Opasraportti

FSci - Courses for exchange students, Mathematics (2020 - 2021)

University's new study guide for academic year 2020-2021 is published at https://opas.peppi.oulu.fi.

The study guide includes information on degrees, curriculums, courses and course timetables. Course registrations are still done in Oodi.

If you have questions on information in the study guide, please contact the study field's Academic Affairs Service Team https://www.oulu.fi/forstudents/faculty-study-affairs.

Courses in English for exchange students at the Field of Mathematics

This Course Catalogue lists courses taught in English that are available for exchange students at the Field of Mathematics, Faculty of Science during academic year 2020-21.

When preparing your study plan please use the information provided under the **Courses** tab in this catalogue. Read carefully the information of each course you wish to take (language of instruction, target group, course content, timing, preceding studies, additional information etc.).

For information on the exchange application process please see www.oulu.fi/university/studentexchange. All exchange applicants must submit their exchange application through SoleMOVE by the deadline given, proposed study plan is attached to the on-line application.

Accepted exchange students are required to register to all courses. Course registration takes place once you have received your University of Oulu login information, this takes place close to the start of your exchange period. When registering you will be able to find detailed information on teaching and schedule under the **Instruction** tab.

Teaching periods for 2020-21
Autumn term 2020
Period 1: Sept 1 - Oct 25, 2020
Period 2: Oct 26 – Dec 18, 2020

Spring term 2021
Period 3: Jan 5 – March 14, 2021
Period 4: March 15 – May 9, 2021

For arrival and orientation dates see www.oulu.fi/university/studentexchange/academic-calender

Any questions on courses at the Field of Mathematics, Faculty of Science should be addressed to:

Outi Kivelä

study.science(at)oulu.fi

Further information on application process and services for incoming exchange students:
www.oulu.fi/university/studentexchange or international.office(at)oulu.fi

Tutkintorakenteisiin kuulumattomat opintokokonaisuudet ja -jaksot

900013Y: Beginners' Finnish Course 1, 3 op
900053Y: Beginners' Finnish Course 2, 5 op
802338A: Complex Analysis II, 5 op
900054Y: Conversational Skills in Finnish, 3 op
801698S: Cryptography, 5 op
900015Y: Intermediate Finnish Course 1, 5 op
900016Y: Intermediate Finnish Course 2, 5 op
802668S: Introduction to Functional Analysis, 5 op
802678S: Mathematics of Imaging and Vision, 5 op
801631S: Modern real analysis, 5 op
802679S: Principles of Deep Learning, 5 op
802680S: Riemann Geometry, 10 op
900027Y: Special Course in Finnish: Writing Skills, 3 op
900017Y: Survival Finnish, 2 op

Opintojaksojen kuvaukset

Tutkintorakenteisiin kuulumattomien opintokokonaisuuksien ja -jaksojen kuvaukset

900013Y: Beginners' Finnish Course 1, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900013Y   Beginners' Finnish Course 1 (OPEN UNI)   2.0 op

Proficiency level:
A1 (target level A1.2)
Status:
The course is intended for the international students in every faculty of Oulu University.
Required proficiency level:
A1.1, Completion of the Survival Finnish course (900017Y) or the equivalent language skills.
ECTS Credits:
3 ECTS credits
Language of instruction:
As much Finnish as possible; English will be used as a help language.
Timing:
-
Learning outcomes:

By the end of the course the student can understand and use some familiar and common everyday expressions relating to her/himself and everyday situations. S/he can interact in a simple way provided the other person talks slowly and clearly and is willing to help. The student is able to read short simple texts and messages dealing with familiar topics. S/he also deepens her/his understanding of the Finnish language and communication styles.

Contents:

This is lower elementary course which aims to help students to learn communication skills in ordinary everyday situations. During the course, students broaden their vocabulary and knowledge of grammar and principles of pronunciation. They also practise to understand easy Finnish talk about everyday subjects, and reading and writing short and simple texts/messages.

The topics and communicative situations covered in the course are: talking about oneself, one's family, studies and daily routines, as well as asking about these things from other person; expressing opinions; food, drink and transactions in the grocery; accommodation and describing it; colours and adjectives.

The structures studied are: verb types, basics of the change of the consonants k, p and t in verbs and nouns, basics of the partitive and genitive cases, possessive structure, some declension types for nouns (word types) and the basics of the local cases.

Mode of delivery:

Contact teaching and guided self study

Learning activities and teaching methods:

Lessons 2 times a week (26 h, including the final exam) and guided self study (55 h)

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University.

Prerequisites and co-requisites:

Completion of the Survival Finnish Course

Recommended optional programme components:

-

Recommended or required reading:

Kuparinen, K. & Tapaninen, T. Oma suomi 1 (chapter 2 - 5)

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Grading scale is 1-5.

Person responsible:

Anne Koskela

Working life cooperation:

-

Other information:

Sign-up in WebOodi or Tuudo. The course will start right after the Survival Finnish course.

900053Y: Beginners' Finnish Course 2, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

  ay900053Y   Beginners' Finnish Course 2 (OPEN UNI)   4.0 op

Proficiency level:

A1.3

Status:

International degree and post-graduate degree students, exchange students and the staff members of the University.

Students of the Oulu University of Applied Sciences (OAMK) students and OAMK's international and exchange students may also participate to this cross-institutional study. The quota principle is as follows: at least two OAMK students in a course and if there are more places, they are filled according to the queuing principle.

See more information for OAMK students https://www.oulu.fi/forstudents/crossinstitutionalstudy.

Required proficiency level:

A1.2, completion of the Beginners' Finnish course 1 (900013Y) or the equivalent language skills.

ECTS Credits:

5 ECTS credits

Language of instruction:

As much Finnish as possible; English will be used as a help language.

Timing:

-

Learning outcomes:

By the end of the course the student can understand and use some very common everyday expressions and sentences. S/he can communicate in easy and routine tasks requiring a simple and direct exchange of information on familiar everyday matters. The student understands different kinds of short texts. S/he can for example locate important information in them. In addition, s/he has acquired more detailed knowledge of the language and culture.

Contents:

This is a post-elementary course. During the course students learn more about communication in ordinary everyday situations in Finnish. They also extend their vocabulary and knowledge of grammar. Students practise understanding simple Finnish talk and short texts.

The topics and communicative situations covered in the course are: talking about weather, carrying out transactions in clothing stores and at the doctor's, asking about location, asking for help/favours, expressing how you are feeling, writing an invitation and email; talking about past, describing people and things; seasons, the names of the months, travelling, vehicles, body parts, adjectives, food, drink and parties.

The structures studied are: the local cases, more about the change of the consonants k, p and t, more declension types for nouns (word types), nominative plural (basic form plural), basics of the imperfect (past tense of verbs), basics of the object cases, some postposition structures, some sentence types (predicative and necessity sentences).

Mode of delivery:

Contact teaching and quided self study

Learning activities and teaching methods:

Lessons 2 times a week (52 h, including the tests) and guided self study (83 h)

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University.

Students of the Oulu University of Applied Sciences (OAMK) students and OAMK's international and exchange students may also participate to this cross-institutional study. The quota principle is as follows: at least two OAMK students in a course and if there are more places, they are filled according to the queuing principle.

See more information for OAMK students https://www.oulu.fi/forstudents/crossinstitutionalstudy.

Prerequisites and co-requisites:

Completion of the Beginners' Finnish Course 1 or the equivalent language skills.

Recommended optional programme components:

-

Recommended or required reading:

Kuparinen, K. & Tapaninen, T. Oma suomi 1 (chapters 6 - 10)

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and tests will be taken into consideration in the assessment.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Grading scale is 1-5.

Person responsible:

Arja Haapakoski

Working life cooperation:

-

Other information:

Sign-up in WebOodi or Tuudo. Staff members in staff training portal.

802338A: Complex Analysis II, 5 op

Voimassaolo: 01.06.2016 -

Opiskelumuoto: Intermediate Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits / 42 hours of work
Language of instruction:
English
Timing:
The course is held in the autumn semester, during the period 1. It is recommended to complete the course at the first autumn semester.
Learning outcomes:
Upon completition of the course, the student will be able to:
1. Apply the fundamental theorem of integration in complex sense to some concrete functions.
2. Represent functions via power series (for analytic functions) via Laurent expansions (for functions with singularities).
3. Calculate the residues and some classes of integrals using residue theory.
4. Calculate some classes of series by residue theory.
5. Use Laplace transform for solutions of ODEs.
Contents:
1. Fundamental theorem of integration.
2. Harmonic functions and mean value formulae.
3. Liouville's theorem and fundamental theorem of algebra.
4. Representation of analytic functions via the power series.
5. Laurent expansions.
6. Residues and their calculus.
7. The principle of the argument and Rouche's theorem.
8. Calculations of integrals by residue theory.
9. Calculation of series by residue theory.
10. Laplace transform.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures 28 h / Group work 14 h / Self-study at least 20 h.
Target group:
No specific targets except passing final exam w.r.t. the content and outcomes (see previous parts).
Prerequisites and co-requisites:
Complex Analysis (031077P)
Calculus of several variables including multidimenional integral (Calculus of several variables 800328A)
Recommended or required reading:
Any book in Complex Analysis, in particular Lecture Notes of V.S. Serov "Complex Analysis, Second Edition", Oulu University Press, 2017.
Assessment methods and criteria:
Final Exam
Grading:
The course utilizes a numerical grading scale 0-5, zero stands for a fail.
Person responsible:
Valery Serov
Working life cooperation:
The course does not contain working life cooperation.

900054Y: Conversational Skills in Finnish, 3 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Proficiency level:
B1/B2 , according to the Common European Framework.
Status:
The course is intended for the international students in every faculty at the University of Oulu. Students of the Oulu University of Applied Sciences (OAMK) may also participate to this cross-institutional study. See courses, student quota and applying for OAMK students https://www.oulu.fi/forstudents/crossinstitutionalstudy.
Required proficiency level:
A2.2
Completion of Intermediate Finnish 2 (900016Y) or the equivalent language skills.
ECTS Credits:
3 ECTS credits
Language of instruction:
Finnish
Timing:
-
Learning outcomes:
By the end of the course the student can interact with a degree of fluency (and spontaneity) that makes regular interaction with native speakers quite possible. S/he can describe and explain (clearly and in detail) on a wide range of objects, experiences and events, dreams, hopes and ambitions. The student can bring out opinions, give reasons and explanations for them and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options. S/he is also able to give a (clear) prepared presentation and answer the questions posed by the audience.
Contents:
During the course students strengthen their communication skills in formal and informal situations. The goal is to activate the student's Finnish skills and encourage him/her to use them in different situations. There will be various types of situational dialogue, conversation and listening exercises in the course. In addition, students will conduct a short survey which will also be reported to other students in the class.
Mode of delivery:
Contact teaching and guided self study
Learning activities and teaching methods:
Lessons twice a week (28-30 h), group work (15 h) and guided self study (36 h)
Target group:
International degree and post-graduate degree students, exchange students and the staff members of the University. Students of the Oulu University of Applied Sciences (OAMK) may also participate to this cross-institutional study. See courses, student quota and applying for OAMK students https://www.oulu.fi/forstudents/crossinstitutionalstudy.
Prerequisites and co-requisites:
Completion of Intermediate Finnish 2 (900016Y) or equivalent skills
Recommended optional programme components:
-
Recommended or required reading:
Will be provided during the course.
Assessment methods and criteria:
To pass the course, students must attend class on a regular basis and complete group work tasks and homework assignments.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading is on a pass/fail basis.
Person responsible:
Anne Koskela
Working life cooperation:
-
Other information:
Sign-up in WebOodi or Tuudo. Staff members in in staff training portal.

801698S: Cryptography, 5 op

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opintokohteen oppimateriaali:
Trappe, Wade; Washington, Lawrence C., , 2005
Menezes, Alfred J.; van Oorschot, Paul C.; Vanstone, Scott A. , , 1997
Opintokohteen kielet: Finnish

   ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish (in exercises also English)
Learning outcomes:
After passing the course the student is able to use:
- primality testing
- algorithms for solving discrete logarithm
- elliptic curves on cryptography
- lattices on cryptography
- digital signatures
Contents:
Primality testing, Pollard's p-1 factorization method, Shanks's Babystep-Gianstep algorithm, The index calculus method for computing discrete logarithms, Pollard rho method, The Pohlig-Hellman algorithm, Elliptic curves and cryptography (Diffie-Hellman, ElGamal, Menezes-Vanstone, Lenstra), Lattices and cryptography (GGH, NTRU, LLL), Digital signatures.
Learning activities and teaching methods:
28 h lectures, 14 h exercises
Target group:
Major and minor students
Prerequisites and co-requisites:
Basic in Algebra
Algebraic structures
Introduction to Cryptography
Recommended or required reading:
Lecture notes;
Hoffstein, Jeffrey, Pipher, Jill, Silverman, Joseph H.: An introduction to mathematical cryptography.
Assessment methods and criteria:
Final exam
Grading:
Fail, 1-5
Person responsible:
Marko Leinonen

900015Y: Intermediate Finnish Course 1, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

   ay900015Y   Intermediate Finnish Course 1 (OPEN UNI)   4.0 op

   Proficiency level:
A2.1
Status:
The course is intended for the international students in every faculty at the University of Oulu.

Required proficiency level:
A1.3, Completion of the Beginners' Finnish course 2 (900053Y) or the equivalent language skills.
ECTS Credits:
5 ECTS credits
Language of instruction:
Mainly Finnish
Timing:
-
Learning outcomes:
By the end of the course the student can communicate in ordinary everyday situations when the topics are familiar or connected with everyday matters. S/he can search for and locate key informational content in different kinds of texts. The student can also identify the topic and some details of the discussion around her/him. S/he can describe activities and personal experiences both orally and in writing and s/he also knows the difference between spoken/colloquial and written/standard language. The student knows how things can be expressed with different degrees of politeness and can apply that information in her/his own communication.
Contents:
The course is a lower intermediate course. During the course students strengthen their communication skills in ordinary everyday situations and acquire a wider vocabulary and more thorough knowledge of grammar. In addition, students practise understanding and producing Finnish talk and reading newspaper articles.

The topics and communicative situations covered in the course are: requesting different kinds of requests, expressing politeness, making appointments with friends, giving directions, doing the shopping, talking about the past and talking about his/her future plans, hobbies, transactions e.g. in the doctor's and post office.

The structures studied are: more about the imperative, the verb rections, the deverbal noun (-minen), passive present tense, part of the plural declension of nouns, the third infinitive (ma-infinitive), more about sentence types, perfect tense, more about object cases.
Mode of delivery:
Contact teaching and guided self-study.
Learning activities and teaching methods:
Lessons 2 times a week (52 h, including the tests) and guided self-study (83 h)
Target group:
International degree and post-graduate degree students, exchange students and the staff members of the University
Prerequisites and co-requisites:
Completion of the Beginners' Finnish Course 2
Recommended optional programme components:
-
Recommended or required reading:
Gehring, S. & Heinzmann, S.: **Suomen mestari 2,** (chapters 1 - 5)
Assessment methods and criteria:
Regular and active participation in the weekly lessons (twice a week), homework assignments and the tests will be taken into consideration in the assessment.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading scale is 1-5.
Person responsible:
Anne Koskela
Working life cooperation:
-
Other information:
Sign-up in WebOodi or Tuudo.

900016Y: Intermediate Finnish Course 2, 5 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Proficiency level:
A2.2
Status:
The course is intended for the international students in every faculty at the University of Oulu.
Also students of the Oulu University of Applied Sciences (OAMK) may also participate to this cross-institutional study. See courses, student quota and applying for OAMK students https://www.oulu.fi/forstudents/crossinstitutionalstudy.
Required proficiency level:
A2.1, Completion of the Intermediate Finnish course 1 (900015Y) or the equivalent language skills.
ECTS Credits:
5 ECTS credits
Language of instruction:
Finnish
Timing:
-
Learning outcomes:
By the end of the course the student can communicate in various informal situations in Finnish. The student understands the main points of messages and talk around her/him. S/he can produce simple connected text on topics which are familiar or of personal interest and describe experiences and also report heard content to others.
Contents:
The course is an upper intermediate course. During the course students learn the necessary written and oral skills to be able to cope in informal situations arising during everyday life, work and study. In the course, students practise understanding more Finnish talk and written texts, and finding information and talking about it to other people. In the classes the main stress is on oral exercises and group work.
The topics and communicative situations covered in the course are: transactions e.g. in clothes shops and on the phone, Finnish small talk, reacting in different situations, information and facts about Finnish celebrations and features of colloquial/spoken language.
The structures studied are: the perfect and pluperfect, revision of all the verb tenses, comparison of adjectives, conditional, more about the plural declension of nouns (particularly the plural partitive case), more about object and predicative cases, the passive imperfect.
Mode of delivery:
Contact teaching and guided self-study
Learning activities and teaching methods:
Lessons (52 h, including the tests) and guided self-study (83 h).
Target group:
International degree and post-graduate degree students, exchange students and the staff members of the University.
Students of the Oulu University of Applied Sciences (OAMK) students and OAMK's international and exchange students may also participate to this cross-institutional study. The quota principle is as follows: at least two OAMK students in a course and if there are more places, they are filled according to the queuing principle.
See more information https://www.oulu.fi/forstudents/crossinstitutionalstudy.
Prerequisites and co-requisites:
Completion of the Intermediate Finnish Course 1 or equivalent skills
Recommended optional programme components:
-
Recommended or required reading:
Gehring, S. & Heinzmann, S.: **Suomen mestari 2 (chapters 6 - 8).**
Assessment methods and criteria:
Regular and active participation in the weekly lessons (twice a week), homework assignments and the tests will be taken into consideration in the assessment.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Grading scale is 1-5.
Person responsible:
Anne Koskela
Working life cooperation:
-
Other information:
Sign-up in WebOodi or Tuudo.

802668S: Introduction to Functional Analysis, 5 op

Voimassaolo: 01.06.2015 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Mathematics
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits
Language of instruction:
English
Timing:
4th year
Learning outcomes:
This is an introduction course, it includes normed spaces, subspaces, quotients, bounded linear operators and functionals, Banach duals, uniform boundedness principle, open mapping theorem and Hahn-Banach theorem. If time permits, reflexive spaces will also be studied.
Contents:
Definition of normed spaces. Examples. Quotient spaces. Bounded linear operators. Banach duals. Uniform bounded principle. Open mapping theorem. Hahn-Banach theorem. Reflexive spaces.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
28 h lectures, 14 h exercises.
Target group:
Students with some background on topology.
Recommended or required reading:
Lecture notes by Filali
Assessment methods and criteria:
Final Exam
Grading:
Fail, 1-5
Person responsible:
Mahmoud Filali
Working life cooperation:
No
Other information:
Lecture in English / questions can be done in Finnish, exam in English/Finnish

802678S: Mathematics of Imaging and Vision, 5 op

Voimassaolo: 01.08.2020 -
Opiskelumuoto: Advanced Studies
Laji: Course
Vastuuyksikkö: Field of Mathematics
Arvostelu: 1 - 5, pass, fail
Opettajat: Andreas Hauptmann
Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits
Language of instruction:
English
Timing:
3rd/last year during B.Sc., 1st or 2nd year of Master
Learning outcomes:

Students will be familiar with basic operations to analyse, process, and understand images. Identify suitable presentations for different classes of images. Learn suitable analytical models for denoising and segmentation of images. We will discuss methods for classifications and decomposition of images and image sequences. Methods will be implemented using Matlab/Python.

Contents:
Basics of representing images and signals using Fourier and wavelet transforms. Variational models for image denoising and nonlinear diffusion. Deconvolution and basic inverse problems arising in imaging. Segmentation and the Mumford-Shah functional. Image classification and low rank decompositions. Motion estimation and optical flow.

Mode of delivery:
Face-to-face teaching

Learning activities and teaching methods:
Lectures (28 h), practical and computer classes (14 h) and independent work.

Target group:
Students having mathematics, applied mathematics, or statistics as the major or a minor subject.

Prerequisites and co-requisites:
Core courses in the B.Sc curriculum of mathematical sciences, Numerical Analysis, optimization (recommended), Introduction to Inverse Problems (beneficial, but not necessary).

Recommended or required reading:
Weickert, Joachim. *Anisotropic diffusion in image processing*. Vol. 1. Stuttgart: Teubner, 1998.

Assessment methods and criteria:
Active participation in practicals and final exam.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
Fail, 1-5

Person responsible:
Andreas Hauptmann

Working life cooperation:
No

801631S: Modern real analysis, 5 op

Voimassaolo: 01.01.2018 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Meng Wu

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits
Language of instruction:
English
Learning outcomes:
On successful completion of this course, the student will be able to:
- derive and prove basic results of modern real analysis.
- apply the results and methods of modern real analysis in different topics of mathematics, like in Geometric Measure Theory, Fractal Geometry, Dynamical systems.
Contents:
The course presents Lebesgue spaces (Hölder's and Minkowski's inequalities), the Vitali covering theorem, the Hardy-Littlewood maximal function, Lebesgue's density theorem, Mastrand's projection theorem, rectifiability.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
28 h lectures, 14 h exercises
Target group:
Students with some background on real analysis.
Assessment methods and criteria:
Exercises and Final Exam
Grading:

Fail, 1-5
Person responsible:
Meng Wu

802679S: Principles of Deep Learning, 5 op

Voimassaolo: 01.08.2020 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Andreas Hauptmann

Opintokohteen kielet: English

ECTS Credits:
5 ECTS credits
Language of instruction:
English
Timing:
3rd/last year during B.Sc., 1st or 2nd year of Master
Learning outcomes:
Students will get familiar mathematical concepts underlying deep learning models. Use optimization methods to train large models. Understand the approximation properties of learned models. Get familiar with concepts of probability distributions and optimal transport to train and design generative networks. Accompanying implementations are done in Python.
Contents:
Basic neural network architectures used for computer vision. Optimization techniques used to train large models. Principles of automatic differentiation. Universal approximation theorem. Optimal transport, Wasserstein distances, Sinkhorn approximation, and generative networks.
Mode of delivery:
Face-to-face teaching
Learning activities and teaching methods:
Lectures (24 h), practical and computer classes (18 h) and independent work.
Target group:
Students having mathematics, applied mathematics, or statistics as the major or a minor subject. Theoretical Computer Science.
Prerequisites and co-requisites:
Core courses in the B.Sc curriculum of mathematical sciences, Numerical Analysis, optimization (recommended), Mathematics of Imaging and Vision (beneficial, but not necessary).
Recommended or required reading:
Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. *Deep learning*. MIT press, 2016.
Assessment methods and criteria:
Active participation in practicals and final project work.
Read more about assessment criteria at the University of Oulu webpage.
Grading:
Fail, 1-5
Person responsible:
Andreas Hauptmann
Working life cooperation:
No

802680S: Riemann Geometry, 10 op

Voimassaolo: 01.08.2020 -

Opiskelumuoto: Advanced Studies

Laji: Course

Vastuuyksikkö: Field of Mathematics

Arvostelu: 1 - 5, pass, fail

Opettajat: Esa Järvenpää
Opintokohteen kielet: Finnish

ECTS Credits:
10 ECTS credits
Language of instruction:
Finnish/English
Timing:
3.-4. period
Learning outcomes:
After the completion of the course the students know the basic concepts in Riemann geometry and master the basic results in this field.
Contents:
Riemann metric, connection, geodesic and curvature.
Mode of delivery:
Contact teaching
Learning activities and teaching methods:
Lectures 56 h, exercises 28 h
Target group:
Master's and PhD-students in mathematics and physics
Prerequisites and co-requisites:
Differential geometry
Recommended or required reading:
Lectures. Recommended re
Loppukoe tai harjoitustyö ja esitelmä
ading will be announced in the first lecture.
Assessment methods and criteria:
Final exam or an essay and a seminar
Grading:
1-5 or passed/failed
Person responsible:
Esa Järvenpää

900027Y: Special Course in Finnish: Writing Skills, 3 op

Voimassaolo: 01.08.1995 -
Opiskelumuoto: Language and Communication Studies
Laji: Course
Vastuuyksikkö: Languages and Communication
Arvostelu: 1 - 5, pass, fail
Opintokohteen kielet: Finnish

Proficiency level:
B1/B2, according to the Common European Framework.
Status:
Course is intended for the international students in every faculty at the University of Oulu.
Students of the Oulu University of Applied Sciences (OAMK) students and OAMK's international and exchange students may also participate to this cross-institutional study. The quota principle is as follows: at least two OAMK students in a course and if there are more places, they are filled according to the queuing principle.See more information https://www.oulu.fi/forstudents/crossinstitutionalstudy.
Required proficiency level:
A2.2 Completion of the Finnish for Advanced Students (900020Y) or the equivalent language skills.
ECTS Credits:
3 ECTS credits
Language of instruction:
Finnish
Timing:
-
Learning outcomes:

By the end of the course the student can write coherent and detailed descriptions and summaries about various matters. S/he is able to summarize text and justify his/her own statements of opinions. In addition, the student knows the steps of the writing process and understands the significance of a text's function and target audience. S/he can also differentiate between formal and informal writing styles.

Contents:
During the course students develop their writing skills in Finnish and are guided in the drafting of different text types and documents needed in studies and work. In the course students learn how to write informal and formal letters, an argument-essay, a summary, a job application and a report.

Mode of delivery:
One contact lesson at the beginning of the course and guided independent studying using online

Learning activities and teaching methods:
The course will be held online using a Moodle environment.

Target group:
Course is intended for the international students in every faculty at the University of Oulu.
Students of the Oulu University of Applied Sciences (OAMK) students and OAMK's international and exchange students may also participate to this cross-institutional study. The quota principle is as follows: at least two OAMK students in a course and if there are more places, they are filled according to the queuing principle.See more information https://www.oulu.fi/forstudents/crossinstitutionalstudy.

Prerequisites and co-requisites:
Completion of the Intermediate Finnish Course 2

Recommended optional programme components:
-

Recommended or required reading:
Web based material in Moodle.

Assessment methods and criteria:
To pass the course, the student must complete all the required writing assignments.
Read more about assessment criteria at the University of Oulu webpage.

Grading:
Grading is on a pass/fail basis.

Person responsible:
Anne Koskela

Working life cooperation:
-

Other information:
Sign-up in WebOodi or in Tuudo. Staff members in staff training portal.

900017Y: Survival Finnish, 2 op

Voimassaolo: 01.08.1995 -

Opiskelumuoto: Language and Communication Studies

Laji: Course

Vastuuyksikkö: Languages and Communication

Arvostelu: 1 - 5, pass, fail

Opintokohteen kielet: Finnish

Leikkaavuudet:

ay900017Y   Survival Finnish Course (OPEN UNI)   2.0 op

Proficiency level:
A1.1
Status:
The course is intended for the international students in every faculty at the University of Oulu.
Required proficiency level:
No previous Finnish studies.
ECTS Credits:
2 ECTS cr
Language of instruction:
Finnish and English.
Timing:
-
Learning outcomes:

By the end of the course the student can understand and use some very common everyday expressions and phrases, and s/he can locate informational content in simple texts and messages. The student also knows the basic characteristics of Finnish language and Finnish communication styles.

Contents:

This is an introductory course which aims to help students to cope with the most common everyday situations in Finnish. During the course, students learn some useful everyday phrases, some general features of the vocabulary and grammar, and the main principles of pronunciation.

The topics and communicative situations covered in the course are: general information about the Finnish language, some politeness phrases (how to greet people, thank and apologize), introducing oneself, giving and asking for basic personal information, numbers, some time expressions (how to tell and ask the time, days of the week, time of day), food, drink and asking about prices.

The structures studied are: personal pronouns and their possessive forms, forming affirmative, negative and interrogative sentences, the conjugation of some verbs, the basics of the partitive singular and some local cases for answering the 'where'-question.

Mode of delivery:

Contact teaching, on-line learning and independent work. There will be organized also one on-line group in each semester.

Learning activities and teaching methods:

Lessons 2 times a week (26 h, including the final exam) and guided self study (24 h).

Target group:

International degree and post-graduate degree students, exchange students and the staff members of the University.

Prerequisites and co-requisites:

-

Recommended optional programme components:

-

Recommended or required reading:

Will be provided during the course.

Assessment methods and criteria:

Regular and active participation in the weekly lessons (twice a week), homework assignments and written exam at the end of the course will be observed in assessment.

Read more about assessment criteria at the University of Oulu webpage.

Grading:

Grading scale is on a pass/fail basis.

Person responsible:

Arja Haapakoski

Working life cooperation:

-

Other information:

Sign-up in WebOodi or in Tuudo.