Catalogue report

LUT School of Engineering Science (23B3)

Master's Programme in Global Management of Innovation and Technology (GMIT)

The Degree programme in Industrial Engineering and Management for Master of Science in Technology (120 ECTS credits) 2018-19

- The degree is called Master of Science in Technology (M.Sc. Tech.), Diplomi-insinööri (DI) in Finnish
- A higher university degree, giving the students eligibility to apply for scientific doctoral studies
- A total of 120 ECTS credits
- Duration two years, full-time studies of 60 ECTS credits per academic year.

Learning outcomes of the Master's programme in Global Management of Innovation and Technology (GMIT) in academic year 2018-19

The graduates are able to:

− understand and analyze the impact of global megatrends on innovation management in organizations

− evaluate, analyze and create strategies relating to products, services and technologies

− make rational decisions based on decision-making strategies, frameworks, tools and analysis methods in international networks and markets

− analyze processes and structures of organizations and identify their interconnected development issues

− practice, plan and manage the build-up of product and service systems and business platforms for creating tangible and intangible solutions for techno-economic problems

− plan and manage international business from start-ups to multinational enterprises with an entrepreneurial and innovative mindset

− apply innovation and technology management theories, methods and tools to practical management activities

− work and lead efficiently in cross-cultural and inter-disciplinary collaborative teams and projects, and communicate in a logical and convincing way both orally and in writing.

Degree structures

The Degree structure in Global Management of Innovation and Technology (GMIT)

Master of Science in Technology (120 ECTS credits), Industrial Engineering and Management 2018-19

Core studies 33-37 ECTS credits
Specialisation studies 59-63 ECTS credits (min.)
Minor studies 24 ECTS credits (min.)

Double Degree students follow their own degree structure.

Double Degree Programme in Global Management of Innovation and Technology (GMIT) 2018-19

Degree structure status: accepted

Academic year: 2018-19

Beginning date of the academic year: 01.08.2018

Core Studies 30 ECTS cr (min 30 cr)

Studies in partner university.

Specialisation Studies 70 ECTS cr (70 - 82 cr)

TuDGMITDDSpec: GMIT Specialisation Studies Double Degree, 70 - 82 cr
- *Compulsory studies, 55 ECTS cr*
  - A330A0252: Internationalization of the Firm and Global Marketing, 6 cr
  - CS10A0120: Introduction to M.Sc. Studies in Industrial Engineering and Management, 1 cr
  - CS30A1376: Product Development, 6 cr
  - CS10A0863: Research Methods for Master Students, 6 cr
  - CS30A1341: Strategic Technology and Innovation Management, 6 cr
  - CS90A0060: Master's Thesis, 30 cr
- *Elective studies, min. 15 ECTS cr*
  - CS10A0875: Industrial Project Management, 3 cr
  - CS30A1661: Open Innovation, 6 cr
  - CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr
  - CS30A1372: Creative Design and Problem Solving, 6 cr
  - CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr

Minor Studies 20 ECTS cr (min 20 cr)

Partner university or LUT studies: LUT minor in Technology for the students without former degree in Technology.

Complementary Studies

Please note that if student’s former degree in university or UAS is not from the field of technology, some non-degree complementary studies may be required for the M.Sc. (Tech.) degree.

Free Elective Studies

There is no need for free elective studies in Master's programme GMIT 120 ECTS cr. In case a student desires some additional courses over 120 credits, a maximum of two elective courses per academic year is recommended.

Master's Programme in Global Management of Innovation and Technology (GMIT) 2018-19 (E)

Degree structure status: accepted

Academic year: 2018-19

Beginning date of the academic year: 01.08.2018

Core Studies 37 ECTS cr (min 37 cr)

TuDGMIT2Core: GMIT Core Studies 2 year, 37 cr
- *Obligatory studies, 37 ECTS cr*
  - KIEN0017: Academic Writing, 3 cr
  - CS10A0875: Industrial Project Management, 3 cr
  - A330A0252: Internationalization of the Firm and Global Marketing, 6 cr
  - CS10A0120: Introduction to M.Sc. Studies in Industrial Engineering and Management, 1 cr
  - CS30A1376: Product Development, 6 cr
  - CS10A0863: Research Methods for Master Students, 6 cr
  - CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr
  - CS30A1341: Strategic Technology and Innovation Management, 6 cr

Specialisation Studies min. 59 ECTS cr (min 59 cr)

TuDGMITSpec: Tuta GMIT, Specialisation Studies, 58 - 59 cr
- *Obligatory specialisation studies 48 ECTS cr*
  - CS30A1372: Creative Design and Problem Solving, 6 cr
  - CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr
  - CS30A1661: Open Innovation, 6 cr
  - CS90A0060: Master's Thesis, 30 cr
- *Elective specialisation studies min. 11 ECTS cr*
  - CS10A0760: Business in Russia, 6 cr
  - CS10A0885: Research Project in Industrial Management, 1 - 6 cr
  - CS30A1391: Systems Engineering, 6 cr
  - CS30A1671: Service Innovation and Management, 6 cr
  - CS30A7402: Software and Application Innovation, 6 cr
  - CS30A0940: Intelligent product-service systems, 6 cr
  - A210A0702: New Venture Management, 6 cr
  - CS30A7370SS: Simulation Modelling in Industrial Management, 3 cr
  - A330A5000SS: International Marketing of High Technology Products and Innovations, 3 cr
  - CS20A6040: Lean Six Sigma Green Belt, 6 cr
- *Exchangeable courses*
  - CS30A1684SS: Advanced Course in Strategic Management, 3 cr
  - CS30A1655: Advanced Course in Strategic Management, 6 cr

Minor Studies in Technology min. 24 ECTS cr (min 24 cr)

The minor studies **KoDSaManu "Modern Manufacturing"** is also suitable for the students having no former studies in technology.

KoDSaMate Advanced Materials Engineering, suitable for the students having no former studies in technology.

Other minors in technology for GMIT-students taught in English (note prerequisities):

- **TiDSOsedt Software Engineering and Digital Transformation minor**, requires former BSc-level studies in software engineering (inc. basic course in programming)
- **YmDSaEnLi Energy and Business minor,** requires former BSc-level studies in energy technology (at minimum minor level studies)

Complementary Studies

Please note that if the student's former degree in university or UAS is not from the field of technology, some non-degree complementary studies may be set as prerequisities for the M.Sc. (Tech.) degree.

Free Elective Studies

There is no need for elective studies in Master's programme GMIT 120 ECTS cr. In case a student desires some additional courses over 120 credits, a maximum of two elective courses per academic year is recommended.

Master's Programme in Global Management of Innovation and Technology (GMIT) for LUT IEM BSc 2018-19(E)

Degree structure status: accepted

Academic year: 2018-19

Beginning date of the academic year: 01.08.2018

Core Studies 33 ECTS cr (min 33 cr)

CS10A0875: Industrial Project Management, 3 cr
A330A0252: Internationalization of the Firm and Global Marketing, 6 cr
CS30A1376: Product Development, 6 cr
CS10A0863: Research Methods for Master Students, 6 cr
CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr
CS30A1341: Strategic Technology and Innovation Management, 6 cr

Specialisation Studies min. 63 ECTS cr (min 63 cr)

TuDGMITSpec2: Tuta GMIT, Specialisation Studies BSc, 58 - 63 cr
Obligatory specialisation studies 48 ECTS cr
CS30A1372: Creative Design and Problem Solving, 6 cr
CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr
CS30A1661: Open Innovation, 6 cr
CS90A0060: Master's Thesis, 30 cr
Elective Specialisation studies min. 15 ECTS c
CS10A0760: Business in Russia, 6 cr
CS10A0885: Research Project in Industrial Management, 1 - 6 cr
CS30A1391: Systems Engineering, 6 cr
CS30A1671: Service Innovation and Management, 6 cr
CS30A7402: Software and Application Innovation, 6 cr
CS30A0940: Intelligent product-service systems, 6 cr

A210A0702: New Venture Management, 6 cr
CS30A7370SS: Simulation Modelling in Industrial Management, 3 cr
A330A5000SS: International Marketing of High Technology Products and Innovations, 3 cr
CS20A6040: Lean Six Sigma Green Belt, 6 cr

Exchangeable courses

CS30A1684SS: Advanced Course in Strategic Management, 3 cr
CS30A1655: Advanced Course in Strategic Management, 6 cr

Minor Studies in Technology min. 24 ECTS cr (min 24 cr)

Minor in Technology is required. A student should choose an extensive minor on the field of B.Sc. minor studies or he/she can choose a B.Sc. level technical minor (meaning different studies from the B.Sc. degree included). Please check the more detailed information from GMIT Study guide -> Minor studies.

Free Elective Studies

There is no need for elective studies in Master's programme GMIT 120 ECTS cr. In case a student desires some additional courses over 120 credits, a maximum of two elective courses per academic year is recommended.

Courses and study modules not included in degree structures

Courses not included in degree structures:

Minor studies for students coming directly to GMIT M.Sc. degree:

The minor studies **KoDSaManu "Modern Manufacturing".** This minor is also suitable for the students having no former studies in technology.
KoDSaMate Advanced Materials Engineering, suitable for the students having no former studies in technology.

Other minors in technology for GMIT students taught in English (note prerequisities):

TiDSOsedt Software Engineering and Digital Transformation minor, requires former B.Sc.-level studies in software engineering (including basic course in programming)
YmDSaEnLi Energy and Business, requires former B.Sc.-level studies in energy technology (at minimum minor level studies)

Minor studies for students continuing their studies from LUT B.Sc. degree:

Minor in Technology is required. A student should choose an extensive minor on the field of B.Sc. minor studies or he/she can choose a B.Sc. level technical minor (meaning different studies from the B.Sc. degree included).

Minor in Technology (B.Sc.) Extensive minor in Technology:

Prerequisites:
No former subject oriented studies required.

Prerequisites required:
B.Sc. level minor in the same subject area.

Tietotekniikka **(TikSOTite)**
Software Engineering and Digital Transformation minor **(TiDSOsedt)**
Konetekniikka **(KoDSaKote)**
Modern Manufacturing **(KoDSaManu)**
Energia- ja ympäristötekniikan perusteet **(YmKSaEnYmPe)**
Energiatekniikan tekniset ratkaisut **(YmDSaTekRat)**
Energia ja liiketoiminta **(YmDSaEnLi)**
Kemian prosessitekniikka **(KeSoM300)**

YmDSaEnLi: , 20 - 30 cr
Obligatory Studies 11 ECTS cr
BH60A2601: Climate Change, 5 cr
BL20A1300: Energy Resources, 6 cr
Valitaan vaihtoehtoisia opintojaksoja siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.
BH40A0101: Renewable Energy, 3 cr
BH60A1800: Introduction to Environmental Law, 5 cr
BH61A0201: Energy Economics, 5 cr
BL20A0201: Power Exchange Game for Electricity Markets, 3 cr
BL20A0400: Electricity Market, 5 cr
BL20A1400: Renewable Energy Technology, 6 cr
BL20A1500: Energy Scenarios, 6 cr
BL20A1600: Smart Grids, 5 cr
BL40A2301: Energy Efficiency, 6 cr
YmDSaTekRat: , 20 - 30 cr
Obligatory Studies 11 ECTS cr
BH40A0101: Renewable Energy, 3 cr
BH50A0200: Power Plant Engineering, 4 cr
BH60A2401: Energy Recovery from Solid Waste, 4 cr
Valitaan vaihtoehtoisia opintojaksoja siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.
BH50A0500: Introduction to Combustion and Boiler Technology, 5 cr
BH50A1701: District Heating, 4 cr
BH50A1800: Fundamentals of Energy Systems Planning, 6 cr
BH50A1900: Planning of Energy Systems, 4 cr
BH61A0600: Bioenergy, 3 cr
BL20A0700: Introduction to Electrical Power Systems, 4 cr
BL30A0500: Introduction to Electrical Drives, 3 cr
BL40A2301: Energy Efficiency, 6 cr
YmKSaEnYmPe: , 20 - 30 cr
Pakolliset opinnot 14 op.
BH20A0710: Fundamentals of Thermodynamics, 3 cr
BL40A2600: Wind power and solar energy technology and business, 5 cr
BH60A0001: Basic Course in Environmental Technology, 6 cr
Vaihtoehtoisia opintoja valitaan siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.
BH50A0200: Power Plant Engineering, 4 cr
BH60A5600: Sustainability Transition and Sustainable Business, 6 cr
BH61A0000: Fundamentals of Energy Economics, 2 cr
BL10A0100: Basics of Electric Engineering, 3 cr
KoDSaKote: , 20 - 30 cr
Pakolliset opinnot 19 op
BK10A3500: Materials, 7 cr
BK10A5500: Technical Documentation and 3D-modelling, 6 cr
BK80A2900: Basic Course in Strength of Materials, 3 cr
BK80A3201: Introduction to Mechanics, 3 cr
Valitaan seuraavista opintoja siten, että sivuaineopintojen vähimmäisopintopistemäärä täyttyy.
BK10A3601: Production Technologies, 11 cr
BK60A0200: Mechatronics, 6 cr

BK65A0203: Engineering Design, 7 cr
BK80A2601: Mechanics, 7 cr
BK80A2701: Strength of Materials, 9 cr
BK80A2800: FE-analysis, Elementary Course, 5 cr

KoDSaMate: Advanced Materials Engineering, 20 - 30 cr
Obligatory Studies 25 ECTS cr
BK90C1900: Introduction to Materials Engineering, 4 cr
BK90C2000: Hybrid Materials, 3 cr
BK90C2100: Functional Properties of Nanomaterials, 3 cr
BK90C2200: Sustainable Manufacturing of Advanced Materials, 5 cr
BK90C2300: High Performance Products, 5 cr
BK90C2400: Project course in Material Engineering, 5 cr

KeSoM300: Chemical Process Engineering, 21 - 31 cr
Kaikille pakolliset opinnot 20 op
BJ01A5010: Introduction to Chemical Process Industries, 3 cr
BJ01A5020: Process and Plant Design, 4 cr
BJ01A5030: Introduction to Process Simulation, 4 cr
BJ01A5040: Process Safety, 2 cr
BJ01A5051: Biorefineries, 3 cr
BJ01A4011: Mechanical Unit Operations, 4 cr
Vapaavalintaiset opinnot 5-10 op
BJ02A4051: Development of New Sustainable Products and Solutions, 5 cr
BJ02A2061: Product Design, 5 cr

TikSOTite: Computer Science, 24 - 30 cr
Vaihtoehtoiset (väh. 24 op). Jos opintojakso sisältyy esim. pakollisiin ydinopintoihin, valitaan muuta tilalle. Huomioi esitietovaatimukset!
BM40A0301: Data Structures and Algorithms, 6 cr
CT10A7051: Area Expert's Views on Future Work-life Expectations, 6 cr
CT30A2802: User Interfaces and User-Centric Desing, 6 cr
CT30A3202: Web Applications, 6 cr
CT60A0202: Ohjelmoinnin ja data-analytiikan perusteet, 6 cr
CT60A2411: Object-Oriented Programming, 6 cr
CT60A2500: Principles of C-Programming, 3 cr
CT60A4002: Software Engineering, 6 cr
CT60A4160: Ohjelmistotestauksen periaatteet, 3 cr
CT60A4303: Basics of database systems, 3 cr
CT60A7650: Database Systems Management, 3 cr
LM10A1000: Project Management, 6 cr
LM10A2000: Introduction to Information Systems, 3 cr

KoDSaManu: Modern Manufacturing, 20 - 30 cr
Obligatory Studies 25 ECTS cr
BK50A4000: Production Processes in Modern Job Shops, 5 cr
BK50A4100: Manufacturing Systems and Scheduling, 5 cr
BK50A4200: Product Flow in Job Shops, 5 cr
BK50A4300: Managing Job Shops, 5 cr
BK50A4401: Fabrication Laboratory, 5 - 10 cr

TiDSOsedt: Software Engineering and Digital Transformation minor, 24 - 30 cr
Obligatory courses 12 cr
CT60A5500: Quality Assurance in Software Development, 6 cr
CT70A2000: Requirements Engineering, 6 cr
Elective courses, choose 12 cr
CT30A8922: User Experience Design, 6 cr
CT60A5103: Software Engineering Models and Modeling, 6 cr
CT60A5400: Fundamentals of Game Development, 6 cr
CT60A7322: Software Business Development, 3 cr
CT70A4000: Business Process Modelling, 6 cr
CT70A5000: Impact and Benefits of Digitalization, 6 cr
CT70A7000: Digital Business Platforms, 6 cr

Course descriptions

Descriptions of courses and study modules included in the degree structures

TuDGMITDDSpec: GMIT Specialisation Studies Double Degree, 70 - 82 cr

Validity: 01.08.2018 -
Form of study:
Type: Study module
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F

No course descriptions.

Compulsory studies, 55 ECTS cr

A330A0252: Internationalization of the Firm and Global Marketing, 6 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Anisur Faroque, Sami Saarenketo, Juha Väätänen, Igor Laine

Note:

Only for master's level students. Can not be included in the same degree as A330A0251 Internationalization of the Firm. The course will be lectured twice a year, in periods 2 (Group A) and 3 (Group B).

Year:

M.Sc. (Tech.) 1, M.Sc. (Econ. & Bus. Adm.) 1

Period:

Group A: 2, Group B: 3

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc. (Econ. & Bus. Adm.) Igor Laine (Group A: 2nd period)
Junior researcher, D.Sc. (Econ. & Bus. Adm.) Anisur Faroque (Group B: 3rd period)
Professor, D.Sc. (Econ. & Bus. Adm.) Sami Saarenketo
Professor, D.Sc. (Tech.) Juha Väätänen

Aims:

Learning outcomes: After completing the course the student will understand, evaluate and develop the processes of firm internationalisation and global marketing. In particular, the students will be able to:
1. Identify and evaluate the characteristics of the international market environment and of international

business
2. Recognize the dimensions and drivers of market globalization
3. Assess, criticize, compare and contrast as well as apply the essential theories and frameworks relative to internationalisation of the firm
4. Evaluate the ways in which international trade and investments affect world markets
5. Reflect upon the risks and opportunities in global markets
6. Provide a critical reflection on sustainability in international business
7. Analyze the key management decisions connected with the internationalisation of the firm and global marketing: Whether to internationalise, deciding which markets to enter, deciding how to enter the foreign market
8. Work effectively in cross-cultural teams
9. Create and deliver a group presentation focusing on the internationalisation decisions of a given company.

Contents:

Must know: International trade and investments, Drivers of globalization, Chain of strategic decisions related to internationalization of the firm, internationalization motives and barriers, Risks assessment in international markets, Internationalization theories (Uppsala model, Network approach, Born Global), international market selection process, factors influencing entry mode choice, characteristics of various entry modes (export modes, intermediate entry modes, hierarchical modes).

Should know: Global business relations and trade agreements, Concept of the value chain in internationalization, comparison of SMEs and LSEs in internationalization and global marketing, an environmental analysis in deciding which market to enter (political, economic, sociocultural, and technological environment).

Additional knowledge: Principles of transaction cost analysis.

Teaching Methods:

15 h lectures, 4 h pre-lecture assignments, 12 h in-class exercises, 30 h seminar assignments, 30 h written report, 2 h peer evaluation report, 32 h course literature, 35 h self-study and exam preparation. Total 160 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Examination 30 %, seminar assignments 30 %, pre-lecture assignments 15 %, research report 20 %, peer evaluation report 5 %. Each of the components has to be passed acceptably.

Course Materials:

1) Hollensen, S. (2017) Global Marketing, 7th edition, Pearson Education (older editions apply as well)
2) Cavusgil S.T., Knight G., Reisenberger J. (2017) - International Business: The New Realities, 4th edition, Pearson Education (older editions apply as well)
Additional materials will be announced on lectures. Additional reading and material assigned in class.

Prerequisites:

Sufficient prior business studies and basic knowledge of international marketing required. Due to the teaching methods, the number of participants may be limited to 75 students. In this case, the priority would be given to the students of the School of Business and Management.

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

Yes, 75, priority would be given to the students of the School of Business and Management.

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

Max 15

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

Max 10

CS10A0120: Introduction to M.Sc. Studies in Industrial Engineering and Management, 1 cr

Validity: 01.08.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Marja Talikka, Ville Ojanen, Leonid Chechurin

Year:

M.Sc. (Tech.) 1

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen
Professori Leonid Chechurin
Information Specialist, M.Sc. (Tech.) Marja Talikka

Aims:

The course provides the student with basic knowledge of studying at Lappeenranta University of Technology (LUT), Finland, in general and particularly in his/her school and degree programme. The course is aimed to help students to plan their studies at LUT and follow the progress of their studies with the help of a individual study plan.
Students recognize their own learning strategy and learn about information retrieval and the information sources available at LUT for courses and studying by using the Academic Library's services, collections and databases.

Contents:

The Orientation Days activities. Practical study-related information. Degree requirements. Planning of Master's studies.
Preparation of the individual study plan. Monitoring the progess of studies with the Academic Director and Student Affairs Secretary.
The Academic Library collections and databases.

Teaching Methods:

Participation in the Orientation Days. Planning the individual study plan.
Library introduction lectures and assignments on information retrieval and library databases on Moodle (Period 1).
Study programme meetings with the Academic Director and Study Councellor (Periods 1-4).
Assignments: individual study plan, library assignments. Independent study. Total 26 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Pass/Fail (assignments, active participation in study programme meetings)

Course Materials:

Materials will be announced during the course.

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

No

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

No

CS30A1376: Product Development, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

After fulfilling all requirements of the course, the students will be able to: 1. Understand the concept of new product development 2. Recognise the phases of new product development 3. Work in a team during product development 4. Apply the basic methods of product development.

Contents:

The key topics of the course are: 1. Major Phases of New Product Development, 2. Engineering Concept Development and Testing (design for manufacturability, user-centred engineering, visualisation of design, robust design), 3. Integration of Technical Design and Business Analysis, 4. Intellectual Property in New Product Development, 5. Project Management, 6. Introducing a New Product to the Market

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project work. The classroom problem-solving sessions will be based on team-work in groups of 3-5 students. The 3-4 projects will be carried out in groups of 3-4 students independently and will result in the preparation of the project report. Classroom teaching and problem-solving sessions 36 hours. Project work 94 hours. Period 1. in-class activities (lectures, problem solving), period 2. out-of-class activities (project work). Total workload 130 hours.
Lectures, in-class activity, period 1.
Project work, out-of-class activity period 2.
Project work 94 hours.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Evaluation: solutions created in the classroom problem-solving sessions 40%, project reports 40%, written exam 20%. Attendance requirement: 90% of classroom sessions.

Course Materials:

Course slides
K. Ulrich, S. Eppinger: Product Design and Development, McGraw-Hill, 2012

Prerequisites:

Basic understanding of management. Basic knowledge of engineering disciplines.

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

Yes, 60

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

15–

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

max 5

CS10A0863: Research Methods for Master Students, 6 cr

Validity: 01.08.2014 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Roman Teplov, Daria Podmetina, Ekaterina Albats

Year:

M.Sc. (Tech.) 1-2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
PhD Student Ekaterina Albats
PhD Student Roman Teplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina

Aims:

The course aims to provide guidelines to master students on how to conduct the research in management and how to report its results. In the end of the course, students should be able to:
• write literature review;
• formulate research questions and research design;
• choose research method;
• collect and analyze qualitative or quantitative data;
• interpret and report the results of the research.

Contents:

The course consists of 3 modules, 2 ECTS each. In the first module, students will learn basics of doing research: formulating and clarifying the research topic and research questions; conducting literature review; formulating the research design and choosing research methods. The second module is dedicated to collecting and analyzing quantitative data. The third module will introduce collecting and analyzing qualitative data.

Teaching Methods:

Module seminars 36 h (12 h each module), exercises 6 h (related to modules 2 and 3), preparing reports and self-study 116 h. Total 158 h. Moodle is used in this course.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Based on average grade received from 3 modules (30 % each). Module 1 evaluation is based on learning diary and in-class assignments. Modules 2 and 3 are evaluated based on reports on quantitative and qualitative methods. There is no written exam on this course, but different activities and group assignments during seminars will be evaluated.

Course Materials:

Course book: Saunders, M, Lewis, P. and Thornhill, A. (2009). Research methods for business students, 5th ed., FT/Prentice Hall. Additional materials will be announced on the lectures.

Prerequisites:

The course is targeted to the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Students not from GMIT program have to apply with motivation letter to the teachers. Number of participants is limited.

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

Yes, max 10

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS30A1341: Strategic Technology and Innovation Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Kalle Elfvengren, Ville Ojanen

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen

Aims:

Student can 1. design and analyze technology and innovation strategy of a company, 2. apply different tools and frameworks of technology management, 3. Develop and plan alternative progress routes for managing technology, innovations, as well as product and service portfolios.

Contents:

Core material: Innovation as a core business process. Innovative organisation. Development of technology and innovation strategy. Innovation networks. Decision-making in technological and market uncertainty. Creation of new products and services. New technology-based ventures. Innovation performance and learning. Methods of technology management.

Teaching Methods:

Lectures 12 h, 1st period. Exercises 10 h, 2nd period. Seminars 12 h, 2nd period. Preparation for lectures and exercises 12 h. Seminar work and other assignments 110 h. Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. No exam. Seminar work, group works and other assignments, incl. written reports and presentations 100%.

Course Materials:

Joe Tidd and John Bessant. Managing Innovation – Integrating Technological, Market and Organizational Change, 4th ed. 2009, or newer (2013, 2018). Lecture notes and other material announced in the beginning of the course.

Prerequisites:

Recommended: CS30A0952 Innovaatio- ja teknologiajohtamisen peruskurssi (Finnish course). Recommended: B. Sc. in Industrial Engineering and Management or equivalent basic knowlege of innovation and technology management.

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

Yes, 50, priority to GMIT students.

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

max 5

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

max 5

Description and DL of the company assignment:

The course includes a project work (three person groups) with company assignments on e.g. following topics: Sources of innovations, Networks and other forms of cooperation in innovation and technology management, and Processes for developing and commercializing new products or services. The work load is ca. 50 hours per student. The deadline for the company-related topics is in Mid-September. Contact details: Ville Ojanen, ville.ojanen@lut.fi, +358401621201

CS90A0060: Master's Thesis, 30 cr

Validity: 01.08.2008 -

Form of study: Basic studies

Type: Master's Thesis

Unit: LUT School of Business and Management

Teachers: Lea Hannola

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

Finnish and English

Teacher(s) in Charge:

Lea Hannola, D.Sc. (Tech.), Associate Professor
Other teachers: Professors and Associate Professors of Industrial Engineering and Management

Aims:

Aftercompleting the course, students will be able to:
- demonstrate their knowledge of a topic of scientific and societal importance in a specific professional area
- demonstrate the ability to carry out the project independently and following a plan
- produce the thesis, which is organised coherently, the presentation is academic and the language revised
- act and communicate in different kinds of interactions and work environments in an entrepreneurial way by taking independently and actively responsibility about the development and management of business
- apply and utilize independently new knowledge both in scientific postgraduate studies and other lifelong learning

Contents:

The Master’s thesis is the final project of the degree of Master of Science (Technology). Usually it involves a
development project commissioned by a company and takes about six months.
The work entails working on a development project related to industrial management, preparing a report in the form of a
thesis, and presenting the work in a way that the first supervisor requires.
Topic of the master's thesis has to be confirmed as soon as the topic has been decided with the first supervisor. Use
form 1A in UNI-portal.

Teaching Methods:

Development project and related report, presentation of the work (1. supervisor defines the way), maturity test (usually on the contents of the thesis).

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:

Electronic guide for Master's Thesis workers and supervisors,
Study support -sites in Uni-portal, Industrial Engineering and Management

Prerequisites:

B.Sc. (Tech.) degree (not required of students admitted directly into a Master’s programme), complementary
studies (for students admitted directly into a Master’s programme).

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

No

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

No

Elective studies, min. 15 ECTS cr

CS10A0875: Industrial Project Management, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Ekaterina Albats, Roman Teplov, Olli-Pekka Hilmola, Daria Podmetina

Year:

M.Sc. (Tech.) 1-2

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Daria Podmetina
Professor, D.Sc. (Tech.) Olli-Pekka Hilmola
PhD Student Ekaterina Albats, PhD Student RomanTeplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina

Aims:

The course equips students with theoretical backgrounds and practical project management tools aiming at developing project management skills.
This course aims to familiarize students with
• The project management (PM) concepts and tools for organizing, planning, and controlling projects (PERT, Gantt, critical path, critical chain and DSM matrixes) using the MS Project, and DSM software.
• The critical role of work breakdown structures and networks in planning and scheduling project and management of multi-project environment and multitasking.
• Managerial, cultural, and social aspects of PM and the importance of the organization's strategy during the project selection.
• How to reliably estimate the status of projects and how to finance of technology development projects.

Contents:

This course covers the fundamental concepts and applied techniques for cost effective management of both long-term development programs and short-term projects. The content deals with planning, scheduling, organizing, and controlling projects. The course uses cases from a wide variety of industries. Project management principles and methodology are provided with special focus on planning, controlling, and managing projects to successful completion. After successfully completing this course, the student will be able to:
• Identify the elements of the PM life cycle, including: Plan, Control, and Organize and Allocate Resources
• Understand PM processes and comprehend basic tools and techniques to plan, organize and manage a project;
• Optimize results while managing the triple constraints and manage stakeholder communication

Teaching Methods:

Lectures 14 h, computer exercises 4h, project analysis and report writing 35 h (each group needs to analyze one real technology development project regarding its risks and present it in joint-seminar), individual work and seminar preparation 15 h, total 68 h. Moodle is used in this course.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, based on the report (70 %), and home assignments/group work during the course (30 %). For students who are not able to participate in class, literature exam option can be proposed.

Course Materials:

Kerzner, Harold R. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Wiley, New Jersey. Eppinger, Steven D. & Tyson R. Browning (2012). Design Structure Matrix Methods and Applications. MIT press, Boston.

Prerequisites:

The course is obligatory for the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Number of participants is limited to 50.

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

Yes, 50

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

Yes, 10.

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

Yes, 5.

CS30A1661: Open Innovation, 6 cr

Validity: 01.08.2013 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Antero Kutvonen, Daria Podmetina, Justyna Dabrowska

Year:

M.Sc. (Tech.) 2, M.Sc. (Econ. & Bus. Adm.) 2

Period:

Periods 1-2, Periods 3-4

Teaching Language:

English

Teacher(s) in Charge:

Researchers, D.Sc. Antero Kutvonen, D.Sc. Daria Podmetina and doctoral students, M.Sc. Ekaterina Albats, M.Sc. Justyna Dabrowska

Aims:

After completion of the course, students will be able to
1. explain the concept of open innovation through both theory and examples (to e.g. a company executive)
2. analyze open innovation activities in real life companies and the motives for engaging in them and the mechanisms through which they create value for the company
3. distinguish between different modes of open innovation (inbound, outbound and coupled)

4. analyze the relation between a company’s strategic choices and application of open innovation
5. understand and apply the scientific literature on the theme and relate open innovation to the context of other innovation management theories.

Contents:

Must know: The fundamental definitions and concept of open innovation. Modes and implementations of open innovation, i.e. ways to manage purposive in- and outflows of knowledge to collaboratively develop and/or commercialize innovations. Difference between closed and open innovation in managing technology. Identifying open innovation activities in real life firms. Monetary and strategic motives for engaging in open innovation.
Should know: Process models of inbound, outbound and coupled open innovation. The relation between corporate strategy, technology strategy and open innovation activities. Models of distributed innovation such as crowd-based open innovation. Most common examples of firms used to explain open innovation. Platforms and ecosystems role in business and innovation. Varying topics from state-of-the-art open innovation research, depending on guest lecturer. Basics of IPR management in open innovation.
Nice to know: Development of the open innovation concept on the basis of prior innovation management theories. Knowledge of the main scientific literature surrounding open innovation. Theoretical determinants of open innovation and future perspectives towards the phenomenon.

Teaching Methods:

Lectures and guest speakers 35 h as intensive teaching. Small group assignments during lectures. Group exams (or substituting them with summaries of scientific articles, 16 h) on two of the intensive days, preparing for exams 16 h. Group-based case assignment 36 h. Independent study 44 h. Total 155 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Continuous evaluation based on small group exams (50%) and group-based case assignment (50%). Possibility to substitute group exams with literary work (summaries of scientific articles) in case of absence.

Course Materials:

The course book and reading material will be announced at the first lecture.

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

Yes, 40 students, prioritized based on motivation letter submitted during registratio

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

max 5

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

max 5

CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Justyna Dabrowska, Marko Torkkeli

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Marko Torkkeli

Aims:

Managing in a knowledge-based economy, Managing by Core Competences, Knowledge intensive firms, Uncertainty. Are they the latest buzz words or another passing managerial fad? Old wine in new bottles? Or perhaps, just perhaps, fundamental means of survival and success for modern day corporations? Given the amount of effort that has been devoted to the topic by both academics and practitioners, it appears worth taking a deep and dispassionate look at the role of entrepreneurial thinking in sustained competitive advantage. The goal is to learn as you go and effectively convert assumptions to knowledge at a low cost.
By the end of the course, students will be able to identify business opportunities and analyze them using different tools of uncertainty management. Students will be able to understand the main components of different pitches and be able to design and present a pitch.

Contents:

During the course students learn to develop and test a business idea following the feasibility analysis, discovery driven planning steps as well as using the uncertainty management tools of Attribute Mapping, Supply Chain Analysis, Differentiation, Quizzing and Market-Busters. The course does not teach business plan writing but rather focuses on opportunity recognition and feasibility assessment. Moreover, it adds the elements of lean startup as well as social entrepreneurship as possible avenues in dealing with entrepreneurial challenges.
Entrepreneurial thinking, uncertainty management, strategic entrepreneurship, discovery-driven planning.

Teaching Methods:

Lectures 20 h, Independent study 73 h, seminar work writing 63 h, Total 156 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):

No

Assessment:

0 - 5. Based on assignment and in-class work, participation in the lectures required (possibility to substitute absence with literary work).

Course Materials:

Lectures and additional reading provided in the class. Book: McGrath Rita and MacMillan Ian, (2000). The Entrepreneurial Mindset. Harvard Business School Press.; McGrath Rita and MacMillan Ian, (2005). MarketBusters: 40 strategic moves that drive exceptional business growth. Harvard Business Press.

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

60, priority for GMIT students and others to whom this course is part of the major.

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

Yes, max 15

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS30A1372: Creative Design and Problem Solving, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

Learning outcomes: After fulfilling all requirements of the course, the students will be able to: 1. Understand the principles of creative problem solving 2. Know the basic methods of creative design 3. Work in team during the design process 4. Apply methods of creative design to products, processes, services and business methods

Contents:

The major subjects of the course are: Major Steps in Problem Solving Types of Problems Types of Design Concept of Creativity Survey of Intuitive and Structured Methods of Creativity Enhancement Types of Brainstorming Check lists Morphological analysis Synectics Case-based Reasoning Graphical Methods Evaluation of Ideas

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project works. The in-class problem-solving sessions will be based on the team work realised by the groups of 3-5 students. The 3-4 project works will be realised by the groups of 3-4 students during the out-of-class activities and it will be finished with the preparation of the project report. In-class teaching and problem-solving sessions 42 h, project works 88 h. Total workload 130 h.

Lectures, in class activity, period 1.
Project work, out-of - class activity, period 2.
Project work 88 hours

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Final grade 0-5. Evaluation: Generated solutions of the in class problems 40 %, project reports 30 %, written exam 30%. Obligatory presence during 80% of in-class activities.

Course Materials:

Course slides.

Tony Proctor
Creative problem solving for managers
Routledge, 3rd edition, 2009

H. Scott Fogler and Steven E. LeBlanc
Strategies for Creative Problem Solving
Prentice Hall, 3rd edition , 2013

David Silverstein, Philip Samuel, Neil DeCarlo
The Innovator's Toolkit: 50+ Techniques for Predictable and Sustainable Organic Growth
Wiley, 2009

Alexander Osterwalder and Yves Pigneur
Business Model Generation
Osterwalder and Pigneur, 2010

Prerequisites:

Basic courses of management. Basic knowledge of engineering disciplines (e.g. process or mechanical engineering).

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

Yes, 80

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

15–

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

max 5

CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Leonid Chechurin

Year:

M.Sc. (Tech.) 1-2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Leonid Chechurin

Aims:

After having completed the course, student is to know and able to apply instruments for product/process inventive design. The course helps to recognize the role, place and institutions of invention in innovation process/business. It contains basics on patenting, patent search and analysis, including modern approaches (big data, semantic etc). The course presents conceptual design context and its tools (Quality Function Deployment, Kano model, Decision making tools etc). It reviews modern design tools: Axiomatic Design, Design For X (Manufacturing, Robustness, Assembly, Environment, etc) and focuses on the role and main instruments of TRIZ (Ideal Final Result, Contradictions, SuFiled, Trends of Engineering System Evolution). We learn how to model an engineering system/product by Function framework, perform Function Model analysis transformation, Trimming (system reduction), Function-Oriented search, build Fault tree. About 20 case studies and 100 examples of inventive designs are presented.

Contents:

Introduction Optimization and Invention. Design roadmaps. 1. Information search and analysis: Patent and Scientific paper data bases. Search by keywords and classification codes. Function oriented search. Similarity: bibliographic, semantic. Technology landscapes. Subject-Object-Action framework. ArrowSmith approach. 2. Function based analysis: Ontologies of system description. Function based modeling. Subject-Object-Function framework. Function analysis. 3. Design evaluation: Axiomatic Design. DFx: design for manufacturability and assembly, design for robustness, design for environment, etc. TRIZ's design ideality concept. Trends of engineering system evolution as evaluation tool. Case studies and examples, Hands on. 4. Design modification: Function-based design improvement: trimming, contradiction elimination. Substance-Field. Standards for SuField model transformations. Case Studies, examples, Hands on. 5. Algorithm: Inventive design roadmap. Context of inventive design in industrial environment: market analysis tools (QFD, Kano, etc.), integration to research management tools, decision making tools. Case studies. Conclusion.

Teaching Methods:

Lectures 28 h, exercises 28 h, team work 38 h, reading 49 h, exam 13 h. Total workload 156 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):

No

Assessment:

Final grade 0 - 5. Test 30% + Report on project (Assignment) 50% + Personal reading 20%.

Course Materials:

Hand outs of lecture notes, internet resources in open access (given), selection of papers (given), videos on the main topics of the course - all available in Moodle and http://triz.thinkific.com/

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

max 10

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

max 5

TuDGMIT2Core: GMIT Core Studies 2 year, 37 cr

Validity: 01.08.2018 -

Form of study: Basic studies

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

No course descriptions.

Obligatory studies, 37 ECTS cr

KIEN0017: Academic Writing, 3 cr

Validity: 01.08.2018 -
Form of study: Language and communication studies
Type: Course
Unit: Language Center
Grading: Study modules 0-5,P/F

No course descriptions.

CS10A0875: Industrial Project Management, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Ekaterina Albats, Roman Teplov, Olli-Pekka Hilmola, Daria Podmetina

Year:
M.Sc. (Tech.) 1-2
Period:
3
Teaching Language:
English
Teacher(s) in Charge:
Associate Professor, D.Sc. (Tech.) Daria Podmetina
Professor, D.Sc. (Tech.) Olli-Pekka Hilmola
PhD Student Ekaterina Albats, PhD Student RomanTeplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
Aims:
The course equips students with theoretical backgrounds and practical project management tools aiming at developing project management skills.
This course aims to familiarize students with
• The project management (PM) concepts and tools for organizing, planning, and controlling projects (PERT, Gantt, critical path, critical chain and DSM matrixes) using the MS Project, and DSM software.
• The critical role of work breakdown structures and networks in planning and scheduling project and management of multi-project environment and multitasking.
• Managerial, cultural, and social aspects of PM and the importance of the organization's strategy during the project selection.
• How to reliably estimate the status of projects and how to finance of technology development projects.
Contents:

This course covers the fundamental concepts and applied techniques for cost effective management of both long-term development programs and short-term projects. The content deals with planning, scheduling, organizing, and controlling projects. The course uses cases from a wide variety of industries. Project management principles and methodology are provided with special focus on planning, controlling, and managing projects to successful completion. After successfully completing this course, the student will be able to:
• Identify the elements of the PM life cycle, including: Plan, Control, and Organize and Allocate Resources
• Understand PM processes and comprehend basic tools and techniques to plan, organize and manage a project;
• Optimize results while managing the triple constraints and manage stakeholder communication

Teaching Methods:

Lectures 14 h, computer exercises 4h, project analysis and report writing 35 h (each group needs to analyze one real technology development project regarding its risks and present it in joint-seminar), individual work and seminar preparation 15 h, total 68 h. Moodle is used in this course.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, based on the report (70 %), and home assignments/group work during the course (30 %). For students who are not able to participate in class, literature exam option can be proposed.

Course Materials:

Kerzner, Harold R. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Wiley, New Jersey. Eppinger, Steven D. & Tyson R. Browning (2012). Design Structure Matrix Methods and Applications. MIT press, Boston.

Prerequisites:

The course is obligatory for the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Number of participants is limited to 50.

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

Yes, 50

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

Yes, 10.

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

Yes, 5.

A330A0252: Internationalization of the Firm and Global Marketing, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Anisur Faroque, Sami Saarenketo, Juha Väätänen, Igor Laine

Note:

Only for master's level students. Can not be included in the same degree as A330A0251 Internationalization of the Firm. The course will be lectured twice a year, in periods 2 (Group A) and 3

(Group B).

Year:

M.Sc. (Tech.) 1, M.Sc. (Econ. & Bus. Adm.) 1

Period:

Group A: 2, Group B: 3

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc. (Econ. & Bus. Adm.) Igor Laine (Group A: 2nd period)
Junior researcher, D.Sc. (Econ. & Bus. Adm.) Anisur Faroque (Group B: 3rd period)
Professor, D.Sc. (Econ. & Bus. Adm.) Sami Saarenketo
Professor, D.Sc. (Tech.) Juha Väätänen

Aims:

Learning outcomes: After completing the course the student will understand, evaluate and develop the processes of firm internationalisation and global marketing. In particular, the students will be able to:
1. Identify and evaluate the characteristics of the international market environment and of international business
2. Recognize the dimensions and drivers of market globalization
3. Assess, criticize, compare and contrast as well as apply the essential theories and frameworks relative to internationalisation of the firm
4. Evaluate the ways in which international trade and investments affect world markets
5. Reflect upon the risks and opportunities in global markets
6. Provide a critical reflection on sustainability in international business
7. Analyze the key management decisions connected with the internationalisation of the firm and global marketing: Whether to internationalise, deciding which markets to enter, deciding how to enter the foreign market
8. Work effectively in cross-cultural teams
9. Create and deliver a group presentation focusing on the internationalisation decisions of a given company.

Contents:

Must know: International trade and investments, Drivers of globalization, Chain of strategic decisions related to internationalization of the firm, internationalization motives and barriers, Risks assessment in international markets, Internationalization theories (Uppsala model, Network approach, Born Global), international market selection process, factors influencing entry mode choice, characteristics of various entry modes (export modes, intermediate entry modes, hierarchical modes).

Should know: Global business relations and trade agreements, Concept of the value chain in internationalization, comparison of SMEs and LSEs in internationalization and global marketing, an environmental analysis in deciding which market to enter (political, economic, sociocultural, and technological environment).

Additional knowledge: Principles of transaction cost analysis.

Teaching Methods:

15 h lectures, 4 h pre-lecture assignments, 12 h in-class exercises, 30 h seminar assignments, 30 h written report, 2 h peer evaluation report, 32 h course literature, 35 h self-study and exam preparation. Total 160 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Examination 30 %, seminar assignments 30 %, pre-lecture assignments 15 %, research report 20 %, peer evaluation report 5 %. Each of the components has to be passed acceptably.

Course Materials:

1) Hollensen, S. (2017) Global Marketing, 7th edition, Pearson Education (older editions apply as well)
2) Cavusgil S.T., Knight G., Reisenberger J. (2017) - International Business: The New Realities, 4th edition, Pearson Education (older editions apply as well)
Additional materials will be announced on lectures. Additional reading and material assigned in class.

Prerequisites:

Sufficient prior business studies and basic knowledge of international marketing required. Due to the teaching methods, the number of participants may be limited to 75 students. In this case, the priority would be given to the students of the School of Business and Management.

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

Yes, 75, priority would be given to the students of the School of Business and Management.

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

Max 15

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

Max 10

CS10A0120: Introduction to M.Sc. Studies in Industrial Engineering and Management, 1 cr

Validity: 01.08.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Marja Talikka, Ville Ojanen, Leonid Chechurin

Year:

M.Sc. (Tech.) 1

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen
Professori Leonid Chechurin
Information Specialist, M.Sc. (Tech.) Marja Talikka

Aims:

The course provides the student with basic knowledge of studying at Lappeenranta University of Technology (LUT), Finland, in general and particularly in his/her school and degree programme. The course is aimed to help students to plan their studies at LUT and follow the progress of their studies with the help of a individual study plan.
Students recognize their own learning strategy and learn about information retrieval and the information sources available at LUT for courses and studying by using the Academic Library's services, collections and databases.

Contents:

The Orientation Days activities. Practical study-related information. Degree requirements. Planning of Master's studies.
Preparation of the individual study plan. Monitoring the progess of studies with the Academic Director

and Student Affairs Secretary.
The Academic Library collections and databases.

Teaching Methods:

Participation in the Orientation Days. Planning the individual study plan.
Library introduction lectures and assignments on information retrieval and library databases on Moodle (Period 1).
Study programme meetings with the Academic Director and Study Councellor (Periods 1-4).
Assignments: individual study plan, library assignments. Independent study. Total 26 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Pass/Fail (assignments, active participation in study programme meetings)

Course Materials:

Materials will be announced during the course.

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

No

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

No

CS30A1376: Product Development, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

After fulfilling all requirements of the course, the students will be able to: 1. Understand the concept of new product development 2. Recognise the phases of new product development 3. Work in a team during product development 4. Apply the basic methods of product development.

Contents:

The key topics of the course are: 1. Major Phases of New Product Development, 2. Engineering Concept Development and Testing (design for manufacturability, user-centred engineering, visualisation of design, robust design), 3. Integration of Technical Design and Business Analysis, 4. Intellectual Property in New Product Development, 5. Project Management, 6. Introducing a New Product to the Market

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project work. The classroom problem-solving sessions will be based on team-work in groups of 3-5 students. The 3-4 projects will be carried out in groups of 3-4 students independently and will result in the preparation of the project report. Classroom teaching and problem-solving sessions 36 hours. Project work 94 hours. Period 1. in-class activities (lectures, problem solving), period 2. out-of-class activities (project work). Total workload 130 hours.
Lectures, in-class activity, period 1.
Project work, out-of-class activity period 2.
Project work 94 hours.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Evaluation: solutions created in the classroom problem-solving sessions 40%, project reports 40%, written exam 20%. Attendance requirement: 90% of classroom sessions.

Course Materials:

Course slides
K. Ulrich, S. Eppinger: Product Design and Development, McGraw-Hill, 2012

Prerequisites:

Basic understanding of management. Basic knowledge of engineering disciplines.

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

Yes, 60

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

15–

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

max 5

CS10A0863: Research Methods for Master Students, 6 cr

Validity: 01.08.2014 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Roman Teplov, Daria Podmetina, Ekaterina Albats

Year:

M.Sc. (Tech.) 1-2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
PhD Student Ekaterina Albats
PhD Student Roman Teplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina

Aims:

The course aims to provide guidelines to master students on how to conduct the research in management and how to report its results. In the end of the course, students should be able to:
• write literature review;
• formulate research questions and research design;
• choose research method;
• collect and analyze qualitative or quantitative data;
• interpret and report the results of the research.

Contents:

The course consists of 3 modules, 2 ECTS each. In the first module, students will learn basics of doing research: formulating and clarifying the research topic and research questions; conducting literature review; formulating the research design and choosing research methods. The second module is dedicated to collecting and analyzing quantitative data. The third module will introduce collecting and analyzing qualitative data.

Teaching Methods:

Module seminars 36 h (12 h each module), exercises 6 h (related to modules 2 and 3), preparing reports and self-study 116 h. Total 158 h. Moodle is used in this course.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Based on average grade received from 3 modules (30 % each). Module 1 evaluation is based on learning diary and in-class assignments. Modules 2 and 3 are evaluated based on reports on quantitative and qualitative methods. There is no written exam on this course, but different activities and group assignments during seminars will be evaluated.

Course Materials:

Course book: Saunders, M, Lewis, P. and Thornhill, A. (2009). Research methods for business students, 5th ed., FT/Prentice Hall. Additional materials will be announced on the lectures.

Prerequisites:

The course is targeted to the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Students not from GMIT program have to apply with motivation letter to the teachers. Number of participants is limited.

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

Yes, max 10

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Justyna Dabrowska, Marko Torkkeli

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Marko Torkkeli

Aims:

Managing in a knowledge-based economy, Managing by Core Competences, Knowledge intensive firms, Uncertainty. Are they the latest buzz words or another passing managerial fad? Old wine in new bottles? Or perhaps, just perhaps, fundamental means of survival and success for modern day corporations? Given the amount of effort that has been devoted to the topic by both academics and practitioners, it appears worth taking a deep and dispassionate look at the role of entrepreneurial thinking in sustained competitive advantage. The goal is to learn as you go and effectively convert assumptions to knowledge at a low cost.
By the end of the course, students will be able to identify business opportunities and analyze them using different tools of uncertainty management. Students will be able to understand the main components of different pitches and be able to design and present a pitch.

Contents:

During the course students learn to develop and test a business idea following the feasibility analysis, discovery driven planning steps as well as using the uncertainty management tools of Attribute Mapping, Supply Chain Analysis, Differentiation, Quizzing and Market-Busters. The course does not teach business plan writing but rather focuses on opportunity recognition and feasibility assessment. Moreover, it adds the elements of lean startup as well as social entrepreneurship as possible avenues in dealing with entrepreneurial challenges.
Entrepreneurial thinking, uncertainty management, strategic entrepreneurship, discovery-driven planning.

Teaching Methods:

Lectures 20 h, Independent study 73 h, seminar work writing 63 h, Total 156 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):

No

Assessment:

0 - 5. Based on assignment and in-class work, participation in the lectures required (possibility to substitute absence with literary work).

Course Materials:

Lectures and additional reading provided in the class. Book: McGrath Rita and MacMillan Ian, (2000). The Entrepreneurial Mindset. Harvard Business School Press.; McGrath Rita and MacMillan Ian, (2005). MarketBusters: 40 strategic moves that drive exceptional business growth. Harvard Business Press.

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

60, priority for GMIT students and others to whom this course is part of the major.

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

Yes, max 15

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS30A1341: Strategic Technology and Innovation Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Kalle Elfvengren, Ville Ojanen

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen

Aims:

Student can 1. design and analyze technology and innovation strategy of a company, 2. apply different tools and frameworks of technology management, 3. Develop and plan alternative progress routes for managing technology, innovations, as well as product and service portfolios.

Contents:

Core material: Innovation as a core business process. Innovative organisation. Development of technology and innovation strategy. Innovation networks. Decision-making in technological and market uncertainty. Creation of new products and services. New technology-based ventures. Innovation performance and learning. Methods of technology management.

Teaching Methods:

Lectures 12 h, 1st period. Exercises 10 h, 2nd period. Seminars 12 h, 2nd period. Preparation for lectures and exercises 12 h. Seminar work and other assignments 110 h. Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. No exam. Seminar work, group works and other assignments, incl. written reports and presentations 100%.

Course Materials:

Joe Tidd and John Bessant. Managing Innovation – Integrating Technological, Market and Organizational Change, 4th ed. 2009, or newer (2013, 2018). Lecture notes and other material announced in the beginning of the course.

Prerequisites:

Recommended: CS30A0952 Innovaatio- ja teknologiajohtamisen peruskurssi (Finnish course). Recommended: B. Sc. in Industrial Engineering and Management or equivalent basic knowlege of innovation and technology management.

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

Yes, 50, priority to GMIT students.

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

max 5

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

max 5

Description and DL of the company assignment:

The course includes a project work (three person groups) with company assignments on e.g. following topics: Sources of innovations, Networks and other forms of cooperation in innovation and technology management, and Processes for developing and commercializing new products or services. The work load is ca. 50 hours per student. The deadline for the company-related topics is in Mid-September. Contact details: Ville Ojanen, ville.ojanen@lut.fi, +358401621201

TuDGMITSpec: Tuta GMIT, Specialisation Studies, 58 - 59 cr

Validity: 01.08.2016 -
Form of study:
Type: Study module
Unit: LUT School of Business and Management

No course descriptions.

Obligatory specialisation studies 48 ECTS cr

CS30A1372: Creative Design and Problem Solving, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

Learning outcomes: After fulfilling all requirements of the course, the students will be able to: 1. Understand the principles of creative problem solving 2. Know the basic methods of creative design 3. Work in team during the design process 4. Apply methods of creative design to products, processes, services and business methods

Contents:

The major subjects of the course are: Major Steps in Problem Solving Types of Problems Types of Design Concept of Creativity Survey of Intuitive and Structured Methods of Creativity Enhancement Types of Brainstorming Check lists Morphological analysis Synectics Case-based Reasoning Graphical Methods Evaluation of Ideas

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project works. The in-class problem-solving sessions will be based on the team work realised by the groups of 3-5 students. The 3-4 project works will be realised by the groups of 3-4 students during the out-of-class activities and it will be finished with the preparation of the project report. In-class teaching and problem-solving sessions 42 h, project works 88 h. Total workload 130 h.

Lectures, in class activity, period 1.
Project work, out-of - class activity, period 2.
Project work 88 hours

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Final grade 0-5. Evaluation: Generated solutions of the in class problems 40 %, project reports 30 %, written exam 30%. Obligatory presence during 80% of in-class activities.

Course Materials:

Course slides.

Tony Proctor
Creative problem solving for managers
Routledge, 3rd edition, 2009

H. Scott Fogler and Steven E. LeBlanc
Strategies for Creative Problem Solving
Prentice Hall, 3rd edition , 2013

David Silverstein, Philip Samuel, Neil DeCarlo
The Innovator's Toolkit: 50+ Techniques for Predictable and Sustainable Organic Growth
Wiley, 2009

Alexander Osterwalder and Yves Pigneur
Business Model Generation
Osterwalder and Pigneur, 2010

Prerequisites:

Basic courses of management. Basic knowledge of engineering disciplines (e.g. process or mechanical engineering).

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

Yes, 80

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

15–

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

max 5

CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Leonid Chechurin

Year:

M.Sc. (Tech.) 1-2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Leonid Chechurin

Aims:

After having completed the course, student is to know and able to apply instruments for product/process inventive design. The course helps to recognize the role, place and institutions of invention in innovation process/business. It contains basics on patenting, patent search and analysis, including modern approaches (big data, semantic etc). The course presents conceptual design context and its tools (Quality Function Deployment, Kano model, Decision making tools etc). It reviews modern design tools: Axiomatic Design, Design For X (Manufacturing, Robustness, Assembly, Environment, etc) and focuses on the role and main instruments of TRIZ (Ideal Final Result, Contradictions, SuFiled, Trends of Engineering System Evolution). We learn how to model an engineering system/product by Function framework, perform Function Model analysis transformation, Trimming (system reduction), Function-Oriented search, build Fault tree. About 20 case studies and 100 examples of inventive designs are presented.

Contents:

Introduction Optimization and Invention. Design roadmaps. 1. Information search and analysis: Patent and Scientific paper data bases. Search by keywords and classification codes. Function oriented search. Similarity: bibliographic, semantic. Technology landscapes. Subject-Object-Action framework. ArrowSmith approach. 2. Function based analysis: Ontologies of system description. Function based modeling. Subject-Object-Function framework. Function analysis. 3. Design evaluation: Axiomatic Design. DFx: design for manufacturability and assembly, design for robustness, design for environment, etc. TRIZ's design ideality concept. Trends of engineering system evolution as evaluation tool. Case studies and examples, Hands on. 4. Design modification: Function-based design improvement: trimming, contradiction elimination. Substance-Field. Standards for SuField model transformations. Case Studies,

examples, Hands on. 5. Algorithm: Inventive design roadmap. Context of inventive design in industrial environment: market analysis tools (QFD, Kano, etc.), integration to research management tools, decision making tools. Case studies. Conclusion.

Teaching Methods:

Lectures 28 h, exercises 28 h, team work 38 h, reading 49 h, exam 13 h. Total workload 156 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):

No

Assessment:

Final grade 0 - 5. Test 30% + Report on project (Assignment) 50% + Personal reading 20%.

Course Materials:

Hand outs of lecture notes, internet resources in open access (given), selection of papers (given), videos on the main topics of the course - all available in Moodle and http://triz.thinkific.com/

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

max 10

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

max 5

CS30A1661: Open Innovation, 6 cr

Validity: 01.08.2013 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Antero Kutvonen, Daria Podmetina, Justyna Dabrowska

Year:

M.Sc. (Tech.) 2, M.Sc. (Econ. & Bus. Adm.) 2

Period:

Periods 1-2, Periods 3-4

Teaching Language:

English

Teacher(s) in Charge:

Researchers, D.Sc. Antero Kutvonen, D.Sc. Daria Podmetina and doctoral students, M.Sc. Ekaterina Albats, M.Sc. Justyna Dabrowska

Aims:

After completion of the course, students will be able to
1. explain the concept of open innovation through both theory and examples (to e.g. a company executive)
2. analyze open innovation activities in real life companies and the motives for engaging in them and the mechanisms through which they create value for the company
3. distinguish between different modes of open innovation (inbound, outbound and coupled)

4. analyze the relation between a company’s strategic choices and application of open innovation
5. understand and apply the scientific literature on the theme and relate open innovation to the context of other innovation management theories.

Contents:

Must know: The fundamental definitions and concept of open innovation. Modes and implementations of open innovation, i.e. ways to manage purposive in- and outflows of knowledge to collaboratively develop and/or commercialize innovations. Difference between closed and open innovation in managing technology. Identifying open innovation activities in real life firms. Monetary and strategic motives for engaging in open innovation.
Should know: Process models of inbound, outbound and coupled open innovation. The relation between corporate strategy, technology strategy and open innovation activities. Models of distributed innovation such as crowd-based open innovation. Most common examples of firms used to explain open innovation. Platforms and ecosystems role in business and innovation. Varying topics from state-of-the-art open innovation research, depending on guest lecturer. Basics of IPR management in open innovation.
Nice to know: Development of the open innovation concept on the basis of prior innovation management theories. Knowledge of the main scientific literature surrounding open innovation. Theoretical determinants of open innovation and future perspectives towards the phenomenon.

Teaching Methods:

Lectures and guest speakers 35 h as intensive teaching. Small group assignments during lectures. Group exams (or substituting them with summaries of scientific articles, 16 h) on two of the intensive days, preparing for exams 16 h. Group-based case assignment 36 h. Independent study 44 h. Total 155 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Continuous evaluation based on small group exams (50%) and group-based case assignment (50%). Possibility to substitute group exams with literary work (summaries of scientific articles) in case of absence.

Course Materials:

The course book and reading material will be announced at the first lecture.

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

Yes, 40 students, prioritized based on motivation letter submitted during registratio

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

max 5

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

max 5

CS90A0060: Master's Thesis, 30 cr

Validity: 01.08.2008 -

Form of study: Basic studies

Type: Master's Thesis

Unit: LUT School of Business and Management

Teachers: Lea Hannola

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

Finnish and English

Teacher(s) in Charge:

Lea Hannola, D.Sc. (Tech.), Associate Professor
Other teachers: Professors and Associate Professors of Industrial Engineering and Management

Aims:

Aftercompleting the course, students will be able to:
- demonstrate their knowledge of a topic of scientific and societal importance in a specific professional area
- demonstrate the ability to carry out the project independently and following a plan
- produce the thesis, which is organised coherently, the presentation is academic and the language revised
- act and communicate in different kinds of interactions and work environments in an entrepreneurial way by taking independently and actively responsibility about the development and management of business
- apply and utilize independently new knowledge both in scientific postgraduate studies and other lifelong learning

Contents:

The Master’s thesis is the final project of the degree of Master of Science (Technology). Usually it involves a
development project commissioned by a company and takes about six months.
The work entails working on a development project related to industrial management, preparing a report in the form of a
thesis, and presenting the work in a way that the first supervisor requires.
Topic of the master's thesis has to be confirmed as soon as the topic has been decided with the first supervisor. Use
form 1A in UNI-portal.

Teaching Methods:

Development project and related report, presentation of the work (1. supervisor defines the way), maturity test (usually on the contents of the thesis).

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:

Electronic guide for Master's Thesis workers and supervisors,
Study support -sites in Uni-portal, Industrial Engineering and Management

Prerequisites:

B.Sc. (Tech.) degree (not required of students admitted directly into a Master’s programme), complementary
studies (for students admitted directly into a Master’s programme).

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

No

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

No

Elective specialisation studies min. 11 ECTS cr

CS10A0760: Business in Russia, 6 cr

Validity: 01.08.2012 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Roman Teplov, Daria Podmetina, Ekaterina Albats, Juha Väätänen

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Juha Väätänen
Post Doctoral Researcher, D.Sc. (Tech) Daria Podmetina

Aims:

Student is able to 1. analyze consumer markets and living standard, 2. assess competitiveness of industrial sectors and enterprises, 3. understand innovation process and innovation strategy on individual, company and country levels, 4. assess the specifics of online and offline commerce, 5. be familiar with marketing practices applied locally, 6. understand basics of entrepreneurship and doing business in Russia, 7. be aware of cultural aspects of Russian business.

Contents:

Consumer markets. Living standard. Russian enterprise structures. Industrial and service sectors. Company innovation strategies. Entrepreneurship and new enterprises. Marketing practices. Trade, foreign direct investments and e-commerce. Business culture. Russia's competitiveness, and future trends.

Teaching Methods:

Lectures 14h, research report and home assignments 72 h, course literature 40 h, self study and exam preparation 30 h. Total 156 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Exam 40 %, written report 40 %, home assignments 20%. Each of the components has to be passed acceptably.

Course Materials:

The World Bank report on Russia. Latest available version. Diversifying Russia. Harnessing regional diversity. EBRD. Latest available version. Additional material will be announced on lectures.

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

Yes, 15-

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS10A0885: Research Project in Industrial Management, 1 - 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Juha Väätänen, Ekaterina Albats, Daria Podmetina, Ville Ojanen, Leonid Chechurin

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Professor D.Sc. (Tech.) Juha Väätänen
Associate Professor D.Sc. (Tech.) Ville Ojanen
Professor Leonid Chechurin
Associate Professor D.Sc. (Tech.) Daria Podmetina

Aims:

Student learns to conduct independent research work in Industrial Engineering and Management in a specialized area. Student learns to apply the learned skills of Industrial Engineering and Management in a specific research project.

Contents:

A specific individual research project which is planned together with the supervisor and consists mainly of laboratory/desktop research work, literature work and report writing.

Teaching Methods:

Participation in the work of a research group and preparation of the research report, self-study totaling 26-156 hours.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5

Course Materials:

Literature related to the project.

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

No

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

No

CS30A1391: Systems Engineering, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech) 2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

After completion of the course, the students will be able to:

- Understand the basic concepts of systems engineering
- Apply the basic methods of systems analysis
- Work in a team during systems design

Contents:

The key topics of the course are: the concept of system, developing system requirements, the index of performance, system development and integration, system modelling, multi-criteria decision-making, ranking the alternatives.

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project work. The classroom problem-solving sessions will be based on team work in groups of 3-5 students. The 2-3 projects will be carried out in groups of 3-4 students independently and will result in the preparation of a project report. Classroom teaching and problem-solving sessions 30 hours. Project work 100 hours. Period 3. in-class activities (lectures, problem solving), period 4. out-of-class activities (project work). Total workload 130 hours.
Lectures, in-class 30 h, period 3. Project work, out-of class, 100 h, period 4.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Evaluation: solutions generated in classroom sessions 30%, project reports 40%, written exam 30%. Obligatory presence during 80% of in-class activities.

Course Materials:

Course slides.
Blanchard, B. S., Fabrycky, W. J.,
Systems Engineering and Analysis, Pearson, 2014

Liu Dahai
Systems Engineering, CRC Press, 2016

Alexander I., Beus-Dukic L.
Discovering Requirements, Wiley, 2009

Gibson J., Scherer W., Gibson W.
How to Do Systems Analysis, Wiley, 2007

Martin J.
Systems Engineering Guidebook, CRC, 1996

Prerequisites:

Basic courses on management.

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

Yes, 60

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

15–

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

max 5

CS30A1671: Service Innovation and Management, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Kalle Elfvengren, Ville Ojanen

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen

Aims:

Student can
1. recognize and categorize the variety of services and service firms in modern industrial environment as well as understand their influence in management of industrial innovations
2. identify the characteristics of services and evaluate the similarities, differences and links between services and physical products
3. define the dimensions of service innovations
4. explain the processes of new service development
5. summarize the main managerial challenges in service innovation management
6. select and apply the suitable frameworks, tools and methods, to overcome some typical real-world challenges in service innovation management

Contents:

Typologies of service firms. Characteristics of services. Product-service systems in manufacturing industry. Knowledge-intensive business services. New service development process. Dimensions of service innovations. Productization of services. Supporting methods for service innovation management. Managerial challenges in service innovation management. Utilization of frameworks, methods and tools in service innovation management. Roles of different types of firms in service systems and networks. Value creation through services. Customer-centric service development.

Teaching Methods:

Lectures and exercises 20 h, 3rd period. Seminars 12 h, 4th period. Group assignments and project work 120 h. Total 152 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Written reports and seminars 100 %.

Course Materials:

Lecture notes. Other material, books and articles announced in the beginning of the course.

Prerequisites:

Recommended: B.Sc. on Industrial Engineering and Management, or equivalent knowledge

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

Yes, 50

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

max 5

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

max 5

CS30A7402: Software and Application Innovation, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Antti Herala, Helinä Melkas, Jari Porras, Mirva Hyypiä

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Jari Porras
Professor, D.Sc. (Tech.) Helinä Melkas

Aims:

At the end of this course students will be able to:

1. Identify and conceptualize an opportunity for innovation in the selected field
2. Identify the technical possibilities and limitations in the selected field
3. Demonstrate the knowledge and skills of innovation methods in creation of new meaningful software solutions and applications based on some technology
4. Demonstrate good team working skill in developing and presenting the new innovation.

Contents:

Theme of the course changes on a yearly basis. This course combines technology and technology management perspectives for cross-scientific approach in software and application innovation process. Course consists of

- Basics and use cases of the selected theme and related technologies
- User-centric needs based design in software and application development
- Innovation management, idea generation and opportunity identification process
- (Open) business models and technology commercialization in global markets
- Product and service development

Teaching Methods:

Lectures 14 h, Group meetings 2 h, Independent group based project work 40 h, Period 1
Online workshop 5 h, group meetings 2 h, Seminars 8 h, Independent group based project work 45 h, Documentation 40 h, Period 2
Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Project work 80%, Presentations 20%

Course Materials:

Drucker P., The discipline of innovation, Harvard Business Review, August 2002.
Buur J., Matthews B., Participatory Innovation, International journal of innovation management, Vol. 12, No. 3, 2008.
Technical material focusing on the theme of the year will be announced on the Moodle pages of the course.

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

Yes, max 10

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

No

CS30A0940: Intelligent product-service systems, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Lea Hannola

Note:

This course is aimed for the students of Master's Degree level.

Year:

M.Sc. (Tech.) 2

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc (Tech.) Lea Hannola
Researcher, M.Sc. (Tech.) Ilkka Donoghue

Aims:

Student can
1. understand digital transformation trends affecting manufacturing business 2. define and explain the concepts related to product data management and product life cycle management
3. recognize the company's product processes and understands their interaction with the company's overall operations
4. compare PLM & ERP systems' characteristics, technical features and managerial functions and is able to see their role in product development and business management.

Contents:

PLM trendsand Digital transformation. Differentviews on product: structures – processes – lifecycle – data/information. Challengeswith lifecycle management. Requirementsmanagement and Systems Engineering. Productinformation modeling and change management. Configurationmanagement through lifecycle (CLM). IoT baseddata services for sustainability. Features andfunctionalities of PLM systems. PLM projectand demos of systems utilization. Future PLM invarious industries.

Teaching Methods:

Lectures 21 h, seminars 14 h, 3rd period, as intensive studies. Course assignment 55 h and exam 68 h, 3rd period. Total 158 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Exam 60 %, project assignment and seminar participation 40 %.

Course Materials:

Journal articles and lecture material. Sääksvuori-Immonen: Product Lifecycle Management, Springer 2008.

Prerequisites:

B.Sc. on Industrial Management, or equivalent knowledge.

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

max 10

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

max 5

A210A0702: New Venture Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Terhi Virkki-Hatakka, Antero Tervonen, Sanni Väisänen, Anna Vuorio, Markku Ikävalko

Note:

The course is an advanced level course, but it can also be placed in bachelor's studies. Course is carried out in cooperation with several courses of Mechanical Engineering and Electrical Engineering Degree Programmes.

Year:

B.Sc. (Tech.) 2-3, B.Sc. (Econ. & Bus. Adm.) 2-3, M.Sc. (Tech.) 1-2, M.Sc. (Econ. & Bus. Adm.) 1-2

Period:

1-3

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc.(Bus. Adm.) Anna Vuorio
Associate professor, D.Sc. (Bus. Adm.) Markku Ikävalko
Project manager, D.Sc. (Tech.) Terhi Virkki-Hatakka
University Lecturer, D.Sc. (Tech.) Antero Tervonen
Post-doctoral researcher, D.Sc. (Tech.) Sanni Väisänen
M.A. in Russian language and philosophy James F. Hyneman

Aims:

By the end of the course, students will be able to
- apply the skills and knowledge accumulated from previous courses into practice,
- recognize and develop new business ideas,
- manage creativity and learn methods for idea generation,
- plan different business operations,
- manage and organize business as a whole and act as a manager,
- create various business and management documents and reports,
- communicate issues about the project with other firm members.

Contents:

Recruited business experts together with engineering experts (= mainly mechanical engineering students) explore their creativity and create new business ideas by forming creative swarms. In these swarms of individuals, new business ideas are created and developed further. After evaluating ideas, business experts form virtual firms (= small groups) with 4-6 individuals and develop elements of business activity around their idea in cooperation with engineering experts.
The entire staff of the firm is self-organized and takes care of the establishment of the virtual firm. Business experts formulate a business plan and financial plan in cooperation with possible engineering experts of the firm. The tasks of business experts also include planning of various business activities,

implementing those activities and reporting: management, financial management, cost accounting, budgeting, finance, marketing, supply chain management and logistics in cooperation with product planning and manufacturing.
The board and the Investors' board (= the teachers of different accompanied courses and a business mentor outside the university) support firm operations.

Teaching Methods:

Board steering sessions (= introductory lectures) 12 h, 1st period. Board steering sessions 4 h and the board meetings 3 h, 2nd period. Board steering sessions 4 h and the board meetings 4 h, 3rd period. Independent project work by the staff of the virtual firm (the staff mainly defines working schedules, practices and responsibilities by itself) 133 h, 1st-3rd periods. Total workload 160 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Grade 0-5, evaluation 0-100 points; project work 60 % (includes internal activities of the virtual firm, different written assignments of the business experts and performance in board meetings), peer review by the members of the firm 20 %, and self-evaluation 20%.

Course Materials:

Material of the steering session of the board (= lecture notes). Material sought by the staff of the virtual firm.

Prerequisites:

The basic studies of bachelor’s degree in Business Administration or bachelor’s degree in Industrial Engineering and Management

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

Yes, 50; own quotas for Business Administration students and Industrial Engineering and Management students; priority to master degree students.

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

No

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

No

CS30A7370SS: Simulation Modelling in Industrial Management, 3 cr

Validity: 01.06.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

The number of course attendants is limited to 20. The course teacher selects 20 students after the course registration is over.

Year:

M.Sc. 1-2

LUT Summer School time:

Not organized during summer 2018

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher Samuli Kortelainen, LUT

Aims:

Learning outcomes:

The amount of data available for decision makers is constantly increasing. The increase of data enables new opportunities for managers, but also creates a demand to develop systems that can generate this data into usable intelligence. Simulation techniques offer interesting option for managers to better understand and develop firm's business processes.

The key simulation skills that the student has to possess after successful completion of the course:

- Understanding on what system and complexity theories mean, and what are their business implications
- Capability and design simulations model with a systematic process
- Understand the possibilities, but also restrictions, of simulation modelling as an analysis tool
- Practical simulations skills with the three most common simulation methods
  o System dynamics
  o Discrete event simulation
  o Agent based modelling
- Skill to use simulation models to conduct tests on system performance

Contents:

This course is designated to explore two critical aspects of simulation modelling to business management:
- The analysis and development of already existing processes
- The analysis and testing of new proposed process

First, the natural way to use simulation modelling is to model the firm's current operations. The goal in this kind of simulation is to understand and then develop firm's processes to perform better. As such, simulation offers an opportunity to support management of firm's operational processes. During the course, this methodology is used to simulate firm's manufacture processes, but also more abstract service processes.

The second way to utilize simulation is to model future processes. This enables testing the effect of a new innovation to a given process. This allows analysis on the true value of an innovation and thus supports management of innovations. This application area is the focus of later part of the course.

Teaching Methods:

The teaching is dominantly interactive workshop in small groups supported by in-class lectures. In addition there is a pre-course essay for the course, which has 3 questions. Expected length is 20 pages.

- In-class teaching 6 hours
- Workshop + learning diary at the end of each lecture day 24 hours
- Pre-course work 48 hours

Total workload 78 hours
Maximum course attendants is 20 persons. Final student selection is made by the teacher after the registration is over.

Assessment:

Final grade 0-5. Evaluation:
- essay 60 %
- learning diary 40 %

Course Materials:

Course slides to be distributed during the course.

Prerequisites:

- Previous studies in management are strongly suggested
- Skills that assist learning
  o Basic Excel and coding skills
  o Good skills in logical thinking
  o Basic math skills
  o Positive attitude

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

Yes, maximum course attendants is 20 persons. Final student selection is made by the teacher after the registration is over.

A330A5000SS: International Marketing of High Technology Products and Innovations, 3 cr

Validity: 01.06.2012 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Sanna-Katriina Asikainen, Sanjit Sengupta

Note:

Only for Master's level students. The course topics are related to sustainable development.

Lectured every other academic year (Yes, next realization year/Leave empty):

Yes, 2019-20

Year:

M.Sc. 2

LUT Summer School time:

Summer 2019

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Sanna-Katriina Asikainen, LUT

Aims:

Learning outcomes:

- Distinguish the special characteristics of high technology marketing environment (like the type of innovation, market and technology uncertainties, network externalities) and assess external high technology environments (e.g. relating to competitive landscape, consumer behavior, markets) in global scale.
- Evaluate and justify marketing strategies in high technology environments.
- Make marketing decisions in high technology environments.

Course aims to provide a deep understanding of the functions of marketing regarding challenges and opportunities in high technology products and markets; assist the participants to understand the virtue and limitations of traditional marketing thinking and tools in emergent high technology markets.

Contents:

- Strategy and corporate culture in high tech firms.
- Partnerships and alliances.
- Marketing research in high tech markets.
- Understanding high tech customers.

- Product development and management issues in high tech markets.
- Pricing considerations in high tech markets.
- Advertising and promotion in high tech markets.

Teaching Methods:

- Lectures and in-class assignments 30 hours
- Preparing for lectures 25 hours
- Preparing for exam 25 hours

Total workload 80 hours.

Assessment:

Final grade 0-5. Evaluation 0-100 points:
- Exam 50 points
- In-class assignments 30 points
- Class participation 20 points

Course Materials:

- Mohr, Jakki, Sanjit Sengupta, and Stanley Slater (2010) Marketing of High-Technology Products and Innovations. Third Edition. Pearson Prentice Hall. Web site http://marketinghightech.net/
- Assigned reading.

Prerequisites:

For summer school students: previous studies in business recommended.

For MIMM degree students at LUT: Internationalization of the Firm and Global Marketing, Strategic Global Marketing Management, Technology and Innovation Management.

CS20A6040: Lean Six Sigma Green Belt, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Janne Huiskonen

Year:

M.Sc.(Tech.) 1

Period:

2

Teaching Language:

English

Teacher(s) in Charge:

professor, D.Sc.(tech.) Janne Huiskonen

Aims:

The course will prepare participants to act as a Lean Six Sigma Green Belt in three roles or capacities:
1. To conduct detailed diagnoses of processperformance problems.
2. To conduct independent Green Belt-levelimprovement projects.
3. To support Black Belts in performance ofmore complex projects.

Contents:

Proven method for project management
- DMAIC links together Lean Six Sigma tools to a result-driven project management method
- E.g.: DMAIC, Project charter, SIPOC map

Qualitative tools to understand processes
- Practical tools for process mapping, value analysis, and risk analysis
- E.g.: Value Stream Map, Fishbone Diagram, Potential Problem Analysis'

Quantitative tools to understand variation
- Analytical tools focused on understanding variation and problems in processes
- E.g. : ANOVA, Capability analysis, GageR&R

Teaching Methods:

Workload: Online videos and quizzes 45 h, Workshops 17 h, Group work 30 h, Individual studying 38 h

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Number of mid-term examinations:

No

Assessment:

Pass/fail.
Assessment Methods and Criteria:
1. Participation to workshops
2. Obligatory cases and assignments

Course Materials:

Given at workshops.

Prerequisites:

CS20A0102 Tuotannon- ja materiaalinohjaus

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

Yes, 30. Primarily TUTA students of the Operations Management programme or the GMIT programme.

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

No

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

No

Exchangeable courses

CS30A1684SS: Advanced Course in Strategic Management, 3 cr

Validity: 01.06.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

LUT students: the student who has completed the course CS30A1682 Advanced Course in Strategic Management can not include this course into the LUT degree.

Year:

M.Sc. 1-2

LUT Summer School time:

30.7-3.8.2018

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher Samuli Kortelainen, LUT

Aims:

Learning outcomes.
Strategic management literature is a widely research topic, that has led to a wide and many times confusing and even contradictory litera-ture. In order to fully understand the current state of literature, the lens needs to be first turned to the history of different strategic schools. Therefore, the course starts from the roots of strategy man-agement and then builds a comprehensive view to the current status of strategic management literature.
After the successful completion of course the student has:

- Comprehensive picture of the current state of strategic man-agement theory and understanding reasoning behind different strategic management theories
- Understanding on the limitations and restrictions in current strategic management theory and their practical implications
- Holistic view to current new themes linking strategic man-agement theories to other industrial management disciplines

Contents:

Main schools of strategic management
The course begins on looking at the development history of main strategic management schools, where the goal is to identify similari-ties and differences between different literature streams.
The challenges and criticism of current strategic management theories
Although strategic management theories are widely applied, they are also subjected to wide range of criticism. The second part of lectures focuses on these critical aspects of strategic management.
Current development paths of strategic management theory
Third part focuses on the various detailed development steps in stra-tegic management literature to counter or point critical points in origi-nal theories.
Linking strategic management to other management theories
There are multiple different management literature streams (e.g. marketing, supply-chain, and innovation) that also tackle strategic issues. The fourth part of lectures focuses on bridging these man-agement theories.
New entries to strategic management discussion
The final part of lecture series focuses on raising themes in strategic management such as multi-sided markets, business models, and data analytics.

Teaching Methods:

Lectures 16 hours
In-class room exercises 10 hours
Essay summarizing critical strategic management articles, workload 24 hours
Preparing for the exam 16 hours; final exam executed on the final day of the course 12 hours

Total workload 78 hours

Assessment:

Final grade 0 – 5:

Exam 60%
Essay 40%

Course Materials:

Course slides and selected articles to be announced in the class.

Prerequisites:

- Successfully completed Bachelor or higher level studies in Industrial Management
- Good understanding on basic strategic management concepts
- Basic knowledge on other management topics (marketing, innovation management)

CS30A1655: Advanced Course in Strategic Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

The student who has completed the course CS30A1684SS Advanced Course in Strategic Management can not include this course into the LUT degree.

Year:

M.Sc. (Tech) 2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher, D.Sc. (Tech.) Samuli Kortelainen

Aims:

Strategic management literature is a widely research topic, that has lead to a wide and many times confusing and even contradictory literature. In order to fully understand the current state of literature, the lens needs to be first turned to the history of different strategic schools. Therefore, the course starts from the roots of strategy management and then builds a comprehensive view to the current status of strategic management literature. After the successful completion of course the student has:
1. Comprehensive picture of the current state of strategic management theory o Understanding reasoning behind different strategic management theories
2. Understanding on the limitations and restrictions in current strategic management theory and their practical implications
3. Holistic view to current new themes linking strategic management theories to other industrial management disciplines

Contents:

1. Main schools of strategic management The course begins on looking at the development history of main strategic management schools, where the goal is to identify similarities and differences between different literature streams.
2. The challenges and criticism of current strategic management theories Although strategic management theories are widely applied, they are also subjected to wide range of criticism. The second part of lectures focuses on these critical aspects of strategic management.
3. Current development paths of strategic management theory Third part focuses on the various detailed development steps in strategic management literature to counter or point critical points in original theories.

Teaching Methods:

Lectures 18 h, in-class room exercises 10 h, seminarwork and presentation 50 h, preparation to exam 50 h. Total 128 h. Individual 24 h exam.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Exam 50 %, exercise 50 %.

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

Yes, 10

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS10A0875: Industrial Project Management, 3 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Roman Teplov, Olli-Pekka Hilmola, Daria Podmetina

Year:
M.Sc. (Tech.) 1-2
Period:
3
Teaching Language:
English
Teacher(s) in Charge:
Associate Professor, D.Sc. (Tech.) Daria Podmetina
Professor, D.Sc. (Tech.) Olli-Pekka Hilmola
PhD Student Ekaterina Albats, PhD Student RomanTeplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
Aims:
The course equips students with theoretical backgrounds and practical project management tools aiming at developing project management skills.
This course aims to familiarize students with
• The project management (PM) concepts and tools for organizing, planning, and controlling projects (PERT, Gantt, critical path, critical chain and DSM matrixes) using the MS Project, and DSM software.
• The critical role of work breakdown structures and networks in planning and scheduling project and management of multi-project environment and multitasking.
• Managerial, cultural, and social aspects of PM and the importance of the organization’s strategy during the project selection.
• How to reliably estimate the status of projects and how to finance of technology development projects.
Contents:
This course covers the fundamental concepts and applied techniques for cost effective management of both long-term development programs and short-term projects. The content deals with planning, scheduling, organizing, and controlling projects. The course uses cases from a wide variety of industries. Project management principles and methodology are provided with special focus on planning, controlling, and managing projects to successful completion. After successfully completing this course, the student will be able to:
• Identify the elements of the PM life cycle, including: Plan, Control, and Organize and Allocate Resources
• Understand PM processes and comprehend basic tools and techniques to plan, organize and manage a project;
• Optimize results while managing the triple constraints and manage stakeholder communication
Teaching Methods:

Lectures 14 h, computer exercises 4h, project analysis and report writing 35 h (each group needs to analyze one real technology development project regarding its risks and present it in joint-seminar), individual work and seminar preparation 15 h, total 68 h. Moodle is used in this course.
Examination in Examination schedule (Yes/No):
No
Examination in Moodle (Yes/No):
No
Examination in Exam (Yes/No):
No
Assessment:
0-5, based on the report (70 %), and home assignments/group work during the course (30 %). For students who are not able to participate in class, literature exam option can be proposed.
Course Materials:
Kerzner, Harold R. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Wiley, New Jersey. Eppinger, Steven D. & Tyson R. Browning (2012). Design Structure Matrix Methods and Applications. MIT press, Boston.
Prerequisites:
The course is obligatory for the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Number of participants is limited to 50.
Limitation for students? (Yes, number, priorities/Leave empty):
Yes, 50
Places for exchange-students? (Yes, number/No):
Yes, 10.
Places for Open University Students?(Yes, number/No):
Yes, 5.

A330A0252: Internationalization of the Firm and Global Marketing, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Anisur Faroque, Sami Saarenketo, Juha Väätänen, Igor Laine

Note:
Only for master's level students. Can not be included in the same degree as A330A0251 Internationalization of the Firm. The course will be lectured twice a year, in periods 2 (Group A) and 3 (Group B).

Year:
M.Sc. (Tech.) 1, M.Sc. (Econ. & Bus. Adm.) 1
Period:
Group A: 2, Group B: 3
Teaching Language:
English
Teacher(s) in Charge:
Post-doctoral researcher, D.Sc. (Econ. & Bus. Adm.) Igor Laine (Group A: 2nd period)
Junior researcher, D.Sc. (Econ. & Bus. Adm.) Anisur Faroque (Group B: 3rd period)
Professor, D.Sc. (Econ. & Bus. Adm.) Sami Saarenketo
Professor, D.Sc. (Tech.) Juha Väätänen

Aims:
Learning outcomes: After completing the course the student will understand, evaluate and develop the processes of firm internationalisation and global marketing. In particular, the students will be able to:
1. Identify and evaluate the characteristics of the international market environment and of international business
2. Recognize the dimensions and drivers of market globalization
3. Assess, criticize, compare and contrast as well as apply the essential theories and frameworks relative to

internationalisation of the firm
4. Evaluate the ways in which international trade and investments affect world markets
5. Reflect upon the risks and opportunities in global markets
6. Provide a critical reflection on sustainability in international business
7. Analyze the key management decisions connected with the internationalisation of the firm and global marketing: Whether to internationalise, deciding which markets to enter, deciding how to enter the foreign market
8. Work effectively in cross-cultural teams
9. Create and deliver a group presentation focusing on the internationalisation decisions of a given company.

Contents:
Must know: International trade and investments, Drivers of globalization, Chain of strategic decisions related to internationalization of the firm, internationalization motives and barriers, Risks assessment in international markets, Internationalization theories (Uppsala model, Network approach, Born Global), international market selection process, factors influencing entry mode choice, characteristics of various entry modes (export modes, intermediate entry modes, hierarchical modes).

Should know: Global business relations and trade agreements, Concept of the value chain in internationalization, comparison of SMEs and LSEs in internationalization and global marketing, an environmental analysis in deciding which market to enter (political, economic, sociocultural, and technological environment).

Additional knowledge: Principles of transaction cost analysis.

Teaching Methods:
15 h lectures, 4 h pre-lecture assignments, 12 h in-class exercises, 30 h seminar assignments, 30 h written report, 2 h peer evaluation report, 32 h course literature, 35 h self-study and exam preparation. Total 160 h.

Examination in Examination schedule (Yes/No):
Yes

Examination in Exam (Yes/No):
Yes

Assessment:
0 - 5. Examination 30 %, seminar assignments 30 %, pre-lecture assignments 15 %, research report 20 %, peer evaluation report 5 %. Each of the components has to be passed acceptably.

Course Materials:
1) Hollensen, S. (2017) Global Marketing, 7th edition, Pearson Education (older editions apply as well)
2) Cavusgil S.T., Knight G., Reisenberger J. (2017) - International Business: The New Realities, 4th edition, Pearson Education (older editions apply as well)
Additional materials will be announced on lectures. Additional reading and material assigned in class.

Prerequisites:
Sufficient prior business studies and basic knowledge of international marketing required. Due to the teaching methods, the number of participants may be limited to 75 students. In this case, the priority would be given to the students of the School of Business and Management.

Limitation for students? (Yes, number, priorities/Leave empty):
Yes, 75, priority would be given to the students of the School of Business and Management.

Places for exchange-students? (Yes, number/No):
Max 15

Places for Open University Students?(Yes, number/No):
Max 10

CS30A1376: Product Development, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech) 1
Period:
1-2
Teaching Language:
English
Teacher(s) in Charge:
Professor, Ph.D. Andrzej Kraslawski
Aims:
After fulfilling all requirements of the course, the students will be able to: 1. Understand the concept of new product development 2. Recognise the phases of new product development 3. Work in a team during product development 4. Apply the basic methods of product development.
Contents:
The key topics of the course are: 1. Major Phases of New Product Development, 2. Engineering Concept Development and Testing (design for manufacturability, user-centred engineering, visualisation of design, robust design), 3. Integration of Technical Design and Business Analysis, 4. Intellectual Property in New Product Development, 5. Project Management, 6. Introducing a New Product to the Market
Teaching Methods:
The course is organised as a combination of regular lectures and interactive problem-solving sessions and project work. The classroom problem-solving sessions will be based on team-work in groups of 3-5 students. The 3-4 projects will be carried out in groups of 3-4 students independently and will result in the preparation of the project report. Classroom teaching and problem-solving sessions 36 hours. Project work 94 hours. Period 1. in-class activities (lectures, problem solving), period 2. out-of-class activities (project work). Total workload 130 hours.
Lectures, in-class activity, period 1.
Project work, out-of-class activity period 2.
Project work 94 hours.
Examination in Examination schedule (Yes/No):
Yes
Examination in Moodle (Yes/No):
No
Examination in Exam (Yes/No):
No
Assessment:
0-5. Evaluation: solutions created in the classroom problem-solving sessions 40%, project reports 40%, written exam 20%. Attendance requirement: 90% of classroom sessions.
Course Materials:
Course slides
K. Ulrich, S. Eppinger: Product Design and Development, McGraw-Hill, 2012
Prerequisites:
Basic understanding of management. Basic knowledge of engineering disciplines.
Limitation for students? (Yes, number, priorities/Leave empty):
Yes, 60
Places for exchange-students? (Yes, number/No):
15–
Places for Open University Students?(Yes, number/No):
max 5

CS10A0863: Research Methods for Master Students, 6 cr

Validity: 01.08.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Roman Teplov, Daria Podmetina, Ekaterina Albats

Year:
M.Sc. (Tech.) 1-2

Period:
1-2
Teaching Language:
English
Teacher(s) in Charge:
Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
PhD Student Ekaterina Albats
PhD Student Roman Teplov

Person in Charge: Post-Doctoral Researcher, D.Sc. (Tech.) Daria Podmetina
Aims:
The course aims to provide guidelines to master students on how to conduct the research in management and how to report its results. In the end of the course, students should be able to:
• write literature review;
• formulate research questions and research design;
• choose research method;
• collect and analyze qualitative or quantitative data;
• interpret and report the results of the research.
Contents:
The course consists of 3 modules, 2 ECTS each. In the first module, students will learn basics of doing research: formulating and clarifying the research topic and research questions; conducting literature review; formulating the research design and choosing research methods. The second module is dedicated to collecting and analyzing quantitative data. The third module will introduce collecting and analyzing qualitative data.
Teaching Methods:
Module seminars 36 h (12 h each module), exercises 6 h (related to modules 2 and 3), preparing reports and self-study 116 h. Total 158 h. Moodle is used in this course.
Examination in Examination schedule (Yes/No):
No
Examination in Moodle (Yes/No):
No
Examination in Exam (Yes/No):
No
Assessment:
0-5. Based on average grade received from 3 modules (30 % each). Module 1 evaluation is based on learning diary and in-class assignments. Modules 2 and 3 are evaluated based on reports on quantitative and qualitative methods. There is no written exam on this course, but different activities and group assignments during seminars will be evaluated.
Course Materials:
Course book: Saunders, M, Lewis, P. and Thornhill, A. (2009). Research methods for business students, 5th ed., FT /Prentice Hall. Additional materials will be announced on the lectures.
Prerequisites:
The course is targeted to the students of Global Management of Innovation and Technology (GMIT) master program, but other students can also participate. Students not from GMIT program have to apply with motivation letter to the teachers. Number of participants is limited.
Places for exchange-students? (Yes, number/No):
Yes, max 10
Places for Open University Students?(Yes, number/No):
This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS34A0401: Strategic Entrepreneurship in an Age of Uncertainty, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Justyna Dabrowska, Marko Torkkeli

Year:
M.Sc. (Tech.) 1
Period:
3
Teaching Language:
English
Teacher(s) in Charge:
Professor, D.Sc. (Tech.) Marko Torkkeli
Aims:
Managing in a knowledge-based economy, Managing by Core Competences, Knowledge intensive firms, Uncertainty. Are they the latest buzz words or another passing managerial fad? Old wine in new bottles? Or perhaps, just perhaps, fundamental means of survival and success for modern day corporations? Given the amount of effort that has been devoted to the topic by both academics and practitioners, it appears worth taking a deep and dispassionate look at the role of entrepreneurial thinking in sustained competitive advantage. The goal is to learn as you go and effectively convert assumptions to knowledge at a low cost.
By the end of the course, students will be able to identify business opportunities and analyze them using different tools of uncertainty management. Students will be able to understand the main components of different pitches and be able to design and present a pitch.
Contents:
During the course students learn to develop and test a business idea following the feasibility analysis, discovery driven planning steps as well as using the uncertainty management tools of Attribute Mapping, Supply Chain Analysis, Differentiation, Quizzing and Market-Busters. The course does not teach business plan writing but rather focuses on opportunity recognition and feasibility assessment. Moreover, it adds the elements of lean startup as well as social entrepreneurship as possible avenues in dealing with entrepreneurial challenges.
Entrepreneurial thinking, uncertainty management, strategic entrepreneurship, discovery-driven planning.
Teaching Methods:
Lectures 20 h, Independent study 73 h, seminar work writing 63 h, Total 156 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):
No
Assessment:
0 - 5. Based on assignment and in-class work, participation in the lectures required (possibility to substitute absence with literary work).
Course Materials:
Lectures and additional reading provided in the class. Book: McGrath Rita and MacMillan Ian, (2000). The Entrepreneurial Mindset. Harvard Business School Press.; McGrath Rita and MacMillan Ian, (2005). MarketBusters: 40 strategic moves that drive exceptional business growth. Harvard Business Press.
Limitation for students? (Yes, number, priorities/Leave empty):
60, priority for GMIT students and others to whom this course is part of the major.
Places for exchange-students? (Yes, number/No):
Yes, max 15
Places for Open University Students?(Yes, number/No):
This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS30A1341: Strategic Technology and Innovation Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Kalle Elfvengren, Ville Ojanen

Year:
M.Sc. (Tech.) 1
Period:
1-2
Teaching Language:
English
Teacher(s) in Charge:
Associate Professor, D.Sc. (Tech.) Ville Ojanen
Aims:
Student can 1. design and analyze technology and innovation strategy of a company, 2. apply different tools and frameworks of technology management, 3. Develop and plan alternative progress routes for managing technology, innovations, as well as product and service portfolios.
Contents:
Core material: Innovation as a core business process. Innovative organisation. Development of technology and innovation strategy. Innovation networks. Decision-making in technological and market uncertainty. Creation of new products and services. New technology-based ventures. Innovation performance and learning. Methods of technology management.
Teaching Methods:
Lectures 12 h, 1st period. Exercises 10 h, 2nd period. Seminars 12 h, 2nd period. Preparation for lectures and exercises 12 h. Seminar work and other assignments 110 h. Total 156 h.
Examination in Examination schedule (Yes/No):
No
Examination in Moodle (Yes/No):
No
Examination in Exam (Yes/No):
No
Assessment:
0-5. No exam. Seminar work, group works and other assignments, incl. written reports and presentations 100%.
Course Materials:
Joe Tidd and John Bessant. Managing Innovation – Integrating Technological, Market and Organizational Change, 4th ed. 2009, or newer (2013, 2018). Lecture notes and other material announced in the beginning of the course.
Prerequisites:
Recommended: CS30A0952 Innovaatio- ja teknologiajohtamisen peruskurssi (Finnish course). Recommended: B. Sc. in Industrial Engineering and Management or equivalent basic knowlege of innovation and technology management.
Limitation for students? (Yes, number, priorities/Leave empty):
Yes, 50, priority to GMIT students.
Places for exchange-students? (Yes, number/No):
max 5
Places for Open University Students?(Yes, number/No):
max 5
Description and DL of the company assignment:
The course includes a project work (three person groups) with company assignments on e.g. following topics: Sources of innovations, Networks and other forms of cooperation in innovation and technology management, and Processes for developing and commercializing new products or services. The work load is ca. 50 hours per student. The deadline for the company-related topics is in Mid-September. Contact details: Ville Ojanen, ville.ojanen@lut.fi, +358401621201

TuDGMITSpec2: Tuta GMIT, Specialisation Studies BSc, 58 - 63 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

No course descriptions.

Obligatory specialisation studies 48 ECTS cr

CS30A1372: Creative Design and Problem Solving, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

Learning outcomes: After fulfilling all requirements of the course, the students will be able to: 1. Understand the principles of creative problem solving 2. Know the basic methods of creative design 3. Work in team during the design process 4. Apply methods of creative design to products, processes, services and business methods

Contents:

The major subjects of the course are: Major Steps in Problem Solving Types of Problems Types of Design Concept of Creativity Survey of Intuitive and Structured Methods of Creativity Enhancement Types of Brainstorming Check lists Morphological analysis Synectics Case-based Reasoning Graphical Methods Evaluation of Ideas

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project works. The in-class problem-solving sessions will be based on the team work realised by the groups of 3-5 students. The 3-4 project works will be realised by the groups of 3-4 students during the out-of-class activities and it will be finished with the preparation of the project report. In-class teaching and problem-solving sessions 42 h, project works 88 h. Total workload 130 h.

Lectures, in class activity, period 1.
Project work, out-of - class activity, period 2.
Project work 88 hours

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Final grade 0-5. Evaluation: Generated solutions of the in class problems 40 %, project reports 30 %, written exam 30%. Obligatory presence during 80% of in-class activities.

Course Materials:

Course slides.

Tony Proctor
Creative problem solving for managers
Routledge, 3rd edition, 2009

H. Scott Fogler and Steven E. LeBlanc
Strategies for Creative Problem Solving
Prentice Hall, 3rd edition , 2013

David Silverstein, Philip Samuel, Neil DeCarlo
The Innovator's Toolkit: 50+ Techniques for Predictable and Sustainable Organic Growth
Wiley, 2009

Alexander Osterwalder and Yves Pigneur
Business Model Generation
Osterwalder and Pigneur, 2010

Prerequisites:

Basic courses of management. Basic knowledge of engineering disciplines (e.g. process or mechanical engineering).

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

Yes, 80

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

15–

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

max 5

CS30A1641: Inventive Product Design and Advanced TRIZ, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Leonid Chechurin

Year:

M.Sc. (Tech.) 1-2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Leonid Chechurin

Aims:

After having completed the course, student is to know and able to apply instruments for product/process inventive design. The course helps to recognize the role, place and institutions of invention in innovation process/business. It contains basics on patenting, patent search and analysis, including modern approaches (big data, semantic etc). The course presents conceptual design context and its tools (Quality Function Deployment, Kano model, Decision making tools etc). It reviews modern design tools: Axiomatic Design, Design For X (Manufacturing, Robustness, Assembly, Environment, etc) and focuses on the role and main instruments of TRIZ (Ideal Final Result, Contradictions, SuFiled, Trends of Engineering System Evolution). We learn how to model an engineering system/product by Function framework, perform Function Model analysis transformation, Trimming (system reduction), Function-Oriented search, build Fault tree. About 20 case studies and 100 examples of inventive designs are presented.

Contents:

Introduction Optimization and Invention. Design roadmaps. 1. Information search and analysis: Patent and Scientific paper data bases. Search by keywords and classification codes. Function oriented search. Similarity: bibliographic, semantic. Technology landscapes. Subject-Object-Action framework. ArrowSmith approach. 2. Function based analysis: Ontologies of system description. Function based modeling. Subject-Object-Function framework. Function analysis. 3. Design evaluation: Axiomatic Design. DFx: design for manufacturability and assembly, design for robustness, design for environment, etc. TRIZ's design ideality concept. Trends of engineering system evolution as evaluation tool. Case studies and examples, Hands on. 4. Design modification: Function-based design improvement: trimming, contradiction elimination. Substance-Field. Standards for SuField model transformations. Case Studies, examples, Hands on. 5. Algorithm: Inventive design roadmap. Context of inventive design in industrial environment: market analysis tools (QFD, Kano, etc.), integration to research management tools, decision making tools. Case studies. Conclusion.

Teaching Methods:

Lectures 28 h, exercises 28 h, team work 38 h, reading 49 h, exam 13 h. Total workload 156 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):

No

Assessment:

Final grade 0 - 5. Test 30% + Report on project (Assignment) 50% + Personal reading 20%.

Course Materials:

Hand outs of lecture notes, internet resources in open access (given), selection of papers (given), videos on the main topics of the course - all available in Moodle and http://triz.thinkific.com/

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

max 10

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

max 5

CS30A1661: Open Innovation, 6 cr

Validity: 01.08.2013 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ekaterina Albats, Antero Kutvonen, Daria Podmetina, Justyna Dabrowska

Year:

M.Sc. (Tech.) 2, M.Sc. (Econ. & Bus. Adm.) 2

Period:

Periods 1-2, Periods 3-4

Teaching Language:

English

Teacher(s) in Charge:

Researchers, D.Sc. Antero Kutvonen, D.Sc. Daria Podmetina and doctoral students, M.Sc. Ekaterina Albats, M.Sc. Justyna Dabrowska

Aims:

After completion of the course, students will be able to
1. explain the concept of open innovation through both theory and examples (to e.g. a company executive)
2. analyze open innovation activities in real life companies and the motives for engaging in them and the mechanisms through which they create value for the company
3. distinguish between different modes of open innovation (inbound, outbound and coupled)
4. analyze the relation between a company's strategic choices and application of open innovation
5. understand and apply the scientific literature on the theme and relate open innovation to the context of other innovation management theories.

Contents:

Must know: The fundamental definitions and concept of open innovation. Modes and implementations of open innovation, i.e. ways to manage purposive in- and outflows of knowledge to collaboratively develop and/or commercialize innovations. Difference between closed and open innovation in managing technology. Identifying open innovation activities in real life firms. Monetary and strategic motives for engaging in open innovation.
Should know: Process models of inbound, outbound and coupled open innovation. The relation between corporate strategy, technology strategy and open innovation activities. Models of distributed innovation such as crowd-based open innovation. Most common examples of firms used to explain open innovation. Platforms and ecosystems role in business and innovation. Varying topics from state-of-the-art open innovation research, depending on guest lecturer. Basics of IPR management in open innovation.
Nice to know: Development of the open innovation concept on the basis of prior innovation management theories. Knowledge of the main scientific literature surrounding open innovation. Theoretical determinants of open innovation and future perspectives towards the phenomenon.

Teaching Methods:

Lectures and guest speakers 35 h as intensive teaching. Small group assignments during lectures. Group exams (or substituting them with summaries of scientific articles, 16 h) on two of the intensive days, preparing for exams 16 h. Group-based case assignment 36 h. Independent study 44 h. Total 155 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Continuous evaluation based on small group exams (50%) and group-based case assignment (50%). Possibility to substitute group exams with literary work (summaries of scientific articles) in case of absence.

Course Materials:

The course book and reading material will be announced at the first lecture.

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

Yes, 40 students, prioritized based on motivation letter submitted during registratio

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

max 5

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

max 5

CS90A0060: Master's Thesis, 30 cr

Validity: 01.08.2008 -
Form of study: Basic studies
Type: Master's Thesis
Unit: LUT School of Business and Management
Teachers: Lea Hannola

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

Finnish and English

Teacher(s) in Charge:

Lea Hannola, D.Sc. (Tech.), Associate Professor
Other teachers: Professors and Associate Professors of Industrial Engineering and Management

Aims:

Aftercompleting the course, students will be able to:
- demonstrate their knowledge of a topic of scientific and societal importance in a specific professional area
- demonstrate the ability to carry out the project independently and following a plan
- produce the thesis, which is organised coherently, the presentation is academic and the language revised
- act and communicate in different kinds of interactions and work environments in an entrepreneurial way by taking independently and actively responsibility about the development and management of business
- apply and utilize independently new knowledge both in scientific postgraduate studies and other lifelong learning

Contents:

The Master’s thesis is the final project of the degree of Master of Science (Technology). Usually it involves a
development project commissioned by a company and takes about six months.
The work entails working on a development project related to industrial management, preparing a report in the form of a

thesis, and presenting the work in a way that the first supervisor requires.
Topic of the master's thesis has to be confirmed as soon as the topic has been decided with the first supervisor. Use
form 1A in UNI-portal.

Teaching Methods:

Development project and related report, presentation of the work (1. supervisor defines the way), maturity test (usually on the contents of the thesis).

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:

Electronic guide for Master's Thesis workers and supervisors,
Study support -sites in Uni-portal, Industrial Engineering and Management

Prerequisites:

B.Sc. (Tech.) degree (not required of students admitted directly into a Master’s programme), complementary
studies (for students admitted directly into a Master’s programme).

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

No

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

No

Elective Specialisation studies min. 15 ECTS c

CS10A0760: Business in Russia, 6 cr

Validity: 01.08.2012 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Roman Teplov, Daria Podmetina, Ekaterina Albats, Juha Väätänen

Year:

M.Sc. (Tech.) 1

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Juha Väätänen
Post Doctoral Researcher, D.Sc. (Tech) Daria Podmetina

Aims:

Student is able to 1. analyze consumer markets and living standard, 2. assess competitiveness of industrial sectors and enterprises, 3. understand innovation process and innovation strategy on individual, company and country levels, 4. assess the specifics of online and offline commerce, 5. be familiar with marketing practices applied locally, 6. understand basics of entrepreneurship and doing business in Russia, 7. be aware of cultural aspects of Russian business.

Contents:

Consumer markets. Living standard. Russian enterprise structures. Industrial and service sectors. Company innovation strategies. Entrepreneurship and new enterprises. Marketing practices. Trade, foreign direct investments and e-commerce. Business culture. Russia's competitiveness, and future trends.

Teaching Methods:

Lectures 14h, research report and home assignments 72 h, course literature 40 h, self study and exam preparation 30 h. Total 156 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Exam 40 %, written report 40 %, home assignments 20%. Each of the components has to be passed acceptably.

Course Materials:

The World Bank report on Russia. Latest available version. Diversifying Russia. Harnessing regional diversity. EBRD. Latest available version. Additional material will be announced on lectures.

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

Yes, 15-

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

CS10A0885: Research Project in Industrial Management, 1 - 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Juha Väätänen, Ekaterina Albats, Daria Podmetina, Ville Ojanen, Leonid Chechurin

Year:

M.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Professor D.Sc. (Tech.) Juha Väätänen
Associate Professor D.Sc. (Tech.) Ville Ojanen
Professor Leonid Chechurin
Associate Professor D.Sc. (Tech.) Daria Podmetina

Aims:

Student learns to conduct independent research work in Industrial Engineering and Management in a specialized area. Student learns to apply the learned skills of Industrial Engineering and Management in a specific research project.

Contents:

A specific individual research project which is planned together with the supervisor and consists mainly of laboratory/desktop research work, literature work and report writing.

Teaching Methods:

Participation in the work of a research group and preparation of the research report, self-study totaling 26-156 hours.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5

Course Materials:

Literature related to the project.

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

No

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

No

CS30A1391: Systems Engineering, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Andrzej Kraslawski

Year:

M.Sc. (Tech) 2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Professor, Ph.D. Andrzej Kraslawski

Aims:

After completion of the course, the students will be able to:

- Understand the basic concepts of systems engineering
- Apply the basic methods of systems analysis
- Work in a team during systems design

Contents:

The key topics of the course are: the concept of system, developing system requirements, the index of performance, system development and integration, system modelling, multi-criteria decision-making, ranking the alternatives.

Teaching Methods:

The course is organised as a combination of regular lectures and interactive problem-solving sessions and project work. The classroom problem-solving sessions will be based on team work in groups of 3-5 students. The 2-3 projects will be carried out in groups of 3-4 students independently and will result in the preparation of a project report. Classroom teaching and problem-solving sessions 30 hours. Project work 100 hours. Period 3. in-class activities (lectures, problem solving), period 4. out-of-class activities (project work). Total workload 130 hours.
Lectures, in-class 30 h, period 3. Project work, out-of class, 100 h, period 4.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Doctoral School course where enrollment is in WebOodi (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Evaluation: solutions generated in classroom sessions 30%, project reports 40%, written exam 30%. Obligatory presence during 80% of in-class activities.

Course Materials:

Course slides.
Blanchard, B. S., Fabrycky, W. J.,
Systems Engineering and Analysis, Pearson, 2014

Liu Dahai
Systems Engineering, CRC Press, 2016

Alexander I., Beus-Dukic L.
Discovering Requirements, Wiley, 2009

Gibson J., Scherer W., Gibson W.
How to Do Systems Analysis, Wiley, 2007

Martin J.
Systems Engineering Guidebook, CRC, 1996

Prerequisites:

Basic courses on management.

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

Yes, 60

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

15–

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

max 5

CS30A1671: Service Innovation and Management, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Kalle Elfvengren, Ville Ojanen

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Ville Ojanen

Aims:

Student can
1. recognize and categorize the variety of services and service firms in modern industrial environment as well as understand their influence in management of industrial innovations
2. identify the characteristics of services and evaluate the similarities, differences and links between services and physical products
3. define the dimensions of service innovations
4. explain the processes of new service development
5. summarize the main managerial challenges in service innovation management
6. select and apply the suitable frameworks, tools and methods, to overcome some typical real-world challenges in service innovation management

Contents:

Typologies of service firms. Characteristics of services. Product-service systems in manufacturing industry. Knowledge-intensive business services. New service development process. Dimensions of service innovations. Productization of services. Supporting methods for service innovation management. Managerial challenges in service innovation management. Utilization of frameworks, methods and tools in service innovation management. Roles of different types of firms in service systems and networks. Value creation through services. Customer-centric service development.

Teaching Methods:

Lectures and exercises 20 h, 3rd period. Seminars 12 h, 4th period. Group assignments and project work 120 h. Total 152 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Written reports and seminars 100 %.

Course Materials:

Lecture notes. Other material, books and articles announced in the beginning of the course.

Prerequisites:

Recommended: B.Sc. on Industrial Engineering and Management, or equivalent knowledge

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

Yes, 50

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

max 5

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

max 5

CS30A7402: Software and Application Innovation, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Antti Herala, Helinä Melkas, Jari Porras, Mirva Hyypiä

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Jari Porras
Professor, D.Sc. (Tech.) Helinä Melkas

Aims:

At the end of this course students will be able to:

1. Identify and conceptualize an opportunity for innovation in the selected field
2. Identify the technical possibilities and limitations in the selected field
3. Demonstrate the knowledge and skills of innovation methods in creation of new meaningful software solutions and applications based on some technology
4. Demonstrate good team working skill in developing and presenting the new innovation.

Contents:

Theme of the course changes on a yearly basis. This course combines technology and technology management perspectives for cross-scientific approach in software and application innovation process. Course consists of

- Basics and use cases of the selected theme and related technologies
- User-centric needs based design in software and application development
- Innovation management, idea generation and opportunity identification process
- (Open) business models and technology commercialization in global markets
- Product and service development

Teaching Methods:

Lectures 14 h, Group meetings 2 h, Independent group based project work 40 h, Period 1
Online workshop 5 h, group meetings 2 h, Seminars 8 h, Independent group based project work 45 h, Documentation 40 h, Period 2

Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Project work 80%, Presentations 20%

Course Materials:

Drucker P., The discipline of innovation, Harvard Business Review, August 2002.
Buur J., Matthews B., Participatory Innovation, International journal of innovation management, Vol. 12, No. 3, 2008.
Technical material focusing on the theme of the year will be announced on the Moodle pages of the course.

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

Yes, max 10

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

No

CS30A0940: Intelligent product-service systems, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Lea Hannola

Note:

This course is aimed for the students of Master's Degree level.

Year:

M.Sc. (Tech.) 2

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc (Tech.) Lea Hannola
Researcher, M.Sc. (Tech.) Ilkka Donoghue

Aims:

Student can
1. understand digital transformation trends affecting manufacturing business 2. define and explain the concepts related to product data management and product life cycle management
3. recognize the company's product processes and understands their interaction with the company's overall operations
4. compare PLM & ERP systems' characteristics, technical features and managerial functions and is able to see their role in product development and business management.

Contents:

PLM trendsand Digital transformation. Differentviews on product: structures – processes – lifecycle – data/information. Challengeswith lifecycle management. Requirementsmanagement and Systems Engineering. Productinformation modeling and change management. Configurationmanagement through lifecycle (CLM). IoT baseddata services for sustainability. Features andfunctionalities of PLM systems. PLM projectand demos of systems utilization. Future PLM invarious industries.

Teaching Methods:

Lectures 21 h, seminars 14 h, 3rd period, as intensive studies. Course assignment 55 h and exam 68 h, 3rd period. Total 158 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Exam 60 %, project assignment and seminar participation 40 %.

Course Materials:

Journal articles and lecture material. Sääksvuori-Immonen: Product Lifecycle Management, Springer 2008.

Prerequisites:

B.Sc. on Industrial Management, or equivalent knowledge.

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

max 10

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

max 5

A210A0702: New Venture Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Terhi Virkki-Hatakka, Antero Tervonen, Sanni Väisänen, Anna Vuorio, Markku Ikävalko

Note:

The course is an advanced level course, but it can also be placed in bachelor's studies. Course is carried out in cooperation with several courses of Mechanical Engineering and Electrical Engineering Degree Programmes.

Year:

B.Sc. (Tech.) 2-3, B.Sc. (Econ. & Bus. Adm.) 2-3, M.Sc. (Tech.) 1-2, M.Sc. (Econ. & Bus. Adm.) 1-2

Period:

1-3

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc.(Bus. Adm.) Anna Vuorio
Associate professor, D.Sc. (Bus. Adm.) Markku Ikävalko
Project manager, D.Sc. (Tech.) Terhi Virkki-Hatakka
University Lecturer, D.Sc. (Tech.) Antero Tervonen
Post-doctoral researcher, D.Sc. (Tech.) Sanni Väisänen
M.A. in Russian language and philosophy James F. Hyneman

Aims:

By the end of the course, students will be able to
- apply the skills and knowledge accumulated from previous courses into practice,
- recognize and develop new business ideas,
- manage creativity and learn methods for idea generation,
- plan different business operations,
- manage and organize business as a whole and act as a manager,
- create various business and management documents and reports,
- communicate issues about the project with other firm members.

Contents:

Recruited business experts together with engineering experts (= mainly mechanical engineering students) explore their creativity and create new business ideas by forming creative swarms. In these swarms of individuals, new business ideas are created and developed further. After evaluating ideas, business experts form virtual firms (= small groups) with 4-6 individuals and develop elements of business activity around their idea in cooperation with engineering experts.
The entire staff of the firm is self-organized and takes care of the establishment of the virtual firm. Business experts formulate a business plan and financial plan in cooperation with possible engineering experts of the firm. The tasks of business experts also include planning of various business activities, implementing those activities and reporting: management, financial management, cost accounting, budgeting, finance, marketing, supply chain management and logistics in cooperation with product planning and manufacturing.
The board and the Investors' board (= the teachers of different accompanied courses and a business mentor outside the university) support firm operations.

Teaching Methods:

Board steering sessions (= introductory lectures) 12 h, 1st period. Board steering sessions 4 h and the board meetings 3 h, 2nd period. Board steering sessions 4 h and the board meetings 4 h, 3rd period. Independent project work by the staff of the virtual firm (the staff mainly defines working schedules, practices and responsibilities by itself) 133 h, 1st-3rd periods. Total workload 160 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

Grade 0-5, evaluation 0-100 points; project work 60 % (includes internal activities of the virtual firm, different written assignments of the business experts and performance in board meetings), peer review by the members of the firm 20 %, and self-evaluation 20%.

Course Materials:

Material of the steering session of the board (= lecture notes). Material sought by the staff of the virtual firm.

Prerequisites:

The basic studies of bachelor’s degree in Business Administration or bachelor’s degree in Industrial Engineering and Management

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

Yes, 50; own quotas for Business Administration students and Industrial Engineering and Management students; priority to master degree students.

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

No

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

No

CS30A7370SS: Simulation Modelling in Industrial Management, 3 cr

Validity: 01.06.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

The number of course attendants is limited to 20. The course teacher selects 20 students after the course registration is over.

Year:

M.Sc. 1-2

LUT Summer School time:

Not organized during summer 2018

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher Samuli Kortelainen, LUT

Aims:

Learning outcomes:

The amount of data available for decision makers is constantly increasing. The increase of data enables new opportunities for managers, but also creates a demand to develop systems that can generate this data into usable intelligence. Simulation techniques offer interesting option for managers to better understand and develop firm's business processes.

The key simulation skills that the student has to possess after successful completion of the course:

- Understanding on what system and complexity theories mean, and what are their business implications
- Capability and design simulations model with a systematic process
- Understand the possibilities, but also restrictions, of simulation modelling as an analysis tool
- Practical simulations skills with the three most common simulation methods
  o System dynamics
  o Discrete event simulation
  o Agent based modelling
- Skill to use simulation models to conduct tests on system performance

Contents:

This course is designated to explore two critical aspects of simulation modelling to business management:
- The analysis and development of already existing processes
- The analysis and testing of new proposed process

First, the natural way to use simulation modelling is to model the firm's current operations. The goal in this kind of simulation is to understand and then develop firm's processes to perform better. As such,

simulation offers an opportunity to support management of firm's operational processes. During the course, this methodology is used to simulate firm's manufacture processes, but also more abstract service processes.

The second way to utilize simulation is to model future processes. This enables testing the effect of a new innovation to a given process. This allows analysis on the true value of an innovation and thus supports management of innovations. This application area is the focus of later part of the course.

Teaching Methods:

The teaching is dominantly interactive workshop in small groups supported by in-class lectures. In addition there is a pre-course essay for the course, which has 3 questions. Expected length is 20 pages.

- In-class teaching 6 hours
- Workshop + learning diary at the end of each lecture day 24 hours
- Pre-course work 48 hours

Total workload 78 hours
Maximum course attendants is 20 persons. Final student selection is made by the teacher after the registration is over.

Assessment:

Final grade 0-5. Evaluation:
- essay 60 %
- learning diary 40 %

Course Materials:

Course slides to be distributed during the course.

Prerequisites:

- Previous studies in management are strongly suggested
- Skills that assist learning
  - o Basic Excel and coding skills
  - o Good skills in logical thinking
  - o Basic math skills
  - o Positive attitude

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

Yes, maximum course attendants is 20 persons. Final student selection is made by the teacher after the registration is over.

A330A5000SS: International Marketing of High Technology Products and Innovations, 3 cr

Validity: 01.06.2012 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Sanna-Katriina Asikainen, Sanjit Sengupta

Note:

Only for Master's level students. The course topics are related to sustainable development.

Lectured every other academic year (Yes, next realization year/Leave empty):

Yes, 2019-20

Year:

M.Sc. 2

LUT Summer School time:

Summer 2019

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Sanna-Katriina Asikainen, LUT

Aims:

Learning outcomes:

- Distinguish the special characteristics of high technology marketing environment (like the type of innovation, market and technology uncertainties, network externalities) and assess external high technology environments (e.g. relating to competitive landscape, consumer behavior, markets) in global scale.
- Evaluate and justify marketing strategies in high technology environments.
- Make marketing decisions in high technology environments.

Course aims to provide a deep understanding of the functions of marketing regarding challenges and opportunities in high technology products and markets; assist the participants to understand the virtue and limitations of traditional marketing thinking and tools in emergent high technology markets.

Contents:

- Strategy and corporate culture in high tech firms.
- Partnerships and alliances.
- Marketing research in high tech markets.
- Understanding high tech customers.
- Product development and management issues in high tech markets.
- Pricing considerations in high tech markets.
- Advertising and promotion in high tech markets.

Teaching Methods:

- Lectures and in-class assignments 30 hours
- Preparing for lectures 25 hours
- Preparing for exam 25 hours

Total workload 80 hours.

Assessment:

Final grade 0-5. Evaluation 0-100 points:
- Exam 50 points
- In-class assignments 30 points
- Class participation 20 points

Course Materials:

- Mohr, Jakki, Sanjit Sengupta, and Stanley Slater (2010) Marketing of High-Technology Products and Innovations. Third Edition. Pearson Prentice Hall. Web site http://marketinghightech.net/
- Assigned reading.

Prerequisites:

For summer school students: previous studies in business recommended.

For MIMM degree students at LUT: Internationalization of the Firm and Global Marketing, Strategic Global Marketing Management, Technology and Innovation Management.

CS20A6040: Lean Six Sigma Green Belt, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Janne Huiskonen

Year:

M.Sc.(Tech.) 1

Period:

2

Teaching Language:

English

Teacher(s) in Charge:

professor, D.Sc.(tech.) Janne Huiskonen

Aims:

The course will prepare participants to act as a Lean Six Sigma Green Belt in three roles or capacities:

1. To conduct detailed diagnoses of processperformance problems.
2. To conduct independent Green Belt-levelimprovement projects.
3. To support Black Belts in performance ofmore complex projects.

Contents:

Proven method for project management

- DMAIC links together Lean Six Sigma tools to a result-driven project management method
- E.g.: DMAIC, Project charter, SIPOC map

Qualitative tools to understand processes

- Practical tools for process mapping, value analysis, and risk analysis
- E.g.: Value Stream Map, Fishbone Diagram, Potential Problem Analysis'

Quantitative tools to understand variation

- Analytical tools focused on understanding variation and problems in processes
- E.g. : ANOVA, Capability analysis, GageR&R

Teaching Methods:

Workload: Online videos and quizzes 45 h, Workshops 17 h, Group work 30 h, Individual studying 38 h

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Number of mid-term examinations:

No

Assessment:

Pass/fail.
Assessment Methods and Criteria:
1. Participation to workshops
2. Obligatory cases and assignments

Course Materials:

Given at workshops.

Prerequisites:

CS20A0102 Tuotannon- ja materiaalinohjaus

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

Yes, 30. Primarily TUTA students of the Operations Management programme or the GMIT programme.

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

No

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

No

Exchangeable courses

CS30A1684SS: Advanced Course in Strategic Management, 3 cr

Validity: 01.06.2014 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

LUT students: the student who has completed the course CS30A1682 Advanced Course in Strategic Management can not include this course into the LUT degree.

Year:

M.Sc. 1-2

LUT Summer School time:

30.7-3.8.2018

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher Samuli Kortelainen, LUT

Aims:

Learning outcomes.
Strategic management literature is a widely research topic, that has led to a wide and many times confusing and even contradictory litera-ture. In order to fully understand the current state of literature, the lens needs to be first turned to the history of different strategic schools. Therefore, the course starts from the roots of strategy man-agement and then builds a comprehensive view to the current status of strategic management literature.
After the successful completion of course the student has:

- Comprehensive picture of the current state of strategic man-agement theory and understanding reasoning behind different strategic management theories
- Understanding on the limitations and restrictions in current strategic management theory and their practical implications
- Holistic view to current new themes linking strategic man-agement theories to other industrial management disciplines

Contents:

Main schools of strategic management
The course begins on looking at the development history of main strategic management schools, where the goal is to identify similari-ties and differences between different literature streams.
The challenges and criticism of current strategic management theories
Although strategic management theories are widely applied, they are also subjected to wide range of criticism. The second part of lectures focuses on these critical aspects of strategic management.
Current development paths of strategic management theory
Third part focuses on the various detailed development steps in stra-tegic management literature to counter or point critical points in origi-nal theories.

Linking strategic management to other management theories
There are multiple different management literature streams (e.g. marketing, supply-chain, and innovation) that also tackle strategic issues. The fourth part of lectures focuses on bridging these management theories.
New entries to strategic management discussion
The final part of lecture series focuses on raising themes in strategic management such as multi-sided markets, business models, and data analytics.

Teaching Methods:

Lectures 16 hours
In-class room exercises 10 hours
Essay summarizing critical strategic management articles, workload 24 hours
Preparing for the exam 16 hours; final exam executed on the final day of the course 12 hours

Total workload 78 hours

Assessment:

Final grade 0 – 5:

Exam 60%
Essay 40%

Course Materials:

Course slides and selected articles to be announced in the class.

Prerequisites:

- Successfully completed Bachelor or higher level studies in Industrial Management
- Good understanding on basic strategic management concepts
- Basic knowledge on other management topics (marketing, innovation management)

CS30A1655: Advanced Course in Strategic Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Samuli Kortelainen

Note:

The student who has completed the course CS30A1684SS Advanced Course in Strategic Management can not include this course into the LUT degree.

Year:

M.Sc. (Tech) 2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Post-Doctoral Researcher, D.Sc. (Tech.) Samuli Kortelainen

Aims:

Strategic management literature is a widely research topic, that has lead to a wide and many times confusing and even contradictory literature. In order to fully understand the current state of literature, the lens needs to be first turned to the history of different strategic schools. Therefore, the course starts from the roots of strategy management and then builds a comprehensive view to the current status of

strategic management literature. After the successful completion of course the student has:
1. Comprehensive picture of the current state of strategic management theory o Understanding reasoning behind different strategic management theories
2. Understanding on the limitations and restrictions in current strategic management theory and their practical implications
3. Holistic view to current new themes linking strategic management theories to other industrial management disciplines

Contents:

1. Main schools of strategic management The course begins on looking at the development history of main strategic management schools, where the goal is to identify similarities and differences between different literature streams.
2. The challenges and criticism of current strategic management theories Although strategic management theories are widely applied, they are also subjected to wide range of criticism. The second part of lectures focuses on these critical aspects of strategic management.
3. Current development paths of strategic management theory Third part focuses on the various detailed development steps in strategic management literature to counter or point critical points in original theories.

Teaching Methods:

Lectures 18 h, in-class room exercises 10 h, seminarwork and presentation 50 h, preparation to exam 50 h. Total 128 h. Individual 24 h exam.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Exam 50 %, exercise 50 %.

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

Yes, 10

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

This course has 1-5 places for open university students. More information on the web site for open university instructions.

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

YmDSaEnLi: , 20 - 30 cr

Validity: 01.08.2016 -
Form of study:
Type: Study module
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F

Aims:

Energia ja liiketoiminta-sivuopintokokonaisuuden suoritettuaan opiskelija:
- ymmärtää ilmastonmuutoksen merkityksen liiketoiminnan kannalta
- ymmärtää ympäristöasioihin liittyvää lainsäädäntöohjausta
- tunnistaa energiaan liittyviä kestävyyshaasteita

Obligatory Studies 11 ECTS cr

BH60A2601: Climate Change, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Maija Leino, Lassi Linnanen, Sanni Väisänen

Note:

Year:
B.Sc. (Tech.) 2
Period:
3-4
Teaching Language:
Finnish and English
Teacher(s) in Charge:
Professor, D.Sc. (Econ. & Bus. Adm.), M.Sc. (Tech.) Lassi Linnanen

Aims:
Upon completion of the course the student is expected to be able to
1. define factors that affect the climate and the reasons and consequences of climate change,
2. explain how the climate change can be curbed, and
3. calculate carbon footprints.

Contents:
Students are introduced to following subjects on this course: The green house effect, climatic change through history, future scenarios, carbon cycle, radiative forcing, the consequences of climate change, preventing climate change, climate adaption and carbon footprint.

Teaching Methods:
28 h of lectures. Share of independent work (approx. 32 h). Learning diary, done individually (approx. 20 h). Written assignment, incl. literature search and calculations (approx. 50 h). 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, project work 50 %, learning diary 50 %

Course Materials:

Climate.nov MOOC course
Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report.

Prerequisites:

BH60A0001 Ympäristötekniikan perusteet or equivalent knowledge.

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

No

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

max 15

BL20A1300: Energy Resources, 6 cr

Validity: 01.08.2014 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Christian Breyer, Michael Child

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Christian Breyer

Aims:

Upon completion of the course the student will be able to: 1. Identify the constraints and potentials of all relevant energy sources in a global context. 2. Describe all relevant energy conversion technologies on the basis of their energy resource. 3. Analyse the principal structure of future energy systems on the basis of energy resource characteristics. 4. Describe the special relevance of wind energy and solar energy in the ongoing energy transformation.

Contents:

The course provides an overview on the availability of energy resources and related emissions and techno-economic maturity of related energy conversion technologies, which induces a fundamental structure for the future energy system and the related energy transformation pathway. The course comprises the main energy resources for the current and future energy system: crude oil,natural gas, coal, uranium, hydro power, bioenergy, solar energy, wind energy,geothermal energy, and ocean energy. These energy resources have different theoretical, technical and economic potentials as well as geographic variations in availability. The resources also differ considerably in the impact of the emissions related to the respective energy conversion technologies being relevant for the degree of sustainability. A broad variety of energy conversion technologies at different levels of maturity are used for utilizing the resources.

Teaching Methods:

Lectures 14 h, exercises 14 h, 1st period. Lectures 14 h,exercises 14 h, 2nd period. Examination 3h.
Independent study 97 h.
Total workload 156 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 100%.

Course Materials:

Material handed out in class and made available on Moodle.

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

15–

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

max 5

Valitaan vaihtoehtoisia opintojaksoja siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.

BH40A0101: Renewable Energy, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Aki-Pekka Grönman, Antti Uusitalo

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate professor, D.Sc. Aki Grönman

Aims:

Upon completion of the course the students will be able to: 1. describe the operation principle of various power plant types using renewable energy sources, 2. compare the benefits and disadvantages of power plants using renewable energy sources in relation to each other and
traditional power plants, 3. understand the factors affecting power plant efficiencies, and 4. select suitable power plants for a given purpose.

Contents:

Wind power, wind turbine types, water power, hydrogen economy and fuel cells, wave power, tidal power, biomass and biogas utilization, solar power, geothermal energy, principles and efficiency calculations of renewable energy power plants.

Teaching Methods:

Lectures 12 h, tutorials 12 h, independent study, homework, quizz. 4. period.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, quizz 20 %, homework 80 %.

Course Materials:

Lecture material in Moodle. Further material will be announced during lectures.

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

No

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

max 15

BH60A1800: Introduction to Environmental Law, 5 cr

Validity: 01.08.2007 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Lassi Linnanen, Kimmo Malin, Katariina Koistinen, Hilkka Heinonen

Note:

Intensiiviopintojaksona 4. periodilla. Poikkeava ilmoittautumisaika ennakkotehtävien vuoksi. Ilmoittautuminen viimeistään 2.2.2019.

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Econ. & Bus. Adm.), M.Sc. (Tech.) Lassi Linnanen
Junior researcher, M.Sc. (Tech) Katariina Koistinen

Aims:

Upon completion of the course the student is expected to be able to
1. identify solutions provided by environmental law,
2. search for information related to environmental law,
3. prepare a summary on parties involved in environmental decision-making and related control methods, and
4. interpret official legal norms related to environmental issues and apply them to practical work.

Contents:

Influencing environmental problems through legislation. Steering methods of environmental policy. The structure of environmental administration. Basics of decision-making in environmental administration. Central environmental legislation. Environmental law as a multidisciplinary environmental research field. Collecting legal environmental data.

Teaching Methods:

4th period: 30 h of lectures 30 h, intensive teaching, mandatory attendance. Share of individual work (approx. 100
h): 3rd - 4th period: Advance assignments (approx. 20 h). 4th period: Learning diary, individual work (approx. 80 h). 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. Advance asssignments 20 %, learning diary 80 %.

Course Materials:

Useful literature will be announced during the lectures. Moodle.

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

No

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

max 15

BH61A0201: Energy Economics, 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

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:

3rd period: 8 h of lectures, 6 h of exercises, homework based on lectures and exercises. 4th period: 8 h of lectures, 6 h of exercises, homework based on lectures and exercises. Written examination. 98 h of self-study.
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. Examination 80%, homework 20 %.

Course Materials:

Material on Moodle.

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

15–

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

max 5

BL20A0201: Power Exchange Game for Electricity Markets, 3 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Nadezhda Belonogova, Samuli Honkapuro

Year:

M.Sc. (Tech.) 1

Period:

2-3

Teaching Language:

English

Teacher(s) in Charge:

M.Sc. (Tech.) Nadezda Belonogova

Aims:

Upon completion of the course the student will be able to: Plan electricity purchase and sale in an economically viable way, recognize the most common risk management instruments and basic mechanisms of demand response in electricity markets, and exploit financial

products of the power exchange in risk management and trade electricity in day ahead and intraday markets. These skills will be practised in a power exchange game, after which the student will be able to analyse and interpret the game results.

Contents:

Electricity purchase/sale, OTC markets, physical products on the power exchange (Elspot and Elbas), financial products on the power exchange (DS Futures and Futures), risk management.

Teaching Methods:

Lectures 8 h, weekly game situation practice 40 h, 2nd and 3rd period. Written homework 4h, intermediate report 4h and final report 10h. Independent work 12h. The lectures focus on the key learning objectives in the topic. Successful completion of the course requires student's active independent work.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, written report 100 %.

Course Materials:

Course material in Moodle.

Prerequisites:

BL20A0401 Electricity Market.

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

max 5

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

max 5

BL20A0400: Electricity Market, 5 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Jarmo Partanen, Salla Annala

Year:

B.Sc. (Tech.) 3 (M.Sc. (Tech) 1)

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Jarmo Partanen

Aims:

Upon completion of the course the student will be able to: 1. describe the characteristics of the different business sectors in the Nordic electricity market, 2. explain electricity price formation and model electricity consumption, 3. explain the operation principle of the power exchange, 4. identify and describe the products of the power exchange, 5. select the right risk management method for electricity trade, 6. describe the tasks of the different parties in an electric power system in maintaining technical and commercial power balance, 7. conduct the balance settlement, 8. price the products of electricity trade and distribution, 9. describe why and how electricity distribution business is regulated.

Contents:

The development of electricity markets, loads on the electricity network and load forecasts, power exchange, electricity trade, balance management, the fundamentals of pricing, electricity distribution business and related regulation methodology.

Teaching Methods:

28 h of lectures, 14 h of tutorials, 1st period. Independent studies. Written examination. The lectures focus on the core learning objectives in the topic. Successful completion of the course requires student's active independent work. The course is also suitable for distance learning.
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 examination 100 %.

Course Materials:

Lecture book, ppt-presentations and lecture video. All available in Moodle.

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

No

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

max 5

BL20A1400: Renewable Energy Technology, 6 cr

Validity: 01.08.2015 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Christian Breyer, Michael Child

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Christian Breyer

Aims:

Upon completion of the course the student will be able to: 1. Identify the major renewable energy (RE) conversion technologies, mainly converting resources to electricity. 2. Describe the major characteristics of the technologies, in particular applications, efficiency, economics, industrial scale and future prospects. 3. Analyse the need for storage technologies and their different fields of application based on their key technical and economic features.

Contents:

The course is focused on the conversion of the resources to electricity. The RE technologies discussed in the course are: wind turbines, solar photovoltaics, solar thermal electricity generation and hydro powerplants. The storage technologies covered comprise a general overview and in particular include battery storage, pumped hydro storage and power-to-gas technologies. All technologies are classified with respect to their applications, efficiency, maturity, economics, industrial scaling and expected relevance for the ongoing energy transformation.

Teaching Methods:

3rd period lectures 14 h, exercises 14 h. 4thperiod lectures 14 h, exercises 14 h, examination 3 h. Independent study 97 h.
Total workload 156 h.

Suitability for doctoral studies (Yes/Leave empty):

Yes

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 100 %

Course Materials:

Material handed out in class and made available on Moodle.

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

15–

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

max 5

BL20A1500: Energy Scenarios, 6 cr

Validity: 01.08.2015 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Michael Child, Christian Breyer

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Christian Breyer

Aims:

Upon completion of the course the student will be able to: 1. Describe the sustainability requirements of future energy systems as the major guard rail for the energy transformation. 2. Analyse energy transformation scenarios and identify the key technologies and setups for sustainable energy progress. 3. Describe the energy transformation in all sectors, the major technologies, the required transformation period and entire system cost optimization. 4. Describe the special role of power technologies for the energy transformation. 5. Recognize the difference between standard levelized cost ofenergy and total societal cost of energy.

Contents:

The course comprises the key elements of energy scenarios: demand, supply, cost, constraints. Energy demand is an aggregate of power, heat, cooling, mobility, agriculture and industrial energy needs. The demand has tobe matched with supply of energy fulfilling sustainability criteria, safety requirements and societal acceptance for the least cost. A complete set of demand curves, technical characteristics of all major technologies, current and projected technology costs and emission factors are taken into account for sustainable energy transformation pathway formulation. The special relevance ofwind energy and solar photovoltaics, the increasing relevance of power technologies,the role of storage technologies and the necessity of societal cost of energy are discussed in detail. Real scenarios for Finland, Europe and the World used as references.

Teaching Methods:

1st period lectures 14 h, exercises 14 h. 2ndperiod lectures 14 h, exercises 14 h, presentation/oral examination 1 h. Independent study 99 h. Total workload 156 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):

No

Assessment:

0-5, presentation/oral examination 100 %

Course Materials:

Material handed out in class and made available on Moodle.

Prerequisites:

BL20A1300 Energy Resources and BL20A1400 Renewable Energy Technology (at least one of the two courses)

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

max 15

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

max 5

BL20A1600: Smart Grids, 5 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Jarmo Partanen, Jukka Lassila, Samuli Honkapuro, Tero Kaipia

Note:

The course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1-2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. Samuli Honkapuro

Aims:

Upon completion of the course the student will be able to 1. Label the key elements and functionalities of the smart grid system 2. Analyze the impacts of the smart grid elements on electricity distribution system and electricity markets 3. Document and present orally the
results of the seminar work 4. Provide both written and oral peer review.

Contents:

Smart grid concept, demand side management, energy storages, distributed generation, microgrids, communications in smart grids. In addition, annually changing topical subjects.

Teaching Methods:

Lectures 14 h, Moodle quizzes 7 h in 3rd period. Independent seminar work 100 h. Presentation of the seminar work 2 h,
peer review of a written seminar work 5 h and working as an opponent in seminar 2 h in 4th period.
Course is suitable for distance learning.
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):

No

Assessment:

0-5. The course is evaluated based on seminar work (written and oral presentation), Moodle quizzes, and student’s work as a reviewer and an opponent.

Course Materials:

Study materials handed out in Moodle.

Prerequisites:

Attending the course BL20A0500 Sähkönjakelutekniikka (Electricity distribution) OR BL20A0401 Electricity Market OR BL20A0400 Sähkömarkkinat (Electricity Market)

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

max 10

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

max 5

BL40A2301: Energy Efficiency, 6 cr

Validity: 01.08.2013 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Tero Ahonen, Jero Ahola, Tero Kaipia, Antti Kosonen, Lasse Laurila

Note:

The course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc (Tech.) Jero Ahola

Aims:

Upon completion of the course the student will be able to: 1. determine actions for the energy efficiency of the energy conversion process, 2. estimate the overall energy efficiency of the energy conversion system, 3. identify applications of electric energy usage and apply
methods that can be used to improve the energy efficiency.

Contents:

The course provides the student with an introduction to the significance and development potential of energy efficiency in energy production, transmission, distribution and end use. The focus is on electric energy and systems approach. The lecture topics are the efficiency of
energy production processes, the efficiency of electricity transmission and distribution and the efficiency of energy end use. The course is arranged as a series of lectures delivered by experts. The lecture topics may vary from year to year.

Teaching Methods:

Lectures 12 h, individual home works 141 h, examination 3 h. The course is suitable for distance learning. Total workload 156 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):

No

Assessment:

0-5, examination 100%. In addition, 70 % of individual assignments have to be passed. It is also possible to receive additional points to the exam based on the individual assignments.

Course Materials:

Lecture material in Moodle.

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

15–

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

max 15

YmDSaTekRat: , 20 - 30 cr

Validity: 01.08.2016 -

Form of study:

Type: Study module

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Aims:

Energiatekniikan tekniset ratkaisut-sivuopintokokonaisuuden suoritettuaan opiskelija:
- ymmärtää tekniikoita kestävyysongelmien ratkaisemiseksi
- tunnistaa perinteisen energiateknologian haasteet kestävyysongelmien ratkaisemisessa
- tunnistaa uusiutuvan energiantuotannon haasteet ja mahdollisuudet kestävyysongelmien ratkaisemisessa

Obligatory Studies 11 ECTS cr

BH40A0101: Renewable Energy, 3 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Aki-Pekka Grönman, Antti Uusitalo

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate professor, D.Sc. Aki Grönman

Aims:

Upon completion of the course the students will be able to: 1. describe the operation principle of various power plant types using renewable energy sources, 2. compare the benefits and disadvantages of power plants using renewable energy sources in relation to each other and
traditional power plants, 3. understand the factors affecting power plant efficiencies, and 4. select suitable power plants for a given purpose.

Contents:

Wind power, wind turbine types, water power, hydrogen economy and fuel cells, wave power, tidal power, biomass and biogas utilization, solar power, geothermal energy, principles and efficiency calculations of renewable energy power plants.

Teaching Methods:

Lectures 12 h, tutorials 12 h, independent study, homework, quizz. 4. period.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, quizz 20 %, homework 80 %.

Course Materials:

Lecture material in Moodle. Further material will be announced during lectures.

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

No

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

max 15

BH50A0200: Power Plant Engineering, 4 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Esa Vakkilainen, Kari Luostarinen, Juha Kaikko

Year:

B.Sc. (Tech.) 3

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

Docent, D.Sc. (Tech.) Juha Kaikko, D.Sc. (Tech.) Jussi Saari

Aims:

Upon completion of the course the students will be able to 1. explain the basic processes of thermal power plants (excl. nuclear energy) and the impact of various factors on process efficiency, 2. apply mass and energy balances into energy production processes, and 3. calculate
the operating values of basic power plant processes and the costs of energy production.

Contents:

The operation of thermalpower plants and power plant processes. Engineering design: calculation methods of power cycles and calculation of production costs. Condensing power plants, back-pressurepower plants, heating power plants, gas turbine power plants, combined cycle powerplants.

Teaching Methods:

3rd period: 12 h of lectures, 9 h of tutorials. Moodle work. Assignment. Written examination. Tutorials, Moodle work and the assignment must be completed before the examination. Independent study

approximately: Studying given material 23 h. Moodlework 18 h. Assignment 21 h. Preparation for the examination 18 h and the examination 3 h.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Examination 50 %, Moodle on-line work 30 %, assignment 20 %.

Course Materials:

Huhtinen, Markku et al.: Voimalaitostekniikka, Finnish National Board of Education, 2013.
Lecture notes. Moodle material.

Prerequisites:

BH20A0700 Fundamentals of engineering thermodynamics or BH20A0800 Engineering thermodynamics attended.

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

No

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

max 10

BH60A2401: Energy Recovery from Solid Waste, 4 cr

Validity: 01.08.2010 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Mika Horttanainen, Mika Luoranen

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Mika Horttanainen

Aims:

Upon completion of the course the student is expected to be able to
1. describe the properties of waste as fuel,
2. explain the most common waste-to-energy technologies and their suitability for different energy recovery applications and materials,
3. determine the waste-to-energy recovery potential of a region,
4. describe the most important flue gas emissions and their reduction technologies characteristic for the combustion of waste, and
5. analyse the role of energy recovery in municipal waste management.

Contents:

Waste-to-energy in Finland and other countries, properties of waste as a fuel, waste handling before thermal conversion, preparation of recycled fuel, mass combustion of waste, combustion of recycled fuel, gasification of waste, energy recovery in combustion of waste, emission reduction during combustion, flue gas treatment, utilisation and treatment of ash, energy recovery in anaerobic digestion of waste, landfill gas utilisation in energy production.

Teaching Methods:

1st period: 14 h of lectures, 14 h of exercises.
2nd period: 4 h of lectures, assignment info (2 h). Group assignment including calculations, written group report (approx. 44 h). Excursion (approx. 6 h). Written examination and preparation for it, approx. 20 h. Total workload 106 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Examination 50 %, practical assignment 50 %.

Course Materials:

Course book (to the appropriate extent): Niessen, W., 2002. Combustion and incineration processes. Marcel Dekker, Inc., New York. SBN: 0-8247-0629-3. Moodle.

Prerequisites:

Basic knowledge on thermodynamics, chemistry and power plant technology.

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

No

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

max 5

Valitaan vaihtoehtoisia opintojaksoja siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.

BH50A0500: Introduction to Combustion and Boiler Technology, 5 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Esa Vakkilainen

Year:

B.Sc. (Tech.) 2

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Esa Vakkilainen

Aims:

Upon completion of the course the students will be able to 1. describe the combustion processes, 2. describe the operation of the most common boilers burning different fuels, 3. define the fundamentals and configuration options of water-steam cycles, and 4. understand the formation of gaseous emissions and their most typical reduction methods. 5. Can calculate steamboiler efficiency, heat flows to heating surfaces and do combustion calculations.

Contents:

The characteristics of fuels. Combustion calculations. The functioning of the water-steam system. Engineering design; ability tocalculate boiler efficiency, heat loads to surfaces and combustion calculations. Types of boilers. Combustion methods and equipment. Gasifiers. The effect of different fuels and combustion mechanisms on emission formation.

Teaching Methods:

3rd period: 12 h of lectures and 12 h of tutorials. Written assignment and laboratory assignment. Succesfully completed written examination, in addition to which students must successfully complete the tutorial exercises, written assignment and laboratory assignment before taking the examination.
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. Examination 70 %, written and laboratory assignments 20 %, tutorials 10 %.

Course Materials:

Lecture notes. IFRF - Finnish Flame Research Committee, Poltto ja Palaminen, 2nd edition.
Teir, Sebastian, Steam Boiler Technology, 2nd ed. 2006.
Markku Huhtinen et al. Höyrykattilatekniikka, 2004.
Vakkilainen, Esa, Steam generation from Biomass, 2016.

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

No

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

max 10

BH50A1701: District Heating, 4 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Juha Kaikko, Esa Vakkilainen

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Esa Vakkilainen, D.Sc. (Tech.) Jussi Saari

Aims:

Upon completion of the course the student will be able to 1. describe the basics of district heating in the world and in Finland, 2. explain the technical solutions of generating and delivering district heating at a detailed level, do engineering design to 3. dimension heat output and annual thermal energy necessary for various heating applications, 4. dimension the district heating system and its components, 5. understand and calculate various losses, 6. evaluate the basic design and use of district heating networks and heat production.

Contents:

The formation of energy demand in buildings and the consumption variation. Consumer devices, connections and energy measurement. Abitility to design piping as well as network planning and control. Production of district heating, district heating plants and heating power plants. Cost and tariffs for district heating.

Teaching Methods:

3rd period: 10 h of lectures. Independent study 14 h. Independent calculations and online tasks 20 h. 4th period: Written assignment 48 h. Evaluating assignments 12 h.
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. Written assignment 60 %, independent calculations and online tasks 40 %.

Course Materials:

Frederiksen, Svend and Werner, Sven: District Heating and Cooling, Studentlitteratur, 2014.
Koskelainen, Lasse et al.: Kaukolämmön käsikirja, Energiateollisuus, 2006.
Lecture notes.

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

Yes, 5

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

Yes, 5

BH50A1800: Fundamentals of Energy Systems Planning, 6 cr

Validity: 01.08.2011 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Esa Vakkilainen

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Esa Vakkilainen

Aims:

Upon completion of the course the students will be able to 1. use the “Systems Engineering” method for the definition of initial data in energy system projects, 2. describe the implementation phases of the energy system projects, and 3. demonstrate practical skills for the planning, management and implementation of energy system projects and for the estimation of the systems’ environmental impacts.

Contents:

Students develop their own system product (steam, wind or solar power plant) through team and project work. During the course, students apply the “Systems Engineering” method, which consists of the following: the definition of the requirements for the product, testing, validation, the assessment and comparison of alternatives, the management and specification of subentities, risk assessment, reliability analysis, the optimisation and documentation of implementation. The student assumes one of the roles for the team: project manager, technical engineer, environmental engineer, cost engineer. Project planning and execution. Cost analysis. Estimation of environmental impact. The use of computer software as a planning aid.

Teaching Methods:

1st period: 10 h of lectures and planning tutorials. 2nd period: 8 h of lectures and planning tutorials and 2+2 h of seminar. Independent study approximately: Written assignment 80 h. Presentation preparation 14 h. Studying given material 40 h. The planning assignment is carried out in a team.
Total workload 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Written report of the planning assignment 70 %, oral presentation 30 %.

Course Materials:

Lecture notes.

Prerequisites:

Recommended: BH50A0200 Introduction to Power Plant Engineering and BH50A0800 Steam Boilers.

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

No

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

max 5

BH50A1900: Planning of Energy Systems, 4 cr

Validity: 01.08.2012 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Esa Vakkilainen

Year:

M.Sc. (Tech.) 2

Period:

3-4

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Esa Vakkilainen

Aims:

Upon completion of the course the students will be able to 1. describe energy system projects including the related technical dimensioning, the power plant project execution, the siting of the power plantand the minimization of the environmental impact, 2. participate in the evaluation of environmental impacts, licensing and decision making in energy system projects, 3. optimize the power plant and its components, and 4. compare factors affecting the power plant economics.

Contents:

Students continue to develop their own system product (steam, wind or solar power plant) through team and project work. During the course, students apply the “Systems Engineering” method, which consists of the following: the definition of the requirements for the product, testing, validation, the assessment and comparison of alternatives, the management and specification of subentities, risk assessment, reliability analysis, the optimisation and documentation of implementation. The student assumes one of the roles for the team: e.g. project manager, technical engineer, environmental engineer, cost engineer. Project planning and execution. Cost analysis. Estimation of environmental impact. Modelling of the power plant for the planning. The components of power plant. The dimensioning and optimisation of components. Fluid dynamic dimensioning. Thermal engineering simulation. The use of computer software as a planning aid. Documentation and public presentation of results.

Teaching Methods:

3rd period: 10 h of lectures and planning tutorials. 4th period: 8 h of lectures and planning tutorials and 2+2 h of seminar. Independent study approximately: Written assignment 50 h. Presentation preparation 14 h. Studying given material 18 h. The planning assignment is carried out in a team.
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. Written report of the planning assignment 70 %, oral presentation 30 %.

Course Materials:

Lecture notes.

Prerequisites:

BH50A1800 Energiajärjestelmien suunnittelun perusteet.

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

No

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

max 5

BH61A0600: Bioenergy, 3 cr

Validity: 01.08.2011 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Tapio Ranta

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:

1st period: 12 h of lectures. Written examination 3 h. 63 h of self-study.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Examination 100 %.

Course Materials:

Energy Visions 2050, VTT. 2009. Chapters 2, 4.4, 5.2- 5.4.
Additional material will be announced later during lectures.

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

15–

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

max 5

BL20A0700: Introduction to Electrical Power Systems, 4 cr

Validity: 01.08.2007 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Juha Haakana, Jukka Lassila

Year:

B.Sc. (Tech.) 3

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate professor, D.Sc. (Tech.) Jukka Lassila

Aims:

Upon completion of the course the student will be able to: 1. describe the essential operating principles of an electric power system, i.e., principles of power balance and voltage control management, 2. calculate the voltages, load currents, losses, symmetrical fault currents and
costs in electric power systems, 3. describe the basic phenomena and calculation principles related to static and transient stability.

Contents:

Operation of electricity market. Interconnection of electric power systems. Components and their equivalent circuits in electric power systems. Calculation of transmission and distribution networks. An overview of high voltage and equipment technology. Electricity
quality factors.

Teaching Methods:

14 h of lectures, 14 h of tutorials, lectures + exercises of 14 h, assignment 30 h, 1st period. Written examination. The lectures focus on the core learning objectives in the topic. Successful completion of the course requires student’s active independent work.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 100 % + accepted assignment, at maximum 10 additional points to exam.

Course Materials:

Study material in Moodle.
Additional material: Elovaara & Haarla: Sähköverkot I ja II. Otatieto Oy.

Prerequisites:

BL10A0100 Basics of Electrical Engineering and BL30A0000 Electric circuits attended.

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

No

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

max 5

BL30A0500: Introduction to Electrical Drives, 3 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Lasse Laurila

Year:

B.Sc. (Tech.) 3

Period:

2

Teaching Language:

Finnish

Teacher(s) in Charge:

Lasse Laurila, D.Sc. (Tech.), Associate professor.

Aims:

Upon completion of the course the student will be able to describe the principles of electric motors and frequency converters and recognize terms in the field of electric drives. The student can solve simple calculation problems in the field of electric drives.

Contents:

Operation of electromechanical and electromagnetic devices, current vector, torque. Basic types and operation principles of rotating electrical machines: general rotating field machine, DC machine, asynchronous machine, synchronous machine, reluctance machine. Energy efficient electric motor drives. Control principles: scalar, vector and direct torque control (DTC). Applications.

Teaching Methods:

Lectures 14 h, tutorials 14 h, exam 3 h, independent study 47 h.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 100 %. Possible extra assignments to gather extra points to the exam.

Course Materials:

Course material in Moodle.
Pyrhönen, J.: Sähkönkäyttötekniikan perusteet – lecture material (2006).
Recommended to follow also additional material listed in Moodle and lecture materials.

Prerequisites:

Recommended: BL30A0000 Electric Circuits and BL30A0300 Electromagnetism attended.

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

No

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

max 5

BL40A2301: Energy Efficiency, 6 cr

Validity: 01.08.2013 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Tero Ahonen, Jero Ahola, Tero Kaipia, Antti Kosonen, Lasse Laurila

Note:

The course is suitable for distance learning.

Year:

M.Sc. (Tech.) 1

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc (Tech.) Jero Ahola

Aims:

Upon completion of the course the student will be able to: 1. determine actions for the energy efficiency of the energy conversion process, 2. estimate the overall energy efficiency of the energy conversion system, 3. identify applications of electric energy usage and apply
methods that can be used to improve the energy efficiency.

Contents:

The course provides the student with an introduction to the significance and development potential of energy efficiency in energy production, transmission, distribution and end use. The focus is on electric energy and systems approach. The lecture topics are the efficiency of
energy production processes, the efficiency of electricity transmission and distribution and the efficiency of energy end use. The course is arranged as a series of lectures delivered by experts. The lecture topics may vary from year to year.

Teaching Methods:

Lectures 12 h, individual home works 141 h, examination 3 h. The course is suitable for distance learning. Total workload 156 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):

No

Assessment:

0-5, examination 100%. In addition, 70 % of individual assignments have to be passed. It is also possible to receive additional points to the exam based on the individual assignments.

Course Materials:

Lecture material in Moodle.

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

15–

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

max 15

YmKSaEnYmPe: , 20 - 30 cr

Validity: 01.08.2016 -

Form of study:

Type: Study module

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Aims:

Energia- ja ympäristötekniikan perusteet-sivuopintokokonaisuuden suoritettuaan opiskelija:
• ymmärtää erilaiset kestävyyden näkökohdat
• tunnistaa kestävän kehityksen haasteita
• ymmärtää teoreettisia perusteita haasteiden ratkaisemiseksi
• tunnistaa keskeisiä uusiutuvan energian tuotantomuotoja

Pakolliset opinnot 14 op.

BH20A0710: Fundamentals of Thermodynamics, 3 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: Tero Tynjälä

Note:

Course contents same as in first part of course BH20A0750 Engineering Thermodynamics, courses have common lectures and exercise classes in the first teaching period.

Year:

B.Sc. (Tech) 2

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

Tero Tynjälä, D.Sc. (Tech.), Adjunct Professor

Aims:

After completing the course students are familiar with basic concepts in energy technology, such as temperature, state properties, systems and processes, control volume analysis, different forms of energy and fundamental laws of thermodynamics. Students are able to use different charts and tables to find thermodynamic properties of different substances. After completing the course students can formulate the equation for the conservation of energy for an open control volume. Students are able to calculate heat, work and entropy change in ideal gas compression. Students understand the working principle of a heat engine and importance of Carnot-efficiency as a limit for the theoretical maximum efficiency of any heat engine.

Contents:

Basic concepts: state, process, system. Thermodynamical properties, ideal and real gas laws. The first law of thermodynamics, concepts, energy, work, heat, internal energy. Expansion and compression work for isothermal, isentropic and polytropic processes. The second law of thermodynamics, Carnot-process, heat engines, isentropic efficiency. Thermoeconomics, exergy.

Teaching Methods:

1st period: 12 h of lectures, 12 h of tutorials. 30 h of self study in online learning environment and answering to multiple choice (Quiz) assignments, 21 preparation for the examination, 3 h examination. Students must complete the compulsory tutorials before taking the examination.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Examination 60 %, quiz-assignments 40 %.

Course Materials:

Online material on Moodle, “Thermodynamic tables” handout, enthalpy and entropy chart for steam. The relevant parts of Moran, M.J. & Shapiro, H.N.: Fundamentals of Engineering Thermodynamics, 5th ed. 2004 or later.

Number of exercise groups where enrollment is in WebOodi (Number/Leave empty):

5

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

No

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

max 15

BL40A2600: Wind power and solar energy technology and business, 5 cr

Validity: 01.08.2013 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Olli Pyrhönen, Katja Hynynen

Year:

B.Sc. (Tech.) 3

Period:

3-4

Teaching Language:

Finnish

Teacher(s) in Charge:

D.Sc. (Tech.) Katja Hynynen

Aims:

Upon completion of the course the student will be able to: 1. model the process from wind energy into company turnover at the principle level, 2. identify and describe the key technologies related to wind power, the core business principles, environmental issues,
energy policy and their development trends, 3. describe the mutual effects of wind power and electric power systems, 4. identify and describe the technologies related to solar power., 5. describe the basic principle of photovoltaic cells, 6. estimate the performance and
profitability of a PV plant.

Contents:

Process modelling from kinetic energy of wind into company turnover and from solar radiation to turnover. Basic components of a wind
power plant (turbine, gearbox, generator, power electronics, power electronics, tower), environmental effects of wind power, wind park planning, grid effects of wind power, economic feasibility of wind power under different circumstances, wind conditions in Finland. Solar energy technologies, operating principle of solar panels, PV solar power plant structure.

Teaching Methods:

Lectures 14 h, homework, 3rd period. Lectures 14 h, 4th period. Weekly homework. Two 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:

0-5, project works 60 %, homework 40 %.

Course Materials:

Material handed out in class. Moodle.

Prerequisites:

Basics of physics (mechanics, thermodynamics, electricity)

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

No

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

max 5

BH60A0001: Basic Course in Environmental Technology, 6 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: Mika Horttanainen, Mirja Mikkilä, Mika Luoranen, Helena Kahiluoto, Risto Soukka, Lassi Linnanen, Heli Kasurinen

Note:

The course will be lectured twice during academic year, in autumn and in spring.

Year:

B.Sc. (Tech.) 1
It is recommended that the students of energy technology take the course during the autumn semester and the students of electrical engineering, mechanical engineering and environmental technology during the spring semester.

Period:

1-2, 3-4 (will be organised twice a year)

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Mika Horttanainen

Aims:

Upon completion of the course the student is expected to be able to
1. list the most important sustainability challenges posed by production and communities,
2. name the most typical ways of controlling sustainability challenges,
3. use environmental engineering terminology,
4. write a seminar report, act as an opponent, and give a seminar presentation,
5. apply system analytical and life cycle thinking, and
6. explain how other technology fields are connected to environmental engineering.

Contents:

Sustainability challenges at different spatial scales, related to production, consumption, waste, water use, gaseous emissions, transportation systems, natural resources, food systems and the built environment. Technical solutions and steering mechanisms for the management of the sustainability challenges.

Teaching Methods:

1st –2nd/3rd-4th period 22 h of lectures
1st –2nd/3rd-4th period approx. 56 h of lecture quizzes
1st –2nd/3rd-4th period approx. 58 h of literature review and peer review for the assignment
2nd/4th period approx. 10 h of seminar presentation preparations and sessions for the assignment
Total workload 146 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5. Examination in Moodle 70 %, written exercise 30 %.

Course Materials:

Moodle, lecture materials, additional reading related to lecture topics

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

Yes, 130

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

No

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

max 10

Vaihtoehtoisia opintoja valitaan siten, että sivuopintojen vaadittava minimiopintopistemäärä tulee täyteen tutkinto-ohjelman vaatimusten mukaisesti.

BH50A0200: Power Plant Engineering, 4 cr

Validity: 01.08.2007 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Esa Vakkilainen, Kari Luostarinen, Juha Kaikko

Year:

B.Sc. (Tech.) 3

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

Docent, D.Sc. (Tech.) Juha Kaikko, D.Sc. (Tech.) Jussi Saari

Aims:

Upon completion of the course the students will be able to 1. explain the basic processes of thermal power plants (excl. nuclear energy) and the impact of various factors on process efficiency, 2. apply mass and energy balances into energy production processes, and 3. calculate
the operating values of basic power plant processes and the costs of energy production.

Contents:

The operation of thermalpower plants and power plant processes. Engineering design: calculation methods of power cycles and calculation of production costs. Condensing power plants, back-pressurepower plants, heating power plants, gas turbine power plants, combined cycle powerplants.

Teaching Methods:

3rd period: 12 h of lectures, 9 h of tutorials. Moodle work. Assignment. Written examination. Tutorials, Moodle work and the assignment must be completed before the examination. Independent study approximately: Studying given material 23 h. Moodlework 18 h. Assignment 21 h. Preparation for the examination 18 h and the examination 3 h.
Total workload 104 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Examination 50 %, Moodle on-line work 30 %, assignment 20 %.

Course Materials:

Huhtinen, Markku et al.: Voimalaitostekniikka, Finnish National Board of Education, 2013.
Lecture notes. Moodle material.

Prerequisites:

BH20A0700 Fundamentals of engineering thermodynamics or BH20A0800 Engineering thermodynamics attended.

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

No

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

max 10

BH60A5600: Sustainability Transition and Sustainable Business, 6 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:

Replaces the course BH60A1600 Basic Course on Environmental Management and Economics.

Year:

B.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Econ. & Bus. Adm.), M.Sc. (Tech.) Lassi Linnanen
Associate Professor, D.Sc. (Agr. & For.) Mirja Mikkilä

Aims:

Uponcompletion of the course the student is expected to be able to:

1. understand how and what environmental responsibility and sustainability means for business;
2. identify corporate stakeholders and analyzetheir importance and environmental viewpoints;
3. understand the basics of environmental regulations,environmental strategy and risk management;
4. understand the basics of environmental management system;
5. know the basic environmental management toolsand explain the reasons for their application;
6. recognize economic means and tools forsustainability transition;
7. know the basics of system thinking andsustainability transition.

Contents:

Opintojaksolla käsitellään kestävän kehityksen ja liiketoiminnan välisiä vaikutuksia sekä kestävyysmuutoksen taloudellisia ohjauskeinoja. Kestävyysmuutosta ja sen hallinnointia tarkastellaan erityisesti liiketaloudellisena haasteena sekä tähän liittyvää riskien hallintaa ja taloudellisia ohjauskeinoja. Kurssilla käsitellään perusteita keskeisistä käsitteistä: kestävyysmuutos, systeeminen muutos, kestävät innovaatiot, kestävä liiketoiminta, ympäristöjohtaminen, yritysvastuu ml. vastuullinen viestintä ja markkinointi. Kurssilla havainnollistetaan systeemien ja erilaisten toimijoiden, esim. yrityksen sidosryhmien välisiä vaikutussuhteita.

Teaching Methods:

2. period: 7x2h lectures and 8h seminar; independent work140h. Total workload 162.
Independent work consists of group project work (70 %), including seminar and peer-evaluation and individual learning (30 %) assignments, moodle-based quiz.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

Evaluation 0 - 5. Group project work (70 %), independent learning (30 %).

Course Materials:

Course material will be announced during the lectures and in the Moodle.

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

No

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

max 5

BH61A0000: Fundamentals of Energy Economics, 2 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Tapio Ranta, Aija Kivistö

Year:

B.Sc. (Tech.) 1

Period:

2

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

Upon completion of the course the student will be able to: 1. apply alternative investment calculation methods in energy investments, 2. calculate the energy contents of fuels in different energy units, 3. describe the fundamentals of energy production methods and the applicable fuel options, 4. describe the grounds for the fuel price determination, and 5. identify the grounds for the security of energy supply.

Contents:

Finnish energy economics. Principles of investment calculation methods. Main energy units and heat value of fuels. Energy chain of fuels. Principles and efficiencies of energy production methods. Fuel prices and the effect of emission trading. Maintenance and delivery reliability.

Teaching Methods:

12 h of lectures, 6 h of exercises, homework exercises. Written examination. 34 h of self-study.
Total workload 52 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Examination 80 %, homework exercises 20 %.

Course Materials:

Material on Moodle.

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

No

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

max 5

BL10A0100: Basics of Electric Engineering, 3 cr

Validity: 01.08.2007 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Pia Lindh

Year:

B.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Ass. prof., D.Sc. (Tech.) Pia Lindh

Aims:

Upon completion of the course the student will be able to: 1. identify the turning points in the history of electrical engineering, 2. list the most essential electric power generation methods, 3. determine the most important end-uses of electricity, 4. describe the fundamentals of electrical safety, 5. explain electricity price formation, 6. identify applications of electrical engineering and describe their operation principles, 7. solve simple DC and AC systems and 8. understands how transformer and generator works.

Contents:

Short introduction to the history of electrical engineering. Electricity generation, distribution and use. Electrical safety. Electricity price. Electrical quantities: voltage, current, power, energy. Electrical engineering and electronics applications: e.g. electrical machines, electric vehicle, antenna.

Teaching Methods:

Lectures 28 h, Moodle based weekly exercises 30 h and personal e-learning 20 h.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5. Moodle assignments related to the lectures account for 100 % of the grade.

Course Materials:

Course material in the Moodle learning environment.

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

No

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

max 5

KoDSaKote: , 20 - 30 cr

Validity: 01.08.2012 -
Form of study:
Type: Study module
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F

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BK10A3500: Materials, 7 cr

Validity: 01.08.2015 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Miikka Karhu, Timo Kärki

Year:

B.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Laboratory Engineer, M.Sc. (Tech.) Esa Hiltunen
Professor, D.Sc. (Tech.), D.Sc. (Agr. & For.) Timo Kärki

Aims:

After having passed this course, the student will be able to:
1. Recognise, classify and compare groups of material and materials inside the groups,
2. Find typical application areas for materials,
2. Evaluate new possible usages for different groups of materials
3. Make use of test results from different empirical material testing methods,
4. Apply the knowledge acquired on the course on study modules for different production technologies.

Contents:

Presentation of most important practical applications of different groups of materials and defining of selection criteria. Mechanical properties and their definition with different empirical material testing methods. Suitability of materials for different production methods / vice versa. Basics of metallurgy and heat treatment of metallic materials. Polymers and composite materials. Mineral and coal-based fillers for materials. Development targets of modern material technology. Application of acquired knowledge on study modules for production technology and technical design/ machine design.

Teaching Methods:

Lectures 36 h, 1.-2. period. Laboratory works and practices 50 h, including demonstrations and practical tasks of empirical material testing and different manufacturing processes. Independent study 70 h. Group meetings 14 h. Total workload 170 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Number of mid-term examinations:

2

Assessment:

0-5, examination 70 %, laboratory work 30 %.

Course Materials:

Lecture materials. Other literature to be announced during lectures.

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

No

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

max 10

BK10A5500: Technical Documentation and 3D-modelling, 6 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:

Replaces the course BK50A3401 Tekninen dokumentointi ja 3D-mallinnus 6 op.

Year:

B.Sc. (Tech.) 1

Period:

1-3

Teaching Language:

Finnish

Teacher(s) in Charge:

Postdoctoral Researcher D.Sc. (Tech.) Sami Matthews

Aims:

After having passed the course module the student is able to:
- use 3D-modelling software (SolidWorks) in different applications of mechanical engineering and model different geometries
- to measure the basic dimensions of an existing object utilizing a caliper
- to utilize the valid standards during the documentation work
- produce tolerance-based dimensioning of a product and explain what different tolerances mean
- use identification symbols of surface roughness in documents and define their meaning
- produce manufacturing documents including welding documents according to valid

standards
- produce the technical documents of an assembly, recognize different machine parts and find the critical parts of the assembly to ensure the functioning of the product
- produce and select the best software and presentation style from among different alternatives to model and document a product.

Contents:

Basics of standards for technical documentation, data processing and transfer. Rules of drawing and sizing. Process charts of hydraulic systems. Process charts for the most common technical processes Manufacturing documents of a product and symbols and identifications which are used in them (identifications and symbols for tolerances, surface roughness and welding). Manufacturability aspects. Assembly documents. 3D assembly documents. Basics of how to compare CAD software. Basics of CAD/CAM integration. Basics of how to increase the productivity of computer assisted design by utilizing parametric, wizard based and feature based modelling. Basics of product data management (PDM systems, basic facilities of CAE systems). Basics of product visualization and utilization of 3D printing in prototyping work.

Teaching Methods:

Lectures 36 h 1.-3. period. Exercises 18 h, 1. and 2. period. Teamwork 40 h, 2.-3. period. Project work 34 h and independent work 28 h. Total workload 156 h. Student can optionally complete Swedish language course as a group work during the course.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, project work 50 %, exercises 50 %.

Course Materials:

Course material in Moodle.

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

No

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

max 5

BK80A2900: Basic Course in Strength of Materials, 3 cr

Validity: 01.08.2015 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Heli Mettänen

Year:

B.Sc. (Tech.) 2

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

Heli Mettänen, M.Sc. (Tech.), Doctoral Student

Aims:

Students who successfully complete the course will understand the basics of the strength of materials, and be able to apply knowledge to simple parts, structures and pressure vessels.

Contents:

Definition of normal and shear stress. Mechanical properties of materials. Separate treatments of axial load, torsion and bending. Transverse shear, shear flow in thin-walled structures. State of stress resulting from combined loadings. Transformation of a multiaxial state of stress. Design of beams and shafts.

Teaching Methods:

Lectures 21 h, period 1. Exercises 21 h, period 1. Independent study 36 h. Total workload 78 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, final examination 100 %.

Course Materials:

Moodle Hibbeler, R.C., Mechanics of Materials Outinen, H., Koski, J., Salmi, T., Lujuusopin perusteet

Prerequisites:

Recommended Mekaniikka- or Mekaniikan perusteet-course

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

No

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

max 10

BK80A3201: Introduction to Mechanics, 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:

Replaces the course BK80A3200 Mekaniikan perusteet 3 op

Year:

B.Sc. (Tech.) 1

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

University Lecturer, D.Sc. (Tech.) Kimmo Kerkkänen

Aims:

Students who successfully complete the course will demonstrate the following outcomes:
- An ability to make difference between a particle and a rigid body
- An ability to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium in 2D.
- An ability to calculate kinematics and kinetics for particles
- An ability to use Newton's second law and energy and momentum methods for particles

Contents:

Equivalent Systems of Forces, Moment of a Static Force and a Force Couple, Equilibrium of Particles and Rigid Bodies in 2-D, Kinematics of Particles, Force and Acceleration, Work and Energy, Impulse and Momentum Methods for Particles. In general: Differential equations and vector algebra.

Teaching Methods:

Lectures 21 h, 1st period. Exercises 14 h, 1st period. Additional individual work 43 h, 1st period. Moodle examination. Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5. Exam 50 %, individual assignments 50 %.

Course Materials:

Salmi T., 2001, Statiikka. Hibbeler R.C., Engineering Mechanics, Dynamics, 9th ed. Chapters 12-15. Lecture notes.

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

No

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

No

Valitaan seuraavista opintoja siten, että sivuaineopintojen vähimmäisopintopistemäärä täyttyy.

BK10A3601: Production Technologies, 11 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: Juha Varis, Miikka Karhu, Antti Salminen, Katriina Mielonen, Timo Kärki, Mika Lohtander

Note:

The course can be done and registered in two parts, 5 ECTS cr and 6 ECTS cr.

Year:

B.Sc. (Tech.) 2

Period:

3-4

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.), D.Sc. (Agr. & For.) Timo Kärki

Aims:

After completing the course, the student can identify the most typical used manufacturing methods in mechanical engineering
and is able to utilize this knowledge and skills in the applications in production technology. The student is able to apply manufacturing and production technology methods in engineering projectsthat take into account machine design, material selection together with machine design and manufacturing technology and manufacturing technology challenges.

Contents:

The course consists teaching methods using modern theoretical and practical exercises
The course covers the most typical manufacturing methods used in mechanical engineering and illustrated by means of laboratory work. Laboratory exercisec includes the element of turning and sheet metal working, hand welding process, 3D-printing and laser beam machining and manufacturing processes for fiber composites and packaging materials. The course includes the basics of welding processesand mechanization of welding and automation, laser machining processes, sheetmetal work and cutting machining, polymers and composite materials as well aspackaging technology processes and devices. The course is related to sustainable.

Teaching Methods:

Lectures, exercises in Moodle, group work, demo lectures, laboratory exercises, seminar work, independent study,. Lectures 98 h, Exercises 120 h, Independent study 70 h. Total workload 286 h. Exam in electronic exam room EXAM. The course can be done and registered in two parts, 5 ECTS cr and 6 ECTS cr.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Number of mid-term examinations:

2

Assessment:

0-5, mid exam, exam 70%, group work (seminar work) 30%

Course Materials:

Material given in lectures and in Moodle.

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

No

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

max 5

BK60A0200: Mechatronics, 6 cr

Validity: 01.08.2007 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Heikki Handroos

Year:

B.Sc. (Tech.) 3

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Heikki Handroos
Tutkijatohtori, TkT Lauri Luostarinen

Aims:

-The structures, properties, advantages and drawbacks associated with different mechatronic transmissions.
-Select appropriate control, sensor and data transmission system for various kinds of mechatronic machines
-Dimension, compare and select appropriate components for a mechatronic system.
-Develop PLC-based control for a mechatronic machine

Contents:

Typical designs of mechatronic systems in various industrial machines and processes. Structures, operating principles and selection criteria of mechatronic components. Dimensioning hydraulic, pneumatic and electrical transmissions by using mathematical equations. Selection criteria for sensors and control systems. Accuracy of measurement and sensing systems. Intelligent materials in actuators.

Teaching Methods:

Lectures 21h. Exercises and seminars 42h. Laboratory work and assignments 42h including constructing simple mechatronic systems and simulation with a given software. Self oriented working 51h. Total 156 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Number of mid-term examinations:

2

Assessment:

numerical assessment 0-5, where
examination (optionally 2 mid-term exams), effect 2/3
exercises, seminars, laboratory work and assignments, effect 1/3

Course Materials:

Moodle

Number of exercise groups where enrollment is in WebOodi (Number/Leave empty):

2

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

No

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

max 10

BK65A0203: Engineering Design, 7 cr

Validity: 01.08.2015 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Kimmo Kerkkänen

Year:

B.Sc. (Tech.) 2

Period:

1-4

Teaching Language:

Finnish

Teacher(s) in Charge:

University Lecturer, D.Sc. (Tech.) Kimmo Kerkkänen

Aims:

Students who successfully complete the course will demonstrate the following outcomes:
- how to work in a constructive and systematic team
- how to use creative ideation in product development process
- how to apply the methodology of a systematic product planning
- how to work as a member of a product development team
- basics of machine elements and interactions of basic machine elements
- how to select and design basic machine elements for typical applications.

In addition, a student understands basic skills and knowledge required in the design process of a complete construction.

Contents:

Fundamentals of a systematic product planning and systematic machine design process, customer needs definition, conceptual design, constructive creation and evaluation of solution variants, evaluation of costs, design principles for manufacturing, safety and reliability, failure-potential evaluation techniques. Influence of the protection of inventions to product development process, patent applications. The student will be acquainted with the design and manufacturing of technical product from a practical point of view. Selection and design of basic machine elements, analysis of machine elements under static and dynamic loads.

Teaching Methods:

Lectures 42 h, 1st-3rd period. Exercises and seminars 48 h, 1st-4th period. Additional teamwork 66 h, 1st-4th period. Additional individual work 26 h. Total workload 182 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, project works 100 %. Evaluation consists of elements such as evaluation of presentations, written documents, peer evaluation etc.

Course Materials:

Pahl G. & Beitz W., 1996. Engineering Design: A Systematic Approach, London, Springer. 543 s. Ulrich K.T. & Eppinger S.D. 2000. Product Design and Development. New York, Irwin McGraw-Hill. 358 s. Björk T. et.al., 2014, Koneenosien suunnittelu, 517 s. Mott, R. L., 2013. Machine Elements in Mechanical Design. Niemann G. & Winter H., Maschinenelemente I, II ja III. Lecture notes.

Prerequisites:

BK50A340/BK10A5500 Technical documentation and 3D-modelling completed, BK80A3200 basics of Mechanics completed, BK80A2600 Mechanics recommended.

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

No

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

max 15

BK80A2601: Mechanics, 7 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: Jussi Sopanen, Kimmo Kerkkänen

Year:

B.Sc. (Tech.) 1

Period:

2-4

Teaching Language:

Finnish

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) Jussi Sopanen
University Lecturer, D.Sc. (Tech.) Kimmo Kerkkänen

Aims:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:
- An ability to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium in 3D.
- An understanding of the analysis of friction forces.
- An ability to use the principle of virtual work
- A knowledge of internal forces and moments in members
- An ability to calculate kinematics and kinetics for rigid bodies
- An ability to use Newton’s second law and energy and momentum methods for rigid bodies
- A knowledge of basics of vibrations

Contents:

Equilibrium of Rigid Bodies in 3D, Analysis of Structures: frames and machines, Forces in Beams, Friction, Kinematics and Kinetics of Rigid Bodies. Force and Acceleration, Work and Energy, Impulse

and Momentum Methods for Rigid Bodies. Frictionless Eccentric Impact. One Degree of Freedom Harmonic Vibration, Platform Stimulus, Rotating Unbalance. In general: Differential equations and vector algebra, use of mathematical software.

Teaching Methods:

Lectures 63 h, 2nd-4th period. Exercises 42 h, 2nd-4th period. Additional individual work 62 h, 2nd-4th period. Project work 15 h, 2nd period. Moodle examination. Total workload 182 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5: Exam 30 %, individual assignments and project works 70 %.

Course Materials:

Salmi T., 2001, Statiikka. Hibbeler R.C., Engineering Mechanics, Dynamics, 9th ed. Chapters 16-19, 22. Lecture notes.

Prerequisites:

BK80A3200 Basics of Mechanics or BK80A3200 Introduction to Mechanics

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

No

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

15–

BK80A2701: Strength of Materials, 9 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: Heli Mettänen

Note:

The course can be done and registered in two parts, 4 ECTS cr and 5 ECTS cr. Final grade will be given, when the whole course is passed.

Year:

B.Sc. (Tech.) 2

Period:

2-4

Teaching Language:

Finnish

Teacher(s) in Charge:

Heli Mettänen, M.Sc. (Tech.), Doctoral Student

Aims:

Students who successfully complete the course will understand the basics of the strength of materials and the ability to apply the knowledge to simple parts and structures. Ater having passed the course the student is able to:
- establish the stresses and deformations under simple loading cases by utilizing different calculations methods and hypothesis
- compare different optional calculation methods and stress hypothesis and select the most appropriate one
- establish stresses and deformations also in 3D-space

Contents:

Design of beams and shafts. Deflections of beams and shafts. Buckling of columns. Theories of failure. Basics of fatigue in dynamically loaded shafts. Composite beams. Un-symmetric beam bending. States of stress and strain. Generalized Hooke's law. Behavior of orthotropic materials and laminates. Thick-walled axisymmetric shells. Deformation energy and failure theories. St. Venant's theory for torsion. Stresses in curved bars. Deformation of circular members. Castigliano's theorems. Principle of stationary potential energy.

Teaching Methods:

Lectures 63 h, 2nd-4th period. Exercises 63 h, 2nd-4th period. Project work 10 h. Individual work 98 h. Total 234 h

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Number of mid-term examinations:

2

Assessment:

0-5, examination or intermediate examinations 70 %, exercises 30 %.

Course Materials:

Lectures in Moodle. Helpful literature: Hibbeler, R.C., Mechanics of Materials. Outinen, H., Koski, J., Salmi, T., Lujuusopin perusteet. Ugural A.C. and Fenster S.K., Advanced Strength and Applied Elasticity, 4th ed. Ugural A.C. Mechanics of Materials. Hibbeler, Structural Analysis. Pennala, Lujuusopin perusteet.

Prerequisites:

BK80A2900 Lujuustekniikan perusteet completed.

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

No

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

max 5

BK80A2800: FE-analysis, Elementary Course, 5 cr

Validity: 01.08.2015 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Timo Björk, Ilkka Pöllänen

Note:

Replaces the course BK10A5300 FE-analyysin sovellukset konetekniikassa JEDI

Year:

B.Sc. (Tech.) 3

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Ilkka Pöllänen, M.Sc. (Tech.)
Timo Björk, D.Sc. (Tech.), Professor

Aims:

After having passed the course, the student is able to:
- utilize mathematical-physical foundations of FE-method
- solve exercises about statically loaded mechanical structures
- use FE-analysis software

Contents:

The purpose of the lectures is to give basic knowledgeof the element stiffness matrix, composing the global stiffness matrix, handling of boundary conditions and loads, and a solution of the task. In the exercises will be introduced to FE modeling by using commercial software.

Teaching Methods:

Lectures 28 h, 1st-2nd period. Exercises 28 h, 1st-2nd period. Independent work 74 h. Total workload 130 h.
Lectures and exercises are available in Moodle for distance learning. In addition to this, app. 5-6 face-to-face meetings.
The course is suitable for distance learning.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 60 %, exercises 40 %.

Course Materials:

Lectures in Moodle. Hakala M.K., Lujuusopin elementtimenetelmä. Lecture material

Prerequisites:

BK80A2701 Lujuusoppi completed.

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

No

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

max 5

KoDSaMate: Advanced Materials Engineering, 20 - 30 cr

Validity: 01.08.2016 -

Form of study:

Type: Study module

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Aims:

After completing this minor subject the student will be able to:
- understand the influence of material selection to the product design
- structure hybrid materials from separate raw material sources
- have the readiness to understand the usability of nanomaterials and ceramics in processes and products
- apply various manufacturing methods to advanced materials processing and define concepts and entities related to high performance products
- ability to build up material selection route from end product and manufacturing methods to raw materials

Obligatory Studies 25 ECTS cr

BK90C1900: Introduction to Materials Engineering, 4 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Timo Kärki

Year:

M.Sc. (Tech.) 1-2

Period:

2

Teaching Language:

English

Teacher(s) in Charge:

Professor, D.Sc. (Tech.) , D.Sc. (Agr. & For.) Timo Kärki

Aims:

Aim of the course is to introduce possibilities of Material Engineering to students. Diverse possibilities of different materials is taken into consideration when optimizing the variable possibilities in Product Designing. After having completed this course, the student should be able to: understand the influence of material selection to the product design recognize the variable possibilities of different materials show creative and innovative expertise in the field of Materials Engineering.

Contents:

Basics of Materials Engineering and Product Design. Principles of materials selection and introduction to materials selection procedures. Choice of fabrication techniques including case studies related to different materials. Selecting polymers and composites as raw materials: structure, properties, processing characteristics and applications for the commercially important polymers including general classes of polymers: commodity, engineering and specialty thermoplastics, thermosetting resins and rubbers. Introduction to specific metals, alloys and minerals: metallurgy, properties, applications and potentialities of metals, alloys and minerals in a wide variety of engineering environments. Wood materials. Introduction to engineering ceramics. Properties and manufacturing of carbon based materials. Recycled Materials as a raw material source.

Teaching Methods:

Lectures 21 h. Independent study 63 h. Seminar 20 h. Total workload 104 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, examination 70 %, seminar 30 %

Course Materials:

Course material in Moodle. Other literature to be announced during lectures.

Prerequisites:

-

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

max 10

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

max 10

BK90C2000: Hybrid Materials, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Ossi Martikka

Year:

M.Sc. (Tech.) 1-2

Period:

2

Teaching Language:

English

Teacher(s) in Charge:

Project Researcher, D.Sc. (Tech.) Ossi Martikka

Aims:

Organic–inorganic hybrids and composites have been playing a major role in research and society in recent years. This course aims to give the participants an understanding of the properties of the organic and inorganic components, preparation methods, characterisation techniques and also examples of functional hybrid materials. After having completed this course, the student should be able to: structure hybrid materials from separate raw material sources characterize hybrid materials with various testing methods can work in teams and solve problems related to hybrid materials

Contents:

Combinations of different materials. Various structures of hybrid materials. Properties of biopolymers and bionanomaterials. Different characterization methods: optical, morphological, surface, interfacial and mechanical characterization. Designing of Hybrid Materials. Performance of Hybrid Materials.

Teaching Methods:

Lectures 14 h. Exercises and individual guidance 20 h. Independent study 44 h. Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, oral examination in evaluation panel 50 %, exercises and seminar 50 %.

Course Materials:

Course material in Moodle. Other literature to be announced during lectures.

Prerequisites:

-

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

max 10

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

max 10

BK90C2100: Functional Properties of Nanomaterials, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Irina Turku

Year:

M.Sc. (Tech.) 1-2

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

D.Sc. (Tech.) Irina Turku

Aims:

Aim of the course is to get students familiar to different types of nanomaterials. Manufacturing processes of nanomaterials are also highlighted. After having completed this course, the student should be able to: understand the variety of nanomaterials and have the readiness to understand the usability of nanomaterials in processes and products, can work in
teams and solve problems.

Contents:

What is nanoscience about? Classification of nanomaterials. Nanomaterial structures, fundamentals and properties. Carbon based nanomaterials, liquid crystals properties and application, nanocellulose and 'smart" polymers. Analytical tools in nanoscience. Applications of nanomaterials. Synthesis of nanoscale materials. Bottom-up and top-down approaches. Safety of nanomaterials.

Teaching Methods:

14 h of lectures, 2 h of laboratory work, 14 h of tutorials, total workload 78 h, 3rd period

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

Numerical assessment, 0-5; Final grade will include: examination 60 %, essay 40 % and laboratory work (pass).

Course Materials:

M.F. Ashby et al. Nanomaterials, Nanotechnologies and Design, ELSIVIER Ltd, 2009; Lecture materials; Internet resources.

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

15–

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

max 10

BK90C2200: Sustainable Manufacturing of Advanced Materials, 5 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Energy Systems

Grading: Study modules 0-5,P/F

Teachers: Marko Hyvärinen, Katriina Mielonen

Year:

M.Sc. (Tech.) 1-2

Period:

3

Teaching Language:

English

Teacher(s) in Charge:

Laboratory Engineer, D.Sc. (Tech.) Marko Hyvärinen

Aims:

Aim of the course is to demonstrate awareness of the range of modern manufacturing techniques for advanced materials and to select an appropriate manufacturing technique for a given component/use. After having completed this course, the student should be able to: apply various manufacturing methods to advanced materials processing define processing methods based on material selection can understand and identify possibilities of entrepreneurship in sustainable manufacturing.

Contents:

Introduction to processing technology and overview of manufacturing processes. Usable material forms: short fibers, non-woven mat, undirectional, bidirectional, multi-axial and braided weaves. Fundamentals of laminate construction: ply orientation, balance and symmetry. Manufacturing methods: wet layup, prepreg layup, filament winding, automated tape layup, automated fiber placement, resin infusion, press molding and pultrusion. Matrix resins: thermoset vs. thermoplastic polymers, process temperatures, service limits, storage requirements, shelf life limits and pot life/work life. Process equipment: oven, autoclave and platen press. Extrusion, injection moulding and moulding as manufacturing methods. Coating and laminations methods in packaging solutions. Future process developments.

Teaching Methods:

Lectures 28 h. Independent study 72 h. Seminar 30 h. Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5, examination 70 %, seminar 30 %.

Course Materials:

Course material in Moodle. Other literature to be announced during lectures.

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

max 10

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

max 10

BK90C2300: High Performance Products, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Timo Kärki

Year:

M.Sc. (Tech.) 1-2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Laboratory Engineer, D.Sc. (Tech.) Marko Hyvärinen
Post-Doctoral Researcher, D.Sc. (Tech.) Sami-Seppo Ovaska

Aims:

Aim of the course is to highlight the developments in the design of energy systems, aircraft, cars, electronic equipment, constructions, packaging, etc., which depend critically upon the availability of novel materials. Of equal importance is an understanding of both advanced processing techniques, the latest computer based design procedures and environmental

aspects essential for product commercialization from the concept phase. After having completed this course, the student should be able to: define concepts and entities related to high performance products have a good understanding about product range manufactured with various methods can solve real-life problems related to high performance products.

Contents:

Composite industry overview: applications for composites, history and current technologies. Health and safety and industry terminology in high performance products. Applications in energy systems, aeronautical industry, automotive industry, marine industry, construction industry and smart materials in packaging industry.

Teaching Methods:

Lectures 28 h. Independent study 72 h. Seminar 30 h. Total workload 130 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5, examination 70 %, seminar 30 %.

Course Materials:

Course material in Moodle. Other literature to be announced during lectures.

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

max 10

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

max 10

BK90C2400: Project course in Material Engineering, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Marko Hyvärinen

Year:

M.Sc. (Tech.) 1-2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

Laboratory Engineer, D.Sc. (Tech.) Marko Hyvärinen

Aims:

Aim of the course is to get the students familiar to the project type working in materials engineering. Typical project will start with selection of materials and manufacturing method for a certain end product. After having completed this course, the student should be able to: ability to build up material selection route from end product and manufacturing methods to

raw materials ability to work in a project organisation in certain role can act and communicate in groups and networks.

Contents:

Projects are completed across the full spectrum of manufacturing, including energy systems, automotive, construction industry, packaging etc. Project titles are varied and cover areas of operational improvement, strategic decision-making and organizational management. Sub-areas for project can be following: material optimization, selection of manufacturing method, testing, production planning, scheduling and inventory optimization, capacity utilization, lead time reduction, quality improvement and control, new product development process, effective maintenance, energy usage, layout floor planning, inter-departmental effectiveness, feasibility study in to a new technology, market approval, sales, marketing and business strategy, new markets, products, company strategies, competitors and routes to market.

Teaching Methods:

Lectures 6 h, exercises and individual guidance 28 h, project work 96 h. 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, project work 70 %, exercises 30 %.

Course Materials:

Course material in Moodle. Other literature to be announced during lectures.

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

No

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

max 10

KeSoM300: Chemical Process Engineering, 21 - 31 cr

Validity: 01.01.2017 -

Form of study:

Type: Study module

Unit: LUT School of Engineering Science

Grading: Study modules 0-5,P/F

Aims:

Suoritettuaan kemian prosessitekniikan sivuopintokokonaisuuden, opiskelija
• on saanut käsityksen erilaisten prosessilaitteiden toiminnasta
• osaa prosessisuunnittelun ja -simuloinnin perusteet
• tiedostaa prosessiturvallisuuden kokonaisvaltaisen tärkeyden.

Kaikille pakolliset opinnot 20 op

BJ01A5010: Introduction to Chemical Process Industries, 3 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: Tuomas Koiranen

Year:

B.Sc. (Tech.) 1

Period:

1

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

Upon completion of the module, the student will be able to - describe process industries and its subcategories - nominate and explain some most important production processes in the Finnish chemical industry - tell about the role of process industry in the society and its current trends and future outlook - recognize and describe typical job descriptions of a chemical engineer.

Contents:

Different process industry sectors. Typical production in chemical industries, structure and characteristics. Chemical processes, products, industrial companies their values and societal impact. Chemical engineer profession characteristics.

Teaching Methods:

Lectures 8 h, periodi 1. On-line instruction and materials at Moodle. Independent study 70 h. Excursion to factory.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5. Examination in Exam.

Course Materials:

Lecture notes.
Finnish chemical industries by Riistama, Laitinen, Vuori.
J.A. Moulijn, M. Makkee, A.VDiepen, Chemical Process Technology, 2nd Ed., Wiley, 2015

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

No

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

max 10

BJ01A5020: Process and Plant Design, 4 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: Ritva Tuunila

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

After the module the student can - name and explain most common steps of process and plant design - use the most common methods of process and plant design - read and compile basic documents of process design (process flowsheets, equipment definitions, drawings and equipment lists) - perform process calculations, especially mass and energy balances - make preliminary material selections - estimate cost and profitability of the process.

Contents:

Initial information of design. Fundamentals, methodology, steps and content of process design. Process synthesis and analysis. Process flowsheets. Equipment design. Basis of material selection. Layout design. Cost and profitability calculations. Project work.

Teaching Methods:

Lectures, seminars and exercises 28 h, 4th period. Group project work 30 h, self-study 46 h.
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, home assignments 75 %, group work 25 %.

Course Materials:

Coulson J.M. et al. Chemical Engineering, Vol 6 (selected chapters).

Prerequisites:

BJ01A5010 Introduction to Chemical Process Industries attended.

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

No

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

max 5

BJ01A5030: Introduction to Process Simulation, 4 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: Ritva Tuunila

Year:

B.Sc. (Tech.) 3

Period:

2

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

After a module a student can - explain basics and most common applications of process simulation - draw a simulation (information) flowsheet of the process – analyze a process from process simulation point of view - simulate simple chemical processes with a
commercial simulator.

Contents:

Fundamentals and use of process simulation. Simulation flowsheet. Steady-state simulation. Structure of commercial simulation software. Calculations of mass and energy balances of chemical processes by using commercial simulation software (Aspen Plus).

Teaching Methods:

Lectures and exercises 30 h, 2nd period. Simulation assignment 40 h, 2nd period. Self Study 34 h. 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, evaluated home assignments 50%, simulation assignment 50%.

Course Materials:

Lecture notes and other material informed in the lectures.

Prerequisites:

BJ01A4010 Mechanical Unit Operations and BJ01A4030 Design of Unit Operations attended

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

No

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

max 5

BJ01A5040: Process Safety, 2 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: Maaret Paakkunainen

Note:

The course is suitable for distance learning.

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc. (Tech.) Maaret Paakkunainen

Aims:

Upon completion of the module, the student will be able to - explain the concepts of process safety, risk and intrinsic safety - describe the main principles to minimize safety risks - apply some conventional risk evaluation methods in process design (for example hazop, chemical matrix, safety indices...) - explain most important legislation concerning chemical safety - explain the preconditions for fires and explosions - explain the main principles of environmental and occupational safety.

Contents:

Properties of harmful substances and principles for correct material choices. Process safety, the concepts of safety actions and and risk. Evaluation of process risks. Occupational safety.

Teaching Methods:

Lectures 7 h, Visiting lecturers 4h, Period 4. Self-study 41 h.
Course is teached with flipped classroom -technique. During the lectures there will be groupworks based on the self-study material.
Total workload 52 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5, electronic exam 100%

Course Materials:

Lecture notes.
Ulrich Hauptmann: Process and Plant Safety (some parts) (e-book).

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

No

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

max 5

BJ01A5051: Biorefineries, 3 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: Eeva Jernström

Year:

B.Sc. (Tech.) 1

Period:

2

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

After completition of the module, the student will know: - Biorefinery as a framework and the most essential biorefinery concepts - The role and importance the biorefineries for forest industry and the related industry: economical, technological and societal challenges - The
most essential biorefinery products, their raw materials and the most common production processes, emphasis on new and future products And be able to - Describe and assess the usability of bio-based raw materials for hte production of biorefinery products - Assess the
functionality of different biorefinery products and the related challenges - Describe ad assess typical production processes of various biorefinery products and the related challenges from different angles.

Contents:

Current biorefineries, wood resources as raw material for biorefineries, other than wood-based raw material for biorefineries, most typical biorefinery concepts, new integrated pulp and biorefineries, side stream to be used, potential new products and their most essential
production processes, biorefineries in the context of bio-economy.

Teaching Methods:

Lectures, videos, material in the net, individual or group assignments combined with independent studying.
Weekly Moodle exams or an electronic exam after the course.
- Lectures: 12 h, 6 x 2h
- individual assignments at Moodle: 18 h
- preparation for weekly exams, independent study, materials at Moodle: 42 h, 6 x 7 h
- weekly exams at Moodle: 6 h, 6 x 1 h.
Total workload 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5. Particpation to lecturers covers 20 % of the assessment. Approved weekly exams cover 80 % of the assessment.

Course Materials:

Lectures and related material.

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

No

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

max 5

BJ01A4011: Mechanical Unit Operations, 4 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

Year:

B.Sc. (Tech.) 1

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

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

Aims:

After completing the module the student can - list the most common mechanical unit processes – determine pressure drop of pipe flow – determine power need of a pump - describe the most common equipment used for storing, transporting and comminution of solid material - select tentatively suitable equipment for comminution based on the properties of feed material - describe the most common equipment used for solid-liquid separation - select tentatively suitable equipment for solid-liquid separation based on the suspension properties and separation target.

Contents:

Fluid flow in a pipe and pressure drop of pipe flow. Power need of a pump. Storing, transportation and comminution (crushing, grinding) of solid material. Classification of solid material. Solid-liquid separation by sedimentation and filtration.

Teaching Methods:

Lectures, seminars and exercises 28 h, 3rd period. Group work 25 h, self-study 51 h.
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, electronic exam 40%, evaluated home assignments 40%, group work 20%.

Course Materials:

Coulson J.M. et al. Chemical Engineering, Vol 1 and 2 (applicable chapters).
Svarovsky, L. Solid-Liquid Separation, (applicable chapters).

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

No

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

max 5

Vapaavalintaiset opinnot 5-10 op

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: Sami-Seppo Ovaska, Katriina Mielonen

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

BJ02A2061: Product Design, 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: Arto Laari

Year:

M.Sc. (Tech.) 2

Period:

1

Teaching Language:

English

Teacher(s) in Charge:

Docent, D.Sc. (Tech.) Arto Laari

Aims:

Upon completion of the module, the student will be able to: - nominate and classify chemical products - analyze customers's needs - create and develop ideas for chemical products - compare product ideas and make selections - apply his/hers chemical engineering knowledge
in product design - evaluate product costs and profitability.

Contents:

Teaching includes lectures and guided product design work. Students will carry out a product design project in design groups.

Teaching Methods:

Lectures, exercises and seminars 28 h. 1st period. Self-study and project work 102 h.
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, project work 100%.

Course Materials:

Lecture slides.

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

15–

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

max 5

TikSOTite: Computer Science, 24 - 30 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

Teaching Language:
Finnish
Aims:
On the completion of this minor, the students will be able to:
1. Understand software engineering principles, tools and processes in development of software systems.
2. Demonstrate software engineering application domain knowledge and principles of selecting specific implementation principles.
3. Recognize the need for, and engage in, lifelong learning.
4. Can specify software requirements through a productive working relationship with project stakeholders.

Vaihtoehtoiset (väh. 24 op). Jos opintojakso sisältyy esim. pakollisiin ydinopintoihin, valitaan muuta tilalle. Huomioi esitietovaatimukset!

BM40A0301: Data Structures and Algorithms, 6 cr

Validity: 01.01.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Engineering Science
Grading: Study modules 0-5,P/F
Teachers: Tuomas Eerola, Heikki Kälviäinen

Year:
B.Sc. (Tech.) 2
Period:
1-2
Teaching Language:
Finnish
Teacher(s) in Charge:
Professor, D.Sc. (Tech.) Heikki Kälviäinen
Aims:
After the course a student is expected to be able to explain the complexity categories of algorithms and their related data structures, to estimate the complexity category of a given algorithm, to select a suitable design principle of algorithms to solve a problem, to write an algorithm using advanced data structures, and to implement it using the C language.
Contents:
Algorithmic solutions and data structures. Complexity categories. NP-complete problems. Algorithmic notation. Analysis methods. Design principles of algorithms and their relevant data structures. Typical problems and their data structures: sorting, search and network problems, and stacks, lists, trees and graphs. Approximation and random algorithms. Implementations using the C language.
Teaching Methods:

Lectures and exercises 18 h, homework etc. self-studying 50 h, 1st. period. Lectures and exercises 15 h, homework etc. self-studying 43 h, 2nd period. Practical assignment 30 h. Total amount 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 – 5, exercises 100 %. Practical assignment.

Course Materials:

Material announced in the course web page.

Prerequisites:

CT60A0210 Käytännön ohjelmointi or CT60A0220 C-ohjelmoinnin ja testauksen perusteet, recommended BM40A0101 Tietojenkäsittelyn perusteet.

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

No

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

No

CT10A7051: Area Expert's Views on Future Work-life Expectations, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Ari Happonen

Note:

Note! Course replaces CT10A7050 Research/Industry Forum in Software Technology and Engineering and can not be included in the same degree.

Year:

B.Sc. (Tech) 3

Period:

3-4

Teaching Language:

Finnish and English

Teacher(s) in Charge:

D.Sc. (Tech.) Ari Happonen

Aims:

The students will learn about the current trends in research and industry related on digital transformation, how it affects into everyday life and how students should be then prepared to future work-life. Course assignments shall give a glimpse into the current work-life skill set expectations, needed in research and industry context, based on lectures given by visiting and university lecturers. After completing the course student will be able to:
1. utilize the course knowledge into real life case challenges

2. explain more clear sense on future work-life skill set expectations including lifelong learning
3. evaluate own believes of work-life expectations into presented ones
4. demonstrate the ability to follow given guidelines in research methodology
5. apply orally given area expert knowhow into another use case context

Contents:

The course is based on a series of visiting lectures given by the researchers / professors from LUT and lectures given by yearly changing industry and public sector representatives. The lectures introduce students to research and industry topics and current trends that should help the student to focus their studies on LUT. Most lectures have a preliminary task (e.g. research on industry area of the visiting lecturer or reflecting a research article, given by the visiting researcher into real life application context etc.). Tasks are evaluated weekly including follow up discussions on some selected weekly tasks. Some lectures may include e.g. live demonstrations of tools used in research and industry, like data-analysis and modeling tools. Within the lectures, students shall learn e.g. participatory methods and presentation reflection methodology. Visiting lectures may explain the insight on how to achieve a career path they have walked through and they can include rewards for most active students.

Teaching Methods:

Course consists visiting lectures / seminars, in lecture exercises (part of weekly task work), topic discussions, case studies (in form of weekly task) and course reflection document(s).
Period 3: Lectures 14h, reading and weekly tasks 50h, personal reflections 4h
Period 4: Lectures 14h, reading and weekly tasks 64h, personal reflections 10h
Total workload 156 hours.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 – 5, evaluation of the weekly tasks, reflection reports and possible extra tasks and activity in the course lectures 100%.
As part of the course evaluations, course can include bonus / extra tasks. To pass the course, students need to receive at least 55% of evaluation points from normal weekly tasks.

Course Materials:

Self study on Jalali S., Wohlin C., Systematic Literature Studies: Database Searches vs. Backward Snowballing
Material shall be given and presented in the course weekly lectures. In addition, some needed support material for weekly tasks can be given when the tasks are released.

Prerequisites:

Highly recommended to have around 90 ECTS worth of studied ready, before participating into the course.

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

max 15

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

max 10

CT30A2802: User Interfaces and User-Centric Desing, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Kari Heikkinen

Year:

B.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

Finnish

Teacher(s) in Charge:

D.Sc. (Tech.) Kari Heikkinen

Aims:

At the end of the course students will be able to

1. Design a user interface while applying a user centered design cycle
2. Use relevant design tools and techniques (e.g. low fidelity prototyping), aiming at usability and relevant user experience
3. Evaluate the context of use and state-of-the-art interaction opportunities
4. Demonstrate the understanding of usability metrics and their utilisation in user interface design

Contents:

Evolution of UserInterfaces. Effective user interfaces. Main principlesand methods in User-Centric and User Interface design. Characteristics ofdifferent user interfaces. Usability evaluation.

Teaching Methods:

Lecturesand exercises 20 h (3-4. period), Individual assignment 32 h (3-4. period), Practicalgroup assignments 78h, 3-4. period, Group exam26 h. 4. period, Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Continuous evaluation. Group assignments (80%), Group exam (20%)

Course Materials:

Designing interfaces: Patterns for effective interaction design, Jennifer Tidwell, O'Reilly Publishing
The Design of Everyday Things, Donald A. Norman, Basic Books
The best interface is no interface, Golden Krishna

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

No

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

max 5

CT30A3202: Web Applications, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Antti Knutas

Year:

B.Sc. (Tech) 3

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

D.Sc. Antti Knutas

Aims:

At the end of the course the student will be able to:
1. Create web-based software products
2. Understand the evolution of web software and how it led to current online environment
3. Design and implement complex software systems using web-based software and APIs
4. Understand and solve issues related to web environment, such as caching and security
5. Solve real world problems and design online web systems using requirements based on these problems

Contents:

WWW –application architectures and standards. Programming languages and APIs for creating interactive server and client software (e.g. JavaScript, PHP, AJAX). Efficient management of web-based software and publication. The course is programming intensive.

Teaching Methods:

Online lectures and exercises 16 h, exercise classes 15 h, independent reading 4 h, weekly projects 15 h, 1st period.
Online lectures and exercises 16 h, exercise classes 15 h, independent reading 4 h, weekly projects 15 h, final project 56 h, 2nd period.
Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, project, weekly assignments, independent assignments.
Written assignments 10%
Weekly exercises 30%
Practicum 50%
Independent self-study material 10%

Course Materials:

Crockford, D. (2008). JavaScript: The good parts. Sebastopol (CA): O'Reilly : Yahoo! Press.
Bramer, M. (2015). Web Programming with PHP and MySQL: A Practical Guide (1st ed. 2015.). Cham: Springer International Publishing.
Babin, L. (2007). Beginning Ajax with PHP: From Novice to Professional. Berkeley, CA: Apress, Inc.
Other material presented at lectures.

Prerequisites:

Basics of programming and data-analytics (former Basics of programming).
Basics of database systems.

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

No

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

max 5

CT60A0202: Ohjelmoinnin ja data-analytiikan perusteet, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Uolevi Nikula

Note:

This course is given only in Finnish and thus it is not suitable for students who do not understand Finnish properly.

Year:

B.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

tutkijaopettaja, TkT Uolevi Nikula

Aims:

At the end of the course students will be able to
1. Create small programs with the Python programming language utilizing all basic commands and structures like list and class
2. Structure the program in multiple functions and libraries to make the programs understandable, maintainable, and extendable
3. Develop Python programs that can read data distributed as CSV files, select data of interest in the files, and analyze basic characteristics of the data
4. Do basic testing to a program to assess its quality.

Contents:

History of programming and the situation today; Programming in Python; Good programming style and program performance; Basics of data analytics from the programming point of view.

Teaching Methods:

Lectures 7 h, self study 21 h, compulsory assignments 40 h, 1. period. Lectures 7 h, self study 21 h, compulsory assignments and project 50 h, 2. period. Preparation for the exam 7 h and exam 3 h. Total of 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0 - 5. Exam 30 %, project 30%, weekly assignments 40%.

Course Materials:

The LUT Python programming manual, lecture material, other material announced on lectures.

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

No

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

max 15

CT60A2411: Object-Oriented Programming, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Jiri Musto

Year:

B.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

Finnish

Teacher(s) in Charge:

Junior researcher, M.Sc. (Tech) Jiri Musto

Aims:

At the end of the course students will be able to
1. Solve typical programming problems with object-oriented programming methods
2. Use Java and its features in programming
3. Read and describe Java code and UML diagrams
4. Utilize version control
5. Design basic graphical user interface.

Contents:

Object-orientation, classes, inheritance, basics of modelling classes, principles of Java, basic data structures, abstract data types, exceptions, graphical user-interface.

Teaching Methods:

Lectures 2 h, videos 8 h, exercises 14 h, practical assignment 16 h, independent work 30 h 1st period. Videos 8 h, exercises 14 h, practical assignment 30 h, independent work 30 h 2nd period. Training for the exam and exam 8 h. Total amount of work 160 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0 – 5. Exam 30%, exercises 25%, practical assignment 45%

Course Materials:

Lecture slides and videos
Eckel B (2006) Thinking in Java, 4th ed. Prentice Hall, Upper Saddle River, NJ, Thinking in Java,
Herala A, Vanhala E, Nikula U (2015) Olio-ohjelmointi Javalla, versio 1.0. LUT Scientific and Expertise Publications/Oppimateriaalit-Lecture Notes
Other material announced in the lectures.

Prerequisites:

CT60A0220 C-ohjelmoinnin ja testauksen periaatteet, CT60A2500 and CT60A4160 or equivalent.

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

No

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

15–

CT60A2500: Principles of C-Programming, 3 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Uolevi Nikula

Year:

B.Sc. (Tech.) 1

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Uolevi Nikula

Aims:

At the end of the course students will be able to
1. Create small programs with the C-programming language utilizing all basic commands, data structures, and libraries.
2. Structure the program in multiple functions and files to make the programs understandable, maintainable, and extendable.
3. Utilize pointers and dynamic memory allocation to create and manage linked lists.
4. Use make -program to manage program compilation.
5. Use version management system to manage files.

Contents:

C-programming language, pointers and dynamic memory management, good programming practices, make and version management tools.

Teaching Methods:

Lectures 7 h, self study 14 h, compulsory assignments 48 h, 3. period. Preparing for the exam 7 h and exam 2 h. Total of 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5. Exam 30%, project 30%, weekly assignments 40%.

Course Materials:

C-kieli ja käytännön ohjelmointi osa 1, other materials announced at the lectures.

Prerequisites:

Programming skills, e.g. CT60A0201 Introduction to programming.

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

No

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

max 15

CT60A4002: Software Engineering, 6 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Paula Savolainen

Year:

B.Sc. (Tech.) 2

Period:

3-4

Teaching Language:

Finnish

Teacher(s) in Charge:

Post-Doctoral Researcher, PhD Paula Savolainen

Aims:

After the course the student can explain the basic software engineering concepts, knows the different key areas in software projects, and can participate in software projects in different roles utilizingthe fundamental software engineering methods and techniques. The student can make a requirements specification and write the report.

Contents:

Software engineering process, phases, and their contents. The fundamental methods and techniques in software engineering.

Teaching Methods:

Lectures 14 h, self-study 11 h, working on compulsory assignments and a project 41 h, 3. period. Lectures 14 h, self-study 11 h, working on compulsory assignments and a project 52 h, 4. Period. Preparation for 10 h and exam 3 h. Total amount 156 h.

Examination in Examination schedule (Yes/No):

Yes

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 – 5. Exam 50 %, compulsory practical work 30 % and weekly exercises 20 %.

Course Materials:

Haikala & Mikkonen: Ohjelmistotuotannon käytännöt, 12. painos, Talentum, 2011. Other material announced on lectures.

Prerequisites:

CT60A0202 Ohjelmoinnin ja data-analytiikan perusteet (aiemmin CT60A0201).

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

No

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

max 5

CT60A4160: Ohjelmistotestauksen periaatteet, 3 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Uolevi Nikula

Year:

B.Sc. (Tech.) 1

Period:

4

Teaching Language:

Finnish

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Uolevi Nikula

Aims:

At the end of the course students will be able to
1. explain the basic terms and concepts in software testing
2. do software testing in unit, integration, and system levels
3. use basic testing tools in testing and automate testing tasks
4. work in a testing team as a junior software tester.

Contents:

Software testing techniques, levels, automation, tools, working as a tester in a software testing team.

Teaching Methods:

Lectures 14 h, self study 14 h, compulsory assignments 41 h, 4. period. Preparation for the exam 7 h and exam 2 h. Total of 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

Yes

Assessment:

0-5. Exam 30%, project 30%, weekly assignments 40%.

Course Materials:

Ohjelmistotestauksen käsikirja, Jussi Pekka Kasurinen, Docendo Oy, 2013. Purchasing the book is not necessary to complete the course, other materials announced at the lectures.

Prerequisites:

Skills attained in a course like CT60A0201 Introduction to programming.

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

No

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

max 15

CT60A4303: Basics of database systems, 3 cr

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

Year:

B.Sc. (Tech) 2

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

DSc. Antti Knutas

Aims:

At the end of the course the student will be able to:
1.Design and model relational databases
2.Understand how the evolution of relational algebra led to SQL databases
3.Model real world problems with ER and transform the ER model to relational databases
4.Understand and solve issues related to relational database design, such as optimization and normalization
5.Implement relational databases in practice and embed them in applications

Contents:

Database systems. Database design. Object-centric modeling and ER-modeling. Specifying relation models. SQL and object languages.
Perspectives into database design: How database is designed, how information is modeled, and what are information storage structures and access methods.

Transforming ER models to relation model, and then to relation databases. The use of different file formats in different environments. Perspectives to database programming: queries and other operations, database management, e.g. triggers. Implementing databases in practice and how to use SQL databases from other programs.

Teaching Methods:

Online lectures ja -exercises 13h, exercises 12h, SQL-online course 20h 3. period.
Project 22 h, 3. period. Preparing for exam 10h and online exam 2h.
All 78h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0-5, project, weekly assignments, online exam.
SQL syntax self-study, online (Viope)20%
Weekly exercises20%
Project assignment40%
Online exam20%

Course Materials:

Beynon-Davies, P.: Database Systems, Palgrave Macmillan, Third Edition, 2004. Foster, Elvis, C.: Database Systems A Pragmatic Approach, Apress, 2014.

Lecture notes and other material assigned at the course.

Prerequisites:

Basics of programming.

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

No

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

max 5

CT60A7650: Database Systems Management, 3 cr

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

Year:

B.Sc. (Tech.) 2

Period:

4

Teaching Language:

English

Teacher(s) in Charge:

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

Aims:

At the end of the course students will be able to

1. Create a relational model and a relational database
2. Use relational algebra and relational calculus
3. Design a database application, data distribution, and architectures for data storage, retrieval, and administration of a database management system
4. Apply scalability, performance, security, and authorization
5. Demonstrate the knowledge of concepts and principles underlying the functioning of database management systems and maintenance.

Contents:

Relational model and relational database design, Introduction to relational Algebra. Database applications, data distribution and architectures. Data storage and retrieval, data scalability, performance, security, authorization. Modeling and programing for semi-structured data, secondary storage management.

Teaching Methods:

Lectures 14 h, homework work 20 h, 4. period.
Individual assignments, hands on team project assignment 44 h. Total 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Individual assignments = 50%. Project Assignment = 50%

Course Materials:

- Ramez Elmasri, Shamkant B. Navathe (2015), Fundamentals of Database Systems, 7th Edition, Published by Pearson. ISBN-13: 978-0-13-397077-7
- A. Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom: Database Systems : The Complete Book, Pearson Prentice Hall 2nd Edition, 2009

Prerequisites:

CT60A4303 Tietokantojen perusteet required

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

15–

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

No

LM10A1000: Project Management, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Sami Jantunen

Year:

B.Sc. (Tech.) 2, B.Sc. (Econ. & Bus. Adm.) 2

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Sami Jantunen

Aims:

At the end of the course students will be able to

1. Understand basic project management concepts and approaches
2. Choose and apply project management approaches for different types of situations
3. Plan, execute and control projects in practice
4. Collaborate with project stakeholders
5. Use project management applications

Contents:

Project planning, Project execution, monitoring and control. Project quality management. Project human resource management and collaboration within projects. Special characteristics of software projects. Agile project management.

Teaching Methods:

Lectures 6 h, digital lessons 20 h, assignments 40 h, period 3.
Lectures 6 h, digital lessons 20 h, assignments 40 h, period 4.
The total workload for students: 132 h

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

Yes

Examination in Exam (Yes/No):

No

Assessment:

0 - 5, mini-examinations 50 %, assignments 50 %.

Course Materials:

Digital lessons and ebooks about traditional and agile project management (to be announced in Moodle).

Prerequisites:

Introduction to Studies of Industrial Engineering/Economic Science/Software Engineering.

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

Yes, 15-

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

Yes, 15-

LM10A2000: Introduction to Information Systems, 3 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Paula Savolainen

Year:

B.Sc. (Tech.) 1, B.Sc. (Econ. & Bus. Adm.) 1

Period:

3

Teaching Language:

Finnish

Teacher(s) in Charge:

Ph.D. Paula Savolainen

Aims:

At the end of the course the student will be able to:
1. Recognize and explain an information system in a given context using basic concepts
2. Understand the importance of information systems for organizations
3. Analyze challenges and opportunities related to information systems

Contents:

Introduction to information systems, their basic concepts, and why information systems are an essential for organization’s competitiveness. Introduction to information systems development. Introduction to challenges related to management information systems.

Teaching Methods:

Lectures 14 h, self study 40 h, compulsory assignments 24 h, 3. period. Total of 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Weekly assignments and final report.
Weekly quizzes 30%
Weekly assignments 30%
Final report 40%

Course Materials:

Marakas, G., O'Brien, J. A. (2013), Introduction to Information Systems (16th Edition). Materials given in the lectures.

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

No

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

max 10

KoDSaManu: Modern Manufacturing, 20 - 30 cr

Validity: 01.08.2016 -

Form of study:

Type: Study module
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F

Aims:
After completing this minor subject the student will be able to:
- calculate manufacturing process parameter to metallic products to achieve successfully production in technically manner but also economically wise
- design total manufacturing order and overall process to achieve efficient production rate with old and new machines
- create total manufacturing chain from original distributor to end user
- listen, discuss, understand and negotiate with different people with different organizational level
- find and create new production solutions for rapidly changing world
After the studies, students:
- have a theoretical or practical capability to work international environment.
- will understand the importance of the production for the national economy.
- have a theoretical or practical understanding of overall manufacturing and supply chain process to understand deeply different workers role in production.
- have a theoretical or practical understanding of a queque, mathematical distribution and simulation theory used in job shops.
- have a theoretical or practical understanding of a normally used manufacturing process.

Obligatory Studies 25 ECTS cr

BK50A4000: Production Processes in Modern Job Shops, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Juho Ratava, Mika Lohtander

Year:
M.Sc. (Tech.) 1
Period:
1-2
Teaching Language:
English
Teacher(s) in Charge:
Researcher, D.Sc. (Tech.) Mika Lohtander
Aims:
After completing the course, the students:
1. can choose the manufacturing processes for the most common products
2. are able to design a manufacturing order for a modern product
3. are able to evaluate manufacturing time and manufacturing costs based on basic mathematics.
Contents:
The course focuses production processes, material handling and storage methods needed in modern job shops. During the course, students become familiar with the basic metal industry processes as well as manual and automatic assembly processes. Individual works allows students to familiarize themselves to different kind of manufacturing processes. Students presents case-tasks to other students.

Teaching Methods:

Lectures 24 h, lecture exercises 12 h. Independent work like assignments and learning diary 94 h. 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, Lecture assignments 60 %, learning diary 40 %.

Course Materials:

Literature to be announced during lectures. Course material is available in the Moodle.

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

No

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

max 5

BK50A4100: Manufacturing Systems and Scheduling, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Esko Niemi, Mika Lohtander

Year:

M.Sc. (Tech.) 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Reseacrher, D.Sc. (Tech.) Mika Lohtander

Aims:

After completing the course, the student:
1. is able to evaluate the most important production parameters like lead time and bottlenecks by means of simulation
2. is able to design fundamentals of the manufacturing systems
3. is able to evaluate manufacturing time and manufacturing costs based on manufacturing simulation
4. is able to make optimization for most common manufacturing environments.

Contents:

The course focus on production management and analysis methods needed in modern job shops. Production was analyzed by computational methods and manufacturing simulation is introduced and some case studies will analyzed. Example tasks are calculated and discussed in small groups. Every lecture includes its own exercise.

Teaching Methods:

Lectures 24 h, lecture exercise 24 h. Individual work 82 h. 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, activity during course 40 %, individual assigments 60 %.

Course Materials:

Literature to be announced during lectures. Course material is available in the Moodle.

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

No

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

No

BK50A4200: Product Flow in Job Shops, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Mika Lohtander

Lectured every other academic year (Yes, next realization year/Leave empty):

Yes, lecturing every socond year, next time in period 1. and 2. in year 2018-2019.

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Researcher, D.Sc. (Tech.) Mika Lohtander

Aims:

After having passed the course, the student will:
1. is able to act as a product manager in a manufacturing plant
2. is able to analyze production capacity and to make improvement for production
3. is able to take responsibility for the daily operations of a production plant
4. is able to respond plant investments

Contents:

The course lectures will discuss the meaning of an overall function of a manufacturing flow. The course focuses to the strategy and methods of the production. Student will prepare and present during lectures, key factors and most common issues of production. In assignment, the students will plan and design factory lay-out commonly used in metal industry and present product flowin subcontracting network.

Teaching Methods:

Lectures 24 h, Group assignment and individual work 106 h. 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, lecture activity 40 %, assignment and individual work 60 %.

Course Materials:

Literature to be announced during lectures. Course material is available in the Moodle.

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

No

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

No

BK50A4300: Managing Job Shops, 5 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Energy Systems
Grading: Study modules 0-5,P/F
Teachers: Mika Lohtander

Note:

The course will be lectured for the next time during the academic year 2019-2020.

Lectured every other academic year (Yes, next realization year/Leave empty):

Yes, 2019-2020.

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Researcher, D.Sc. (Tech.) Mika Lohtander

Aims:

After having passed the course, the student will:
1. know the factory management duty and responsibility
2. is able to take responsibility for the daily operations of a production plant
3. know the stakeholders role for production

Contents:

The course lectures will discuss the meaning of overall function of manufacturing and stakeholder’s point of view. The topics cover everyday information technology, stakeholder

cooperation and internal operation of the plant. A personal work will dealt more in-depth point of view to management.

Teaching Methods:

Lectures 24 h, individual work 106 h. 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, Activity during lectures and exercises 20 %, individual work 80 %.

Course Materials:

Literature to be announced during lectures. Course material is available in the Moodle.

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

No

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

No

BK50A4401: Fabrication Laboratory, 5 - 10 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: Mika Lohtander

Note:

Suitable also for doctoral studies.

Year:

M.Sc. (Tech.) 1-2

Period:

1-4

Teaching Language:

English

Teacher(s) in Charge:

Researcher, D.Sc. (Tech.) Mika Lohtander

Aims:

After having passed the course, the student will:
1. get touch some important research topics in field of manufacturing
2. be familiar how to transfer research result to practice
3. is capable to create or build simple and practical solutions.

Contents:

The course lectures will discuss the annually changing research themes. During the course the students will plan, design and in some cases built industrial systems. Students will present their Project Work results to a public audience.

Teaching Methods:

Lectures 12 h, project work 118 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):

No

Assessment:

0-5, practical part of project work 50 %, theoretical part of project work 50 %.

Course Materials:

Literature to be announced during lectures. Course material is available in the Moodle.

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

No

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

max 5

Description and DL of the company assignment:

During this particular course, industrial manufacturing related problems could be solved, as an engineering student assignments. Industrial cases could relate to an assembly, processes, automation, product flow, subcontracting or storage. Students can practice production related skill with simulation and optimization software.
Contact:
Mika Lohtander. mika.lohtander@lut.fi, +358 400 579 455

TiDSOsedt: Software Engineering and Digital Transformation minor, 24 - 30 cr

Validity: 01.08.2018 -

Form of study:

Type: Study module

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Aims:

Software Engineering and Digital Transformation Minor Learning Objectives
1. Describe and adapt software engineering knowledge, best practices, and standards appropriate to engineering complex software systems.
2. Analyze a problem; identify and elicit functional, non-functional and sustainability requirements appropriate to its solution.
3. Recognize human, security, social, entrepreneur issues and responsibilities relevant to engineering software and digitalization of services.
4. Acknowledge life-long learning as a way to stay up to date in the profession.

Obligatory courses 12 cr

CT60A5500: Quality Assurance in Software Development, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Uolevi Nikula

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Associate Professor, D.Sc. (Tech.) Uolevi Nikula

Aims:

After the course students are able to do the following activities in the key areas of software development based on the available research literature
1. name key activities and artifacts related to each area
2. develop standard documents for the given areas when relevant
3. describe typical problems occurring in each area
4. summarize typical ways to avoid the identified problems
In general the students have the knowledge to
5.plan and run a software project
6.assure the quality of software development
Students are able to
7.work collaboratively in a team

Contents:

Software economics, project management, process areas, tools, configuration and change management, teams, process assessment, improvement, and measurement.

Teaching Methods:

Lectures 14 h, exercises 14 h, assignments & self-study 14 h, team assignments 36 h, 1. period. Lectures 14 h, exercises 14 h, assignments & self-study 14 h, team assignments 36 h, 2. period. Total workload 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0 - 5. Weekly assignments 70 %, project 30%, no exam.

Course Materials:

Materials announced in the lectures. Basic reference is Robillard, Kruchten, and d'Astous: Software Engineering Process with the UPEDU, Addison-Wesley, 2002.

Prerequisites:

Software Engineering CT60A4002 or equivalent.

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

max 10

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

max 5

CT70A2000: Requirements Engineering, 6 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Sami Jantunen

Year:

M.Sc. 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

AssociateProfessor, D.Sc. (Tech.) Sami Jantunen

Aims:

At the end of this course students will be able to:
1. Perform requirements engineering in the context of the most common software development life cycles and processes
2. Develop effective functional and non-functional requirements that are complete, concise, correct, consistent, testable and unambiguous.
3. Select the appropriate requirements elicitation techniques to identify requirements
4. Effectively analyze requirements and prioritize accordingly.
5. Create a requirements specification to communicate requirements to a broad set of stakeholders
6. Manage change to requirements

Contents:

The focus of this course is in helping the student to choose and apply requirements engineering (RE) techniques to different types of software development situations. The course considers a variety of software development contexts such as bespoke software development, market-driven, and agile development and discusses how these contexts affect the choice of RE techniques. To this end, different RE-related techniques as well as different underlying principles and formats for documenting and maintaining requirements are covered.

Teaching Methods:

Lectures 14 h, homework 20 h, Period 1.
Lectures 14 h, homework 20 h, Period 2.
Individual studies, project assignments 88 h. Total 156 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):

No

Assessment:

0-5, continuous evaluation (no Exam)
Assignments 50%, Weekly Mini-examinations 50%

Course Materials:

Elizabeth Hull, Ken Jackson, Jeremy Dick, Requirements Engineering. 2011. Springer, London. ISBN: 978-1-84996-405-0.
More material to be announced later.

Prerequisites:

No

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

No

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

No

Elective courses, choose 12 cr

CT30A8922: User Experience Design, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Annika Wolff

Note:

NOTE: Can not be included in the same degree as CT30A8921 User and Design Research in Software Engineering.

Year:

M.Sc. 1

Period:

3-4

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc Annika Wolff

Aims:

How do we design interactive technology, systems and services? Why do only a few of them make it to market and most fail? Why users are not able to master, learn and use them? What are the costs and benefits of user experience design? The course answers these questions while outlining the user research, user experience, user-centric design and design thinking approaches for software products, systems and services engineering. Through a mix of readings on human computer interaction (HCI) and design science research, user research investigations and a practical team-oriented design project in the living lab, students will acquire a solid practical and theoretical grounding in “user experience design methods and user interface design”.
The importance of human aspects in design and innovation is a key concern in software and information systems engineering and research. Design principles and methods can be used to increase the value of software products through the concept of open innovation. This course follows the work of open innovation and user-centric design and design thinking theories and principles that established the basis of innovation by design. It analyzes the concept of innovation by design, as it is applied to software and

information system design, from the HCI (human-computer interaction), user experience and research perspective. Students will learn how to formulate a design as a problem space and how to use the UCD UXDT toolkit to create an innovative solution to solve the problem and conduct user testing. This course will teach students the design theories used in the interaction design, user-centered design (UCD) and user experience design thinking (UxDT) processes.
Via a design bootcamp in the CODER Living Lab, students will be able to:
[1]. Advocate and build-in support for interaction, user-centered and user experience design with stakeholders
[2]. Apply user research methods for identifying target users and their problem spaces
[3]. Use ideation techniques that go beyond brainstorming to propose innovative solutions, software products, services and systems
[4]. Conduct rapid prototyping to gather user feedback, inform design decisions and iteratively improve design solutions
[5]. Build and validate diverse forms of user interfaces including mobile, wearable, tangible and cyber physical user interfaces
[6]. Use usability testing and user acceptance methods to assess and validate proof of concept and prototypes
[7]. Integrate user experience design methods into the wider software development and innovation lifecycle.

Contents:

Design theories, principles and methods. Principles of design thinking. Human-centric design processes. User experience in design practices. Co-design in living lab. User research in design. Persona and customer profiling. Diary studies. HCI design patterns. Storytelling. Paper prototyping. Usability and sustainability testing. Controlled experiments. Design of innovative software products. Introduction to design research and science. Socio-technical systems design. Historical, cultural, and technical foundations of design in a range of discipline areas (software engineering, HCI, arts). In a group of 6 students are asked to develop a design concept and validate it in the design living lab. Students are requested to demonstrate their capacity to generate design ideas, innovative concepts, proposals or solutions independently and/or collaboratively in response to a set briefs and/or as a self-initiated activity or based on documented user experiences.

Teaching Methods:

Weekly Design bootcamp sessions 24h. Lecture preparation (mandatory readings from textbooks and video to watch from HCI labs) 24h. Practical large design bootcamp in a group of 6 students' 48h. User research in living lab 36h. Prototyping and presentation of the design portfolio in the class 28 h. Total 160h.
Students will complete many hands-on activities and interact with their fellow students and representatives of real users as they experience a completely different way of learning how to develop human-centric software and information systems, services, and socio-technical systems.

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):

No

Assessment:

Grade: 0-5
Design Portfolio 60%
Individual reflections on design methods included in the design portfolio 20%
Oral group presentation of the final design concept and portfolio 20%

Course Materials:

Specific mandatory readings from the following books will be discussed in class by the professor and the students. The following are also suitable background readings:
• Tim Brown. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation
• Terry Winograd (ed.): Bringing Design to Software. Addison-Wesley, 1996. Bill
• Buxton, Sketching User Experiences: Getting the Design Right and the Right Design, Morgan Kauffmann Series on Interactive Technologies, 2007. Mads, et al. (Eds).
• The Online Encyclopedia of Human Computer Interaction, 2nd Edition. Interaction Design Foundation.
Students are required to read some chapters from these two books, the second is the mandatory textbook:
• User Interface design and evaluation. D. Stone, C. Jarrett, M. Woodroffe. S. Minocha. Morgan Kauffmann Series in Interactive technologies. 2005.
• Interaction Design: Beyond Human-Computer Interaction, 4th Edition, Jenny Preece, Helen Sharp, and Yvonne Rogers. February 2015, Wiley.

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

36 max, places in the living lab

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

No

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

No

CT60A5103: Software Engineering Models and Modeling, 6 cr

Validity: 01.01.2018 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Antti Knutas

Year:

M.Sc. 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Post-doctoral researcher, D.Sc. Antti Knutas

Aims:

Software modeling (this course) is aimed at reducing the gap between problem and software implementation through the development and use of models, which describe complex systems at multiple levels of abstraction and from a variety of perspectives. A model is an abstraction (one aspect or entire system) of an existing or planned system. Models are created to serve particular purposes, for example, to present a human-understandable description of some aspect of a system or to predict its quality.
The course is focused at building a deep understanding of the concept of model and modeling while enabling the students to be able to:
1. Master the importance of conceptual modeling techniques in software engineering and the diverse types of models.
2. Explain the concepts of meta-models, platforms dependent and independent models, model-to-model transformations, automated code generation from models.

3. Understand and select the appropriate modeling method or methods for the software development project at hand and for the various types of software systems such as critical-safety systems, interactive consumer services, enterprise applications, hardware software, etc.
4. Manage, plan, analyze and contribute to various models to represent requirements, design, implementation and maintenance of large intensive software products, systems and services.
5. Understand how human, social and technical factors may have (both) positive and negative influence on the methods and practices of modelling in software engineering.
6. Identify the modeling challenges facing the software engineering research community as well as the avenues for further investigations.

Contents:

Modeling in Software Engineering Body of Knowledge (SWEBOK). Principles and foundations of software engineering. Formal methods. Prototyping techniques. Object-oriented modeling. Data-centric models. Model-driven architecture (MDA). Modeling techniques. Importance of modeling in software development projects and processes. Software engineering tools. Information, structure and behavioral modeling. Systematic literature review and large case studies on specific models and methods, their uses and abuses such as UML, use cases, user task models and prototypes, Z, B, and G Express. Systems Thinking

Teaching Methods:

Lectures/seminars on selected topics 24 h. Presentations 8h, weekly self-study 48 h (mandatory readings), scientific literature review and case studies 56 h, period 1-2. Research papers 20 h. Total 156 h.

The course is designed to be a forum for a scientific discussion and presentations by the professor, students and guests' researchers. Except an introductory lecture, the professor will be mainly acting as a senior project manager and a researcher will be advising students regarding literature review, reliable information sources on software engineering as well as how to select, review and present a case study on software engineering methods. The students will have to work in a team of 2-3; each team will make 2 presentations in the class; each student will have to contribute to the writing of a research paper that can be submitted to a conference or a workshop. Altogether, the presentations provide a systematic framework for selecting the appropriate methods for complex software systems development projects.

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):

No

Assessment:

Grade: 0-5
Project in groups (6 deliverable) 60%
Pictorial research paper 30%
Participation in class 10%

Course Materials:

There is no book that covers all the topics addressed in the course. A selection of readings from top journals will be used as basic readings; students are requested to make their own literature review from IEEE Transactions on Software Engineering, IEEE Software, ACM Transactions on Software Engineering Methodologies, Journal of Software and Systems (JSS), Communication of the ACM. The students are encouraged to walkthrough, one of the two following books as a basic introductory reading:
(1) R.S Pressman. Software Engineering: A Practitioner's Approach, 7/e, McGraw Hill, 2010
(2) J. Sommerville. Software Engineering. 9/e, Addison Wesley, 2011.

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

48.

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

max 5

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

No

CT60A5400: Fundamentals of Game Development, 6 cr

Validity: 01.08.2016 -

Form of study: Basic studies

Type: Course

Unit: LUT School of Business and Management

Grading: Study modules 0-5,P/F

Teachers: Jussi Kasurinen

Year:

M.Sc. (Tech). 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Docent, D.Sc. (Tech.) Jussi Kasurinen

Aims:

Intended Course Learning Outcomes. At the end of this course students will be able to:
1. Conduct independent work in entertainment software engineering context.
2. Independently design and implement a small-scale game program with some industry-relevant platform.
3. Acquiring further knowledge concerning the taught game development tool.
4. Working as a productive member and as part of a team developing larger entertainment software product.

Contents:

Applied software engineering course. The objective for this course is for students to learn how to use their software engineering knowledge in an entertainment software engineering context. With the selected game development tools, student is capable to independently design and develop a small game program on some modern game engine platform, or work as a part of a team developing a larger game product.
List of Topics: lectures and project works:
- Games as software products
- Basics of processes and models applied in the entertainment software industry
- Basics of the game development tools
- Introduction to game engines and their functions
- Basics of 3D objects
- Introduction to game development-related programming problem.
- Basics of artificial intelligence in entertainment software engineering context.
- Basics of sound engineering
- Gamification and Serious games.

Teaching Methods:

Primary mode of work is assisted self-study. Lectures 8 h, Independent work and project assignments 148 h. Total 156 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):

No

Assessment:

0-5. Continuous evaluation (no exam)
Project proposal and presentation 20%
Individual project assignments (x2) 60%
Peer review work on other project assignments 20%.

Course Materials:

Based on the yearly implementation; the taught game engine tutorials and other materials given during the course.

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

No

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

15–

CT60A7322: Software Business Development, 3 cr

Validity: 01.08.2016 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Marianne Kinnula

Year:

M.Sc. (Tech.) 1-2

Period:

Intensive week 20

Teaching Language:

English

Teacher(s) in Charge:

Docent, Ph.D. Marianne Kinnula

Aims:

After completing the course, the student has knowledge of how to 1. develop a software business idea over the whole life cycle of the business, 2. conduct market and business analyses, 3. identify sources for financing the business, and how to 4. select a suitable business model for the company.

Contents:

The course introduces the concepts of business idea, business plan, software business models and strategies, and the software value network. Case studies vary yearly.

Teaching Methods:

Lectures 6 h, workshops 12 h, seminar presentations 8 h, homeworks and project (pre, course, post) 52h. Total amount 78 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5, pre-task, project, essay.

Course Materials:

To be announced in course pages and in lectures.

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

Yes, 40.

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

max 5

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

max 5

CT70A4000: Business Process Modelling, 6 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Ajantha Dahanayake

Year:

M.Sc. (Tech.) 1

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

Professor, PhD Ajantha Dahanayake

Aims:

1. Identify the principles of a business process modelling language and the dimensions of quality in a process model
2.Apply the process of process modelling (“method”) and the social aspects of process modelling
3.Use the modelling language to express and abstract from a realistic business process
4.Apply a method for modelling business processes in all its stages
5.Evaluate the model and the modelling process as a social process
6.Investigate a business and research question related to business process modeling

Contents:

Introduction of the concept and relevance of a business process, role modeling, dimensions of model quality and measurement, BPM and modeling methods, application to business process modeling and digital transformation, research issues.

Teaching Methods:

Lectures 14 h, homework work 20 h, 1. period.
Lectures 14 h, homework 20 h, 2. period.

Reading assignments, 2 hands on team project assignments 88 h. Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. continuous evaluation.
Assessments 50%, Project 50%

Course Materials:

- Silver, Bruce: BPMN Method and Style, 2nd Edition, with BPMN Implementer's Guide: A structured approach for business process modelling and implementation using BPMN 2.0. Cody-Cassidy Press, 2011
- Weske, Mathias: Business Process Management: Concepts, Languages, Architectures. Springer, 2007

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

max 5

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

No

CT70A5000: Impact and Benefits of Digitalization, 6 cr

Validity: 01.01.2018 -
Form of study: Basic studies
Type: Course
Unit: LUT School of Business and Management
Grading: Study modules 0-5,P/F
Teachers: Paula Savolainen

Year:

M.Sc (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

PhD Paula Savolainen

Aims:

The aim of the course is to give knowledge about different functions of an organization, which have to be considered when developing and following a digitalization strategy for the organization, and being able to assess the impact and benefits of digitalization.
After completing this course the student will be able to
1. Understand consequences of digitalization at macro level
2. Understand the ecosystem where the organization in question is operating and its' connections to the organization's business operations
3. Assess technologies from the viewpoint of the organization in question and how technologies enable

new services / new ways of working for the organization
4. Develop an overall digitalization strategy or a project plan for an organization
5. Compile a perception of impacts for the organization in question and possibilities to achieve desired benefits
6. Evaluate research articles and write a reasoned opinion on the articles

Contents:

Drivers of digitalization; analysis of industry sectors, ecosystems, value networks and organizations; new business models; analysis of burning technologies; cost benefit analysis; from current state to unknown; impact of digitalization globally.

Teaching Methods:

Lectures 28 h, assignment given during the lectures (pair work) 10 h, self-study 10 h, reading and analyzing research articles (individual work) 30 h, project work (group work + report + presentation) 78 h. Total 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. continuous evaluation
Assignment: report + presentation 40%
Project work: group work + report + presentation 60%.

Course Materials:

Reading package will be announced at the beginning of the course.

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

max 5

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

No

CT70A7000: Digital Business Platforms, 6 cr

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

Note:

Not lectured in 2018-19, this course will start from academic year 2019-20.

Year:

M.Sc. (Tech.) 2

Period:

1-2

Teaching Language:

English

Teacher(s) in Charge:

D Sc. (Tech) Kari Heikkinen, Professor Ajantha Dahanayake

Aims:

At the end of the course students will be able to
1. Have expertise of the fundamental principles of key enabling pillars and platforms for digital business
2. Understanding how different platforms will add value to digital business
3. Understanding how data analytics will enhance value of heterogeneous data
4. Understand the role of stakeholders, technology trends and business challenges of software technology for being able to build a customer-centric culture and customer understanding
5. Master a digital business platform help to reengineer existing services, business processes and creating new digital services

Contents:

Introduction to pillars of and platforms for digital business: IoT (Internet of Things), 5G and CPS (Cyber Physical Systems), Data and Analytics (Big data), Ecosystems (Cloud evolution and Software as a service), strategies (Cybersecurity) and technologies (Distributed Ledgers, e.g. block chain), Information Systems, Customer experience and Business platforms.
In-depth discussion of platforms examples from different industries for demonstrating the variety of possible approaches towards organizing and managing platforms. Identifying the patterns of technology and transformation underlying current and future platforms of digital business. Overview of the different design steps and important decisions in the development of a digital platform or in its selection for business needs.

Teaching Methods:

Lectures 28 h, Case studies with in-depth discussions 70 h, Course work 28 h, Essay preparation 30 h. Total workload 156 h.

Examination in Examination schedule (Yes/No):

No

Examination in Moodle (Yes/No):

No

Examination in Exam (Yes/No):

No

Assessment:

0-5. Continuous evaluation
Class participation, discussions and quizzes = 40%
Written Case studies (in groups) = 40%
Scientific paper on future vision of digital platforms individual) = 20%

Course Materials:

"Platform Revolution: How Networked Markets Are Transforming the Economy - And How toMake Them Work," by G. Parker, M. Van Alstyne, S. Choudary, 2016.
Handouts during the class

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

Yes, 40, priority given to Digital Transformation students

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

No

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

No