko Huhtanen, D.Sc.(Tech), Research Engineer
Aims:
Upon completion of the module, the student will be able to -Plan and implement a research project -Use the available literature in project research -Act as a researcher in a project group and evaluate own performance -Communicate in a professional way in the project group -
Interpret and report the project results according to good scientific practices-Present the project results according to good scientific practices.
Contents:
Planning and implementing of a research project in the area of chemical technology, especially in industrial chemistry or separation technology. The project work includes acquisition of the needed information, planning and implementing the experimental or modelling work and reporting of the results according to good scientific practices both in written form and in oral presentations. The introductory lectures focus on scientific research and reporting practices as well as design of experiment.
Teaching Methods:
Lectures, exercises and seminars, 1. and 2. period, the first 2 hours of lectures and seminars obligatory. Literature work 40 hours (self-study). Project work including meetings, laboratory work and reporting according to the given instructions 192 hours (self-study).
Total workload 260 h.
Examination in Examination schedule (Yes/No):
No
Examination in Moodle (Yes/No):
No
Examination in Exam (Yes/No):
No

Assessment:

0-5, personal literature work 30%, working in the research project 70%.

Course Materials:

Lectures, literature to be announced during the lectures.

Prerequisites:

Bachelor in Chemical Engineering.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BJ02A1100: Biorefineries, 5 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Engineering Science

Grading: Study modules 0-5,P/F

Note:

The course is suitable for distance learning.
This course is mainly directed to the students in the digital Master's Programme in Biorefineries.

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.) Eeva Jernström

Aims:

By the end of the course, the student is expected to be able to
- Understand the basic concept of a biorefinery and the various alternative concepts
- Understand the main biorefining processes, e.g. kraft pulp process, production of biofuels, further processing of different bio-based raw materials.
- Have general knowledge of current biorefinery products, their applicability to different end-uses
- Apply management and cooperation skills in implementation of project work in combined virtual and f2f working environment.

Contents:

The course covers the most typical biorefining-processes currently in use as well as some selected future processes. Topics include raw materials for biorefineries, processes and process conditions, most common biorefinery products and their end-uses. The course includes Moodle assignments and project work. The project work will be carried out individually or in small groups that will define their own target, and working methodology. The course is suitable for distance learning.

Teaching Methods:

Tutorials and workshops 5 h, 2nd period. Project work 50 h. Self Study of predefined material 75 h. Total workload 130 h.

The course includes Moodle assignments and project work. The project work will be carried out individually or in small groups that will define their own target, and working methodology

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, Moodle assignments 60 %, Project work 40 %.

Course Materials:

Will be announced later.

Limitation for students? (Yes, number, priorities/Leave empty):

Yes, this course is mainly directed to the students in the digital Master's Programme in Biorefineries.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

max 5

BJ02A3030: Solid-Liquid Separation, 5 cr

Validity: 01.08.2014 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Antti Häkkinen, Ritva Tuunila

Note:

Distance learning possible, except for laboratory work measurements, which are arranged for distance learning students in fixed contact teaching days at LUT.

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Antti Häkkinen, Associate Professor, D.Sc. (Tech) Ritva Tuunila

Aims:

After completing the module the student can: - know the fundamental phenomena insolid-liquid separation - name different methods and equipment used for solid-liquid separation - select and size suitable equipment for separation processes based on suspension properties and data from laboratory tests - explain the effects of the characteristics of the solid material and the liquid on the separation and post treatment processes - define different filter media used in filtration and make a preliminary selection of a medium for different cases - perform an experimental test in laboratory scale - write a scientific report.

Contents:

The topics are as follows: Fundamentals of solid-liquid separation, filtration methods, operation of filters, cake formation and washing, deliquoring, design and modeling of filters and scale-up. Filter media and blinding. Experimental design in filtration test work.

Teaching Methods:

Lectures 18h, exercises 18 h, filtration laboratory work + report 20 h, literature review 20 h, Self-study 54 h.
Total workload 130 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, Written exam or assignments 60%, laboratory work 20%, literature review 20%.

Course Materials:

Additional material will be informed at lectures.

Prerequisites:

Knowledge of the fundamentals of particle characterization and mechanical separation methods.
Recommended literature: Fundamentals of Particle Technology by Richard Holdich, Chapters 1–8.

Places for exchange-students? (Yes, number/No):

Yes, max. 10

Places for Open University Students?(Yes, number/No):

Max 5

BJ02A4070: Principles of Thermal Gas-Liquid Processes, 5 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Year:

M.Sc. (Tech.) 1

Period:

2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Tuomas Koiranen

Aims:

Student understands distillation, evaporation and gas scrubbing technologies, including equipment structures and sizing principles. Student can design gas-liquid contactors by hand, is able to form mathematical calculation models, and can apply equations for computer simulation.

Contents:

Gas-liquid contactor theory, sizing principles and equations, calculation examples, computer exercises. Distillation, evaporation, gas scrubbing.

Teaching Methods:

Combined lectures and exercises 10 h, homeworks 72 h, self learning 48 h.
Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

Examination grading scale 0-5. minimum 75 % of homeworks correct, returning to moodle.

Course Materials:

Course books:
Niket S. Kaisare, Computational Techniques for Process Simulation and Analysis Using MATLAB®, Taylor&Francis, 2017
Hussein K. Abdel-Aal, Chemical Engineering Primer with Computer Applications, Taylor&Francis, 2016
Felder, R.M., Elementary Principles of Chemical Processes, Wiley, 2004

Prerequisites:

BM20A1501 Numerical Methods or equivalent, BM20A4301 Introduction to Technical Computation or equivalent

Places for exchange-students? (Yes, number/No):

max 10

Places for Open University Students?(Yes, number/No):

max 5

BJ02A1600: Biobased Materials and Advanced Organic Chemistry, 5 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Year:

M.Sc. (Tech.) 1

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Arto Pihlajamäki, D.Sc. (Tech.), Researcher/Teacher
Tiina Virtanen, M.Sc. (Tech.), Junior Researcher

Aims:

By the end of the course, a student is expected to:
- gain the basic chemical and technological understanding of the production of most important bioproducts from renewable resources
- be able to apply fundamental concepts of organic chemistry into application of biopolymers and their reactions.

Contents:

This course contains two modules. Biobased Materials module will introduce novel biomaterials and focus on properties of biobased polymers, their processing, reactions and applications. Advanced Organic Chemistry module gives extended knowledge in the structure and reactivity of organic biomolecules. There are lists of literature recommended for each module. Students will work in small groups on selected topics.

Teaching Methods:

Moodle lessons: Module 1 60 h, Module 2 60 h, 4th period. Quizzes and activities in Moodle 10 h. Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5, Moodle exam, assignments and fulfilled activities in Moodle, project work reports in Modules 1 and 2.

Course Materials:

To be announced.

Prerequisites:

BJ01A1040 Orgaanisen kemian perusteet (Basic Organic Chemistry) or equivalent knowledge.

Limitation for students? (Yes, number, priorities/Leave empty):

Yes, 50, Students in Chemical Engineering M.Sc. programme.

Places for exchange-students? (Yes, number/No):

max 5

Places for Open University Students?(Yes, number/No):

max 5

BJ02A1200: Bioeconomy, 5 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:

This course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.), Eeva Jernström
Professor, D.Sc. (Tech.) Mika Sillanpää

Aims:

By the end of the course, the student is expected to
- gain the basic understanding of various perspectives of bioeconomy
- gain updated knowledge of modern biorefineries and the basic prerequisites for operation and sustainable business.

Contents:

The study entities are: The multidimensional impact of bioeconomy on Europe, The implementation of bioeconomy, the sustainability – all three dimensions - aspects of bioeconomy. The course is carried as assignments based on selected topics from the book and additional material. Course is planned for distance learning.

Teaching Methods:

Individual studying and assigments based on the book. Moodle is used as the learning platform.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, Moodle assigments 100 %.

Course Materials:

Book: A Sustainable Bioeconomy The green industrial revolution by Professors Mika Sillanpää and Chaker Ncibi.
Other related material announced later.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

max 5

BJ02A0041: Master's Thesis and Seminar, 30 cr

Validity: 01.08.2017 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Engineering Science

Grading: Study modules 0-5,P/F

Teachers: Ritva Tuunila

Note:

Teaching will start in period 1. Thesis work will mainly be done in periods 3-4.
All students planning to do their Master's thesis in the academic year 2018-2019 should enroll to the course in WebOodi before the beginning of the autumn semester.

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Head of the degree programme, supervisor of thesis work

Aims:

Upon completion of the module, the student will be able to: - define a research problem or design task - select appropriate theories and methods for a restricted research problem or design task in the field - can find and use critically data, information and knowledge in the
field, and estimate their reliability - apply his/her chemical engineering knowledge to solve a restricted research problem or carry out a design task - apply his creativity to find new solutions or in best case to generate a new theory or new technology - report the results in
writing and orally and participate in a scientific discussion.

Contents:

The thesis is a research or design project. Students must demonstrate the ability to complete the project independently and following a plan. A report is prepared following the LUT instructions for the Master's thesis.

Teaching Methods:

Lectures 12 h. The thesis is connected to a seminar with other thesis students and their instructors. Seminar practices are announced separately each academic year.
Total workload 780 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, Master's thesis 100%.

Course Materials:

Moodle material

Prerequisites:

B.Sc. degree

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BH61A060E: Bioenergy for EnTeDI, 3 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F

Note:

Only for the students of EnTeDI and Biorefineries M.Sc. programmes.

Year:

M.Sc. (Tech.) 1

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Tapio Ranta, D.Sc. (Tech.), Professor

Aims:

Upon completion of the course the student will be able to understand the meaning of bioenergy, alternative biomass resources, supply methods, refining and end-user applications; describe the quality properties of solid biofuels and how they are measured and evaluated by using standards; and explain the meaning of sustainability in bioenergy systems.

Contents:

The role of bioenergy in the EU energy policy, incentive programmes and future plans. Raw-material sources of bioenergy, potential resources and current use. Biomass supply systems and logistics. Refined biofuel commodities, biogas and liquid biofuels. Biomass international trade. Quality properties of solid biofuels, quality measurement and standards. Sustainable bioenergy.

Teaching Methods:

Independent studies in Moodle, Exercises in Moodle.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Evaluation is based on exercises in Moodle 100%, Pass/Fail.

Course Materials:

Study materials, including the lecture material, will be listed in Moodle.

Limitation for students? (Yes, number, priorities/Leave empty):

Yes, only for the students of EnTeDI and Biorefineries M.Sc. programmes.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

Courses from the following list can be included to increase the extent of specialisation studies.

BJ02A1090: Environmental and Industrial Analytics, 5 cr

Validity: 01.01.2017 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Engineering Science

Grading: Study modules 0-5,P/F

Teachers: Satu-Pia Reinikainen, Eeva Jernström, Maaret Paakkunainen

Note:

The course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Satu-Pia Reinikainen, D.Sc. (Tech.), Professor
Maaret Paakkunainen, D.Sc. (Tech.)
Eeva Jernström, D.Sc. (Tech.)

Aims:

By the end of the course, the student is expected to be able to
- understand role and state-of-art of analytics in environmental and industrial contexts
- understand the effect of digitalization as the 4th industrial revolution
- be able to apply process management skills in implementation of project work.

Contents:

Main themes addressed are reliable sampling, traceability of measurements, modern instrumentation, data handling, process and environmental control/monitoring, and license to operate. Students will carry out a project work on one of these topics, report and present it as the visual synthesis. In addition a study visit aiming at
improved understanding of analytics will be carried out with a problem based learning procedure. Course contains tutorial lectures on the topics, hands on workshops on sampling, statistical process monitoring, and study visits.

Teaching Methods:

8 h of Tutorials, 2 h Study visit, 20 h Online workshops, 30 h Project work, 70 h Independent work. Total workload 130 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

Yes

Assessment:

Numerical assessment (0-5); 40 % Electronic or Moodle Exam, 30 % Project Work, 30 % Other Homework.

Course Materials:

To be announced.

Places for exchange-students? (Yes, number/No):

max 15

Places for Open University Students?(Yes, number/No):

max 5

BJ02A3010: Membrane Technology, 5 cr

Validity: 01.08.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Engineering Science

Grading: Study modules 0-5,P/F

Teachers: Arto Pihlajamäki, Mari Kallioinen, Mika Mänttäri

Year:

M.Sc. (Tech.) 1

Period:

INT. 43 (lectures) + period 2 (laboratory work + seminars).

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. Mika Mänttäri, Associate Professor, D.Sc. Mari Kallioinen, Associate Professor, D.Sc. Arto Pihlajamäki

Aims:

At the end of the course a student is expected to know how to: - explain the basic terms and membrane processes - interpret observed phenomena in the separation process and their influence to the separation process - compare the feasibility of membrane materials, modules
and manufacturing processes - choose the most appropriate membrane and membrane process for a separation process - identify the possibilities, benefits and limits of membrane processes.

Contents:

Membrane processes (micro-, ultra- and nanofiltration, reverse osmosis, pervaporation, etc.). Manufacturing membranes, membrane materials and structures, phenomena in membrane processes (fouling, concentration polarisation, etc.). Modules. Separation mechanisms.
Characterisation of membranes. Applications.

Teaching Methods:

Lectures, exercises and seminar presentations 21 h, self-study (Moodle) 50 h, seminar work and laboratory works and their reporting 30 h, preparation for exam and exam 29 h.
Total workload 130 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, written examination 70%, seminar and laboratory works 30%. Possible extra points from Moodle-assessments (0-10).

Course Materials:

Lecture presentations and additional material (Moodle): book chapters and articles.
Mulder, M., Basic Principles of Membrane Technology, 2nd ed., Kluwer, 1996/2003.

Places for exchange-students? (Yes, number/No):

max 15

Places for Open University Students?(Yes, number/No):

No

BJ02A4051: Development of New Sustainable Products and Solutions, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Katriina Mielonen, Sami-Seppo Ovaska

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

D.Sc. (Tech.) Katriina Mielonen

Aims:

To give an overview about the use of modern biochemicals such as nanocellulose, hemicellulose lignin in various applications.
After the completing the module, the student ought to:
- describe how various renewable resources is utilized in various applications.
- have an insight into material and molecular design and its role for the end product performance
- describe how biomaterials, and in particular wood derived, are used for example in food, pharmaceuticals, composites, and smart materials.

Contents:

Use of fibers, cellulose (derivatives), lignin in various non-paper applications. Fundamentals about biomaterial design, modification, synthesis and use in various products. Chemical and mechanical modification, separation methods, mixing and drying methods. Product specification requirements and characterization methods.

Teaching Methods:

Lectures 28 h, self studies 42 h, project work 40 h. Total workload 130 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5. 70% written examination 30% project work.

Course Materials:

Lecture material will be distributed via Moodle.

Places for exchange-students? (Yes, number/No):

max 5

Places for Open University Students?(Yes, number/No):

max 5

BJ02A1500: Current Issues in Enabling Technologies for Circular Economy, 5 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:

The course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Jutta Nuortila-Jokinen, Docent, D.Sc., Associate professor

Aims:

The aim of this new course is to familiarise students widely into circular economy with the focus on the current and novel technologies that enable the transformation from linear to circular economy.

Contents:

The detailed content will be announced later. The course will be executed in co-operation with Oulu University.

Teaching Methods:

The course is 100 % digitalized.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5. Moodle exam and/or assignment. Details to be announced later.

Course Materials:

To be announced later.

Places for exchange-students? (Yes, number/No):

15–

Places for Open University Students?(Yes, number/No):

15–

BJ03A1010: Introduction to Advanced Water Treatment, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Mika Sillanpää, Eveliina Repo

Note:

Suitable also for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Assistant professor (tenure track) Chaker Necibi

Aims:

By the end of the course, the student is expected to be able to: - describe biological, chemical and physical treatment of water emissions - suggest a suitable treatment method based on the composition of the wastewater - solve simple mathematical problems related to water
treatment and water composition - solve case studies as a group work.

Contents:

Learning the principles of water treatment techniques such as biological methods, coagulation, flocculation, adsorption, advanced oxidation processes (AOPs), membrane technology, magnetic treatment, and electrochemical methods. Comparison of different water treatment techniques will be considered in the course from economic, environmental and technical sides. Case exercises will be conducted as a group work. Weekly homework exercises related to the topic of each week will be calculated in the class or individually.

Teaching Methods:

Lectures 14 h, exercises 8 h, case studies 16 h, 1st period. Preparation for the exam, case reports, independent workload 92 h.
Total workload 130 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5, exam 65%, case studies 25% and exercises 10%.

Course Materials:

Lecture notes. Moodle. Literature recommended by the teacher.

Places for exchange-students? (Yes, number/No):

max 15

Places for Open University Students?(Yes, number/No):

max 5

BJ03A1020: Biological Waste Water Treatment, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Mari Kallioinen

Year:

M.Sc. (Tech.) 2

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.) Mari Kallioinen

Aims:

After completing the course the student will have the basic knowledge of aerobic and anaerobic biological treatment processes. He/she will master the basic principles, terminology, reactor configurations, and related calculations of both processes. He/she understands the context of the biological waste water treatment processes to recycling of nutrients, bioenergy production and recovery and production of value-added compounds from waste waters and organic wastes. In addition, the student will after completing the course use the available literature in his/her research work, act as a part of a project work group and evaluate his/her own performance and communicate in a professional way in the project group.

Contents:

Biological wastewater treatment methods, professional terminology, built-up ecosystem, desired metabolism and reactor types, selection of microbes and enrichment, influence of temperature and other conditions on above-mentioned factors, basic knowledge on the biological methods used in removal of carbon, nitrogen and phosphorous, aerobic and anaerobic wastewater treatment, process alternatives and technologies, designing and operating modes of processes, controlling and optimization of processes, novel technologies, recovery of valuable products from waste originating (secondary raw materials) raw materials, aerobic and anaerobic technologies in the treatment of sewage sludges and organic wastes.

Teaching Methods:

Lectures and seminars 28 h, independent self-study (Moodle) 30 h, group works and literary works 52 h, preparation for exam and exam
20 h. Total workload 130 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5 exam 70 %, Moodle exams and graded group and literary groups 30 %.

Course Materials:

Lecture material and additional material (Moodle), literature announced during the course.

Prerequisites:

BJ03A01010 Introduction to Advanced Water Treatment is recommended or corresponding knowledge.

Places for exchange-students? (Yes, number/No):

max 15

Places for Open University Students?(Yes, number/No):

max 5

Descriptions of courses and study modules not included in the degree structures

VAKASO: Business Knowledge, online studies, 25 - 40 cr

Validity: 01.08.2017 -
Form of study:
Type: Study module
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F

Note:
Only for the students of technology, the business administration students can not take these courses.
Please note the LITO-course enrollment deadlines, they differ from the LUT enrollment. More information at UNI-portal: Flexible Studies.
Aims:
After completing the courses, the student will understand how a company operates as an entity and is able to evaluate his/her own role as an expert in the entity. The student will be capable of applying the focal concepts of business and economics in their own work. In addition, the student will be able to solve problems as part of a diverse team.

If you wish to get a Minor package, Vibu is the obligatory course

VA10A1700: Understanding and Managing a Business as a Dunamic Whole - VIBU Business Simulation Game, 5 cr

Validity: 01.08.2017 -
Form of study: Online-studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F

Note:

The LITO courses are organised in co-operation with multiple universities. To enable registering credits when the course is completed, it is necessary to transfer data about the student from their home university to the university that is responsible for organizing the course. The data to be transferred

consists of: name, gender, nationality, e-mail address, personal identification number and the home university. Data that is classified as secret is not transferred. Without data transfer it is not possible to have the course credits registered.
Only for students of technology.

Period:

October 2018, February and April 2019.

Teaching Language:

Finnish

Teacher(s) in Charge:

Eeli Saarinen, Kaisa Koivisto

Aims:

After completing the course, the student will:
- understand how different areas in business studies are connected in the entity of enterprise functions and in making a profit
- understand the role of ERP and its meaning in managing a company
- apply different business analysis tools in planning and managing a business and understand the essential role of strategy in the process

A central part of the course is to see the business as a whole: the student will understand why it's not practical to optimize single functions separately and why the management needs to have a holistic perspective of the company.

Contents:

- The foundation for this course is a business simulation game, which engages the students in real-time decision-making and provides them with various tasks related to various business topics.
- The participation takes place in small virtual groups, where the team members may all come from different universities.
- The thematic core for the simulation is supply chain management and the entity formed by different functions of a company. The relevant themes include several areas of cross-company logistics: purchase, inventory management, delivery, customer relations, and the reporting related to these topics. The course emphasizes effective management of the supply chain and the impact it has on the company's profit and cash flow.
- During the course, the students are also introduced to the dynamics of supply chains in company networks, where the students' company is a part of a network of suppliers, competitors, and customers.
- In addition, the course gives an overall picture of the role of a company's information systems in steering the business as a whole: how the different functions utilize common enterprise resource-planning and how the ERP works as an essential tool in decision-making.
- The theoretic material and the exercises distributed in the course are related to the abovementioned supply chain management and other LITO learning themes.

Teaching Methods:

The assignments of the course are mainly related to the planning of the simulation company operations and to the analysis of materialized operations. These include:
- developing a business plan
- analyzing the profitability in light of various parameters and reporting these to the different stakeholders
- various strategic analyses on the company operations and on the competitive situation (SWOT, Pester, bench-marking)
- calculations related to the company's basic supply chain and ERP parameters
- income statement and profitability, gross margin, and cash flow analysis (the essential parameters covered in INTRODUCTION TO FINANCIAL ADMINISTRATION course)
- market analysis
- annual report

Furthermore, a written assignment on team dynamics and a team functionality analysis and reflections.
Getting acquainted with the theoretical supplementary material 50 h
Planning and analysis tasks 60 h

Business simulation game 4 x 6 h = 24 h
Total 134 h (5 ECTS)

Assessment:

A numeric evaluation scale of 1-5 will be in use. The performance will be rated based on the assignments given out during the course.

Course Materials:

Simulation game instructions, description on the simulation environment, self-learning videos, course hand-out, and selection of other articles (announced later)

Prerequisites:

The course serves as a capstone, bridging together the other modules in the entity. The course provides an overall picture of the business dynamics and explains how the different fields in business studies are related to it.

It is recommended that before taking this course, the student has taken at least the following LITO courses: Introduction to accounting and financial management and Basics of management and organisation.

Please see UNI-portal, Studies - Flexible studies, LITO for enrolment

VA10A1000: Basics of Management and Organisations, 5 cr

Validity: 01.08.2017 -
Form of study: Online-studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F

Note:

Only for technology students

Period:

September-October 2018

Teaching Language:

Finnish or English

Teacher(s) in Charge:

Susanna Kultalahti

Aims:

On successful completion of the course, the students will be able to:
- name the key concepts and theories in the areas of organization, management and leadership
- name the key concepts and evaluate the functions of human resource management
- understand major tools of strategic management
- understand business in the network of global interactions
- apply theory on practical leadership and management situations

Contents:

Organizations and organizational behavior:
- Organizational structure
- Organizational culture
- Organizational life

Management and leadership:
- The development of leadership thinking and leadership theory
- Key concepts of management
- Leading culture, innovation and change

Strategic thinking and strategic tools:
- The development of strategic thinking and strategy models
- Strategic tools
- Strategic management in global environment
- Ethics, corporate social responsibility
Human resource management:
- Human resource management
- Leading individuals, teams and groups
- Motivation and coaching
- Learning organization

Teaching Methods:

Assignments 134h
Online lectures 10
Portfolio and peer feedback 50
Vocabulary assignment (key concepts) 10
Literature (approximately 268 pages) 64
Total 134 (5 ECTS)

Assessment:

numeric, scale 1-5.

Course Materials:

Stephen P. Robbins, Tim Judge: Essentials of Organizational Behavior, Global Edition, Dawsonera e-Book collection. The course instructors may ask students to read additional literature (e.g. articles). Details of additional readings are given at the beginning of the course.

VA10A1100: Basics of Marketing and Sales, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Note:

The LITO courses are organised in co-operation with multiple universities. To enable registering credits when the course is completed, it is necessary to transfer data about the student from their home university to the university that is responsible for organizing the course. The data to be transferred consists of: name, gender, nationality, e-mail address, personal identification number and the home university. Data that is classified as secret is not transferred. Without data transfer it is not possible to have the course credits registered.
Only for students of technology.

Period:

March- April 2019

Teaching Language:

Finnish or English

Teacher(s) in Charge:

Minna-Maarit Jaskari ja Hanna Komulainen

Aims:

Upon completion of the course, students will be able to:
- describe the role of marketing in an organization and identify the significance of customer-orientation in both development of the organization and personal actions
- apply key concepts of marketing (e.g., customer-perceived value, value creation process, brand, marketing mix and segmentation) in decision-making and in the evaluation of made decisions

- describe the diverse emphasis of B-to-B and consumer marketing and the key characteristics of both logics
- identify and utilize key marketing communication channels in the fickle business environment
- understand the sales process in its entirety and the content of different parts of the sales process in practice in both consumer and in B-to-B sales

Contents:

Key marketing concepts, definitions and phenomena now and before, such as value, value creation and marketing mix
- Understanding these concepts in diverse contexts: the differences between consumer and B-to-B logics
- Customer-centric thinking and value creation
Customer-oriented strategy in a changing business environment
- The key concepts and phenomena in consumer marketing
- B-to-B marketing and organizational buying behavior
- Marketing communication channels and contents
- Sales process in consumer and B-to-B contexts as well as personal sales and interaction skills at different phases of the sales process

Teaching Methods:

Students will complete weekly exercises and the final essay. In addition, a customer experience exercise is done to analyze and evaluate the sales process and a salesperson's interaction skills from the customer perspective. Assignments are done both individually and in groups.
Weekly exercises 42 h, independent reading of the course materials 73 h, final essay 18 h, feedback 0,5 h. Total 133 h (5 ECTS)

Assessment:

Students complete the course by writing a final essay. In the essay, the students analyze a firm that they have chosen for weekly exercises by applying the theoretical content of the course. Grading is from 1 to 5. In addition, weekly exercises are evaluated as a pass/fail.

Course Materials:

The teachers will specify the literature at the beginning of the course.

VA10A1200: Introduction to Accounting and Financial Management, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Note:

Only for students of technology.

Period:

January-February 2019.

Teaching Language:

Finnish

Teacher(s) in Charge:

Teemu Malmi and Seppo Ikäheimo

Aims:

After completing the course, the student will be able to:
-identify the role of accounting in organizations and society
- know the content and structure of financial statements and the purposes statements can be used for
- read financial statements and calculate and interpret key financial ratios
- understand the key role of accounting systems in providing information for decision-making within organizations and how this information can be used to manage both the organization and the behavior

of individuals within the organization
- evaluate and assess the financial profitability of products, services, customers and investments and make sound business decisions based on this information
- identify the role of corporate governance in organizations and society
- know the basic questions of corporate finance and identify answers to those
- use basic functions of Excel

Contents:

The concept of accounting and its meaning in firms and society
The content and differences of management and financial accounting.
The course covers the following themes in the area of financial accounting:
- The goals, contents and structure of statements; central accounting principles, basics of bookkeeping
- Balance sheet, income statement, cash flow statement and their connections
- International Financial Reporting Standards (IFRS), principles of group accounts
- Connections between income statement and taxation
- Financial statement analysis

Management accounting:
- Accounting for strategic management; Implementing strategy, scorecards
- Management of a profit center organization (including Economic Value Added and WACC)
- Budgeting and budgetary system
- Cost accounting tasks and cost concepts, product, service and customer profitability
- Ad hoc calculations, cost-volume-profit analysis and pricing
- Estimating the profitability of investments
- Key concepts of corporate governance

Teaching Methods:

Most of the themes contain short introductory videos, readings material and exercises. Some of the themes include assignments that are evaluated.
Video materials 10 h
Assignment 45 h
Reading course book 35 h
Preparing for the exam 33 h
Total 123 h (5 cr)

Assessment:

Evaluation: numeric scale 1-5
Assignments 20 %
Exam 80 %

Course Materials:

Ikäheimo, Malmi & Walden, Yrityksen laskentatoimi, 2016.

Prerequisites:

Secondary school mathematics

VA10A1300: Introduction to Business Law, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Note:

Only for students of technology.

Period:

November-December 2018.

Teaching Language:

Finnish

Teacher(s) in Charge:

Martti Nieminen, Jenni Similä, Anu Lähteenmäki-Uutela, Tuomas Paulin.

Aims:

After the course, the student will:
- know the main features of the Finnish legal system and its connections to other legal systems, most important legal concepts and structures particularly from the business perspective
- know different sources of law and the fundamentals of how to solve legal problems
- understand the role of law as a system that steers the society and its importance in the core of business activities
- recognize the possibilities and limitations that law provides for business
- understand how and why a company should prepare for the legal risks related to business, how to manage the risks, and how to take the legal aspect into account in the firm's decision making
- know the basic content of key areas of business law. In particular, they are: company law, contract law, immaterial law, labour law, competition law, and tax law.

Contents:

- Structure of the Finnish legal system and its relationship to other legal systems
- Basic legal concepts and structures
- Relevance of law in the core of societal decision-making and business activities
- Risks and possibilities that law provides for business
- Legal risk management in business
- Sources of law and their mutual relationship
- The fundamentals of solving legal problems
- Basics of company law
- Basics of contract law
- Basics of immaterial law
- Basics of labour law
- Basics of competition law
- Basics of tax law

Teaching Methods:

The purpose of the course exercises is to repeat the main issues and to deepen the student's understanding by transferring theoretical knowledge into practice. Exercises deal with, for example, the basic concepts and structures of the legal system, recognizing legal problems, and the basics of different fields of business law, including case exercises. 133 h = 5 ECTS cr.

Assessment:

Students are graded on a scale of 1-5 based on the course exam.

Course Materials:

Literature will be assigned by the teacher at the beginning of the course.

VA10A1400: Economics and the Business Environment, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Note:

Only for students of technology.

Period:

March-April 2019

Teaching Language:

Finnish

Teacher(s) in Charge:

Jussi Heikkilä ja Sami Remes

Aims:

On successful completion of the course, students will be able to:
- define basic economic concepts
- understand economic thinking and to apply economic theory in the analysis of the business environment and market economies.

Contents:

The course provides students with basic skills in analyzing the business environment and its evolution from an economic perspective. Proactive identification of opportunities and threats of the business environment is increasingly important for successful businesses in the global economy.
During the course, students will familiarize themselves with the decision-making of firms and consumers and how the markets function (microeconomics); economic growth, business cycles, labour markets, inflation, monetary policy, and economic policy (macroeconomics); the role of the public sector and focal public policy instruments in market economies (public economics); international trade, financial markets, European integration and multinational companies (global economy).

Teaching Methods:

Individual assignments according to the instructions given at the beginning of the course. 133 h = (5 ECTS).

Assessment:

Evaluation on scale 1-5.

Course Materials:

The teachers will specify the literature at the beginning of the course.

VA10A1500: Introduction to Entrepreneurship, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Elena Ruskovaara, Markku Ikävalko

Note:

Only for students of technology

Period:

January-February 2019

Teaching Language:

Finnish or English

Teacher(s) in Charge:

Vesa Puhakka, Jenni Myllykoski, Markku Ikävalko ja Elena Ruskovaara

Aims:

During the course, the student will learn to understand the significance of an entrepreneurial team, and will form an understanding of entrepreneurship as a creative activity that happens in the form of business.
After completing the course, the student will be able to:
- define business-related principles, possibilities and challenges

- plan business initiating from customer needs, value creation, testing and agility
- interpret business-related substance areas where competence is needed

Contents:

The decision to become an entrepreneur
- Introduction to entrepreneurship

Creating viable business ideas
- Creating business opportunities
- Preliminary research
- Industry analysis
- Business plan

From an idea to an entrepreneurial firm
- Building a team
- Analyzing the start-up strengths and weaknesses from the funding perspective
- Ethical and legal issues in starting a firm
- Writing a business plan and constructing a story
- Attracting funding

Managing an entrepreneurial firm and creating growth
- Marketing
- Understanding VC-operations
- IPRs
- Challenges of growth and managing growth
- Growth strategies
- Operation forms

Teaching Methods:

Course assignments include:
- Familiarization with the course materials 48 h
- Learning and reflection assignments individually and in groups 85 h
- Grouping exercises

The assignments are done on the online learning platform as both individual and group work. Total 133 h (5 cr)

Assessment:

Student performance will be evaluated on a scale from 1 to 5. The course consists of five modules and each module is linked to two chapters in the course book. Each module that the student completes contributes one grade point to the final grade. Hence, passing each of the five modules gives the grade five.

Course Materials:

Barringer, B. & Ireland. D. (2012). Entrepreneurship: Successfully Launching New Ventures, 4th Edition. Prentice Hall. Later editions can also be used.

VA10A1600: Introduction to Corporate social responsibility, 5 cr

Validity: 01.08.2017 -

Form of study: Online-studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Note:

Only for students of technology.

Period:

January-February 2019

Teaching Language:

English

Teacher(s) in Charge:

Nikodemus Solitander
Yewondwossen Tesfaye

Aims:

Upon completion of the course, students will be able to:
- define and apply key concepts and perspectives regarding CSR
- identify relevant issues and analyze the challenges related to corporate responsibility in selected industries
- describe the role of CSR in business and in relation to wider international political and economic relations
- describe the different aspects through which organizational practices can be CSR oriented
- apply key concepts of CSR in their daily work

Contents:

Definitions and historical roots
- Historical roots – sustainable development
- Definitions of CSR
- Why CSR matters – the business case
- Stakeholder salience

Regulatory aspects
- Political CSR
- CSPs and CSR
- MSIs and CSR
- CSR and human rights
- CSR – minimum wage and living wage

Human resource, supply and consumption
- HRM and CSR
- CSR and supply chain
- CSR and sustainable consumption

Relational aspects
- CSR and communication
- CSR and corruption
- CSR and leadership

CSR and responsible investment

Teaching Methods:

The course has individual and group assignments, 133 h = 5 op.

Assessment:

Grading on a scale from 1 to 5. The grade is composed of:
- Quizzes (30%)
- Two short reflections (each 15%/total 30%)
- Case analysis: Final assignment (40%)

Course Materials:

The link to primary reading materials will be provided on the learning platform.

EnDSOEDM: Energiatekniikka digitaalisille maisteriohjelmille, 21 cr

Validity: 01.08.2018 -

Form of study:

Type: Study module

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Aims:
Energiatekniikka digitaalisille maisteriohjelmille sivuopintokokonaisuuden suoritettuaan opiskelija:
• ymmärtää energiantuotannon perusteet Suomessa ja maailmalla
• ymmärtää voimalaitostekniikan perusteet
• ymmärtää energiatalouden ja energiatehokkuuden perusteet.
Sivuopintokokonaisuus soveltuu etäopiskeluun.

Sivuopintokokonaisuus 21 op. Tarkoitettu LESin ja LENSin digiohjelmien opiskelijoille.

BH40A0010: Introduction to Energy Technology for EnTeDI Students, 4 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Note:

The course is only for EnTeDI students or those studyingin in so called digital master's programmes (DIODI, JEDI etc.).

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

D.Sc. (Tech.) Ahti Jaatinen-Värri, D.Sc. (Tech.) Kari Myöhänen

Aims:

- Understands the basicsof power plant engineering, and how the most common power plants work.
- Is able to calculate themost common power plant process and operating parameters.
- Is able to describe the Finnish power system.
- Understands how electricity is produced in Finland and elsewhere.
- Is able to interpret energy scenarios and compare them.

Contents:

Fundamentals of power plant engineering, energy production in Finland and elsewhere, energy scenarios.

Teaching Methods:

On-line lectures, lectures and exercises, independent studies, group assignments, personal assignments, homework, 1 and 2 period.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, homework, assignments, group assignments.

Course Materials:

Course material is announced in Moodle.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BH40A0210: Energy-efficient Pumps, Fans and Compressors, 4 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Note:

The course is only for EnTeDI students or those studying in so called digital master's programmes (e.g. DIODI, JEDI).
It is lectured first time in the acamedic year 2019-2020.

Year:

D.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.) Pekka Punnonen

Aims:

Upon completion of the course the students will be able to: 1. define the operational principle and structure of pumps, blowers, fans and compressors, 2. choose the appropriate type of pumps, blowers, fans and compressors for different applications, 3. demonstrate sufficient
knowledge of pumps, blowers, fans and compressors for economical optimization and for sale or purchase meetings, and 4. design their principal dimensions.

Contents:

Different types of pumps and their operating principles, calculation of centrifugal pumps and their characteristics in pipe network. Cavitation. Different types of compressors and their operating principles, calculation of radial compressors. Different types of blowers and their operating
principles. Process applications, selection criteria and control.

Teaching Methods:

Lectures, on-line, lectures, independent studies. EXAM-eletrical exam. Home assignments, quizzes, dimensioning assignment.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5, quizzes, home assignments and dimensioning assignment 60%, EXAM examination 40%.

Course Materials:

Lecture material in Moodle.
Additionally: Gülich, J.F. 2010: Centrifugal pumps.
Airila, Mauri et al.: Kompressorikirja.
Wirzenius, A.: Keskipakopumput.
Larjola, Jaakko: Radiaalikompressorit.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BH40A0220: Efficient Power Plants and Waste Heat Recovery, 5 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Note:

The course is only for EnTeDIstudents or those studying in so called digital master's programmes (DIODI, JEDI, etc.)

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Antti Uusitalo, D.Sc. (Tech.), Post-doctoral researcher

Aims:

Upon completion of the course student: 1. Has knowledge on different waste heat recovery technologies and knowledge on the principles of waste heat recovery 2. Understands the principles of dimensioning and optimizing of efficient power systems 3. Is able to estimate waste heat recovery potential in different applications and to evaluate the most suitable waste heat recovery technology for different applications.

Contents:

Principles of waste heat recovery and the main factors affecting on waste heat recovery potential and opportunities. Operational principles of high efficiency power plants and different waste heat recovery technologies and their typical applications. Principles of dimensioning of the heat recovery devices.

Teaching Methods:

On-line lectures, quizz,homework, assignments, and independent studies.
Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5

Course Materials:

Material informed later

Limitation for students? (Yes, number, priorities/Leave empty):

Yes, the course is only for EnTeDI students or those studying in so called digital master's programmes (DIODI,JEDI, etc.)

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BH61A020E: Energy Economics for EnTeDI, 5 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Note:

Only for the EnTeDI students.

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Tapio Ranta

Aims:

Upon completion of the course the students will be able to utilise energy economic calculation methods and to calculate the additional cost in the energy production costs caused by emission trading. Students will be able to describe the basic concepts of Finnish energy economics and explain the structure of energy taxation in Finland, and calculate the energy taxes of fuels. Students will understand the structure of energy tariffs, and will be able to compile a duration curve of the consumption curve of energy.

Contents:

Use of energy statistics. The variation in energy demand and duration curves. Calculation methods for energy production costs. Profitability calculations of energy projects. Environmental impacts in energy production, especially carbon dioxide emissions. Energy and fuel markets. The effect of emission trading

on the price of electricity, and energy tariffs. Energy taxation and the pricing system of natural gas. Energy economics in Finland and EU. The need for investments in electricity production. National energy and climate strategy. Fuel economics. Energy scenarios.

Teaching Methods:

Independent studies in Moodle, Homework based on lectures and exercises in Moodle.
Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Evaluation is based on exercises and homework in Moodle 100%, Pass/Fail.

Course Materials:

Study materials, including the lecture material, will be listed in Moodle.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No

BH61A060E: Bioenergy for EnTeDI, 3 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F

Note:

Only for the students of EnTeDI and Biorefineries M.Sc. programmes.

Year:

M.Sc. (Tech.) 1

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Tapio Ranta, D.Sc. (Tech.), Professor

Aims:

Upon completion of the course the student will be able to understand the meaning of bioenergy, alternative biomass resources, supply methods, refining and end-user applications; describe the quality properties of solid biofuels and how they are measured and evaluated by using standards; and explain the meaning of sustainability in bioenergy systems.

Contents:

The role of bioenergy in the EU energy policy, incentive programmes and future plans. Raw-material sources of bioenergy, potential resources and current use. Biomass supply systems and logistics. Refined biofuel commodities, biogas and liquid biofuels. Biomass international trade. Quality properties of solid biofuels, quality measurement and standards. Sustainable bioenergy.

Teaching Methods:

Independent studies in Moodle, Exercises in Moodle.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Evaluation is based on exercises in Moodle 100%, Pass/Fail.

Course Materials:

Study materials, including the lecture material, will be listed in Moodle.

Limitation for students? (Yes, number, priorities/Leave empty):

Yes, only for the students of EnTeDI and Biorefineries M.Sc. programmes.

Places for exchange-students? (Yes, number/No):

No

Places for Open University Students?(Yes, number/No):

No