University Pathway Finland

(Science & Technology)

Course Guide

Aalto University

Tampere University

Contents

Welcome words

A warm welcome to the University Pathway Finland (Science & Technology) programme!

We are proud to host the first Finnish university pathway programme in collaboration with Tampere University. This unique programme gives international students an excellent opportunity to prepare and gain admission for degree studies in Finland while studying from home.

We hope to offer you an insightful international learning experience and a platform to interact with other international students who will become your fellow students in our Bachelor programmes in Finland. I hope that you take full advantage of the teaching provided by our University teachers but also remember that sharing your experiences and ideas with other students with diverse backgrounds is a great way to learn. I hope you will enjoy our extracurricular social and informative programme that we will offer alongside the course programme.

This guide includes the Pathway programme course descriptions: the learning goals, workload, teaching times, as well as completion and grading of each course.

Once you begin your studies, we will invite you to join our digital learning space in Microsoft Teams, where you will find the course descriptions, the social programme, and other information to make your study journey enjoyable and smooth.

I wish an inspirational learning experience in the University Pathway Finland (Science & Technology) programme!

Warm regards,
Sanna Viitanen
Programme manager

Mathematics:
Vectors and matrices 5 ECTS

Teaching period and exams: **29.8.-16.10.2022**
Teaching times: **Mondays and Wednesdays 10-12**

Course content

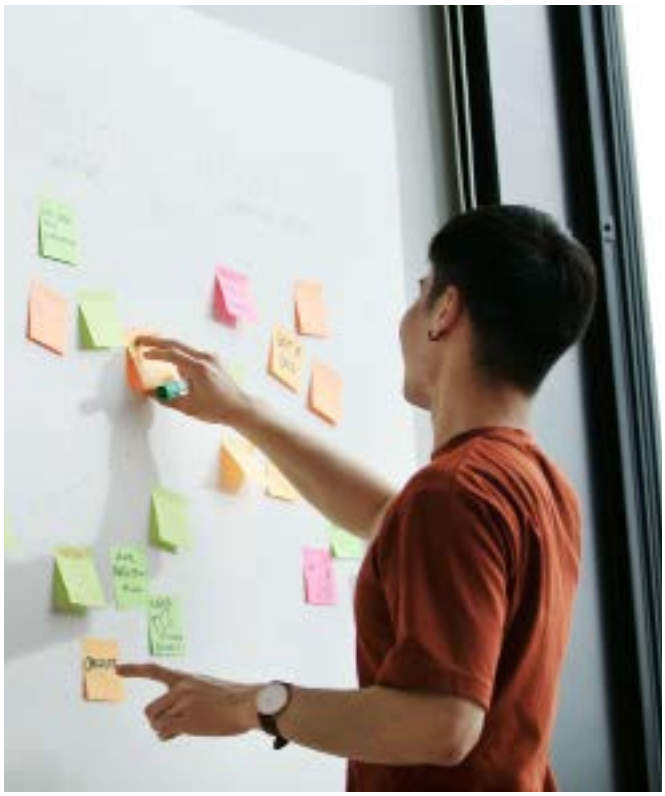
- Core content
  - o Systems of linear equations: solving using Gaussian elimination.
  - o Linear independence of Euclidian space, subspaces, basis, rank, and dimension of Euclidian space.
  - o Lines and planes.
  - o Matrices: matrix algebra, matrix product, the transpose, the inverse, the determinant, eigenvalues and eigenvectors. The cross product, the dot product and the vector triple product of vectors.

- Complementary knowledge
  - o Basic competence in using matlab to solve mathematical problems

Mathematics:
Vectors and matrices 5 ECTS

Learning outcomes

In this course, the student learns the basic theory and methods of linear algebra and matrix analysis. The student learns how to prove theorems, solve problems using mathematical methods, and present solutions orally and in written form.



Completion and grading:

- Attending online classes (80 % attendance)
- Completing assignments
- Written and oral exam
- Grading on scale 1-5
- The exam can be re-taken once

Course workload

-> Online video lectures 14 hrs (study time including study material approximately 42 hrs)
-> Synchronous online classes 14 hrs (study time including preparation for classes 42 hrs)
-> Math clinic 14 hrs
-> Self-study assignments 21 hrs
-> Practise, repetition and exam 16 hrs

Mathematics:
Introductory Calculus 5 ECTS

Teaching period and exams: **24.10.-11.12.2022**
Teaching times: **Mondays and Wednesdays 10-12**

Course Content

- Core content
  - o Set union, intersection, difference and complement. Introduction of the logic and proofs needed in mathematical analysis.
  - o Definition of a function. Monotonicity of a function. Inverse function and combined function. Properties of basic functions. Hyperbolic functions and their inverses.
  - o Complex numbers and their basic properties (sum, difference, product, quotient, conjugate and modulus), presenting and calculating complex numbers both in coordinate form and polar form, complex roots.
  - o Limit and continuity of a function. One-sided and inproper limits, l'Hopital's rule.
  - o Derivative as limit of difference quotient. Derivating basic functions, products and quotients, chain rule. Studying the values and extrema of a function based on derivatives.
  - o Basics of integral calculus.

- Complementary knowledge
  - o Preimage, injection, surjection, bijection.
  - o Roots of real valued polynomials, factorisation.
  - o Intermediate value theorem. Continuity of inverse function.
  - o Derivative of inverse function.
  - o Applications, for example, linear approximations, derivative of a multivariable function, gradient.

- Specialist knowledge
  - o Mean value theorem.

Mathematics:
Introductory Calculus 5 ECTS

Learning outcomes

After this course, the students can use the basic concepts in set theory, union, intersection, complement and difference in presenting subsets of real numbers. The students can sketch graphs of basic functions and their compositions, calculate their limits and derivatives, and draw conclusions on function behaviour and extremal values based on them. The students can present complex numbers in both coordinate form and polar form and apply both forms in elementary calculations, find roots of complex numbers and factorise polynomials. The students can calculate integrals of basic functions. They can deliver both oral and written presentations of their solutions.

Completion and grading:

- Attending online classes (80 % attendance)
- Completing assignments
- Written and oral exam
- Grading on scale 1-5
- The exam can be re-taken once

Course workload

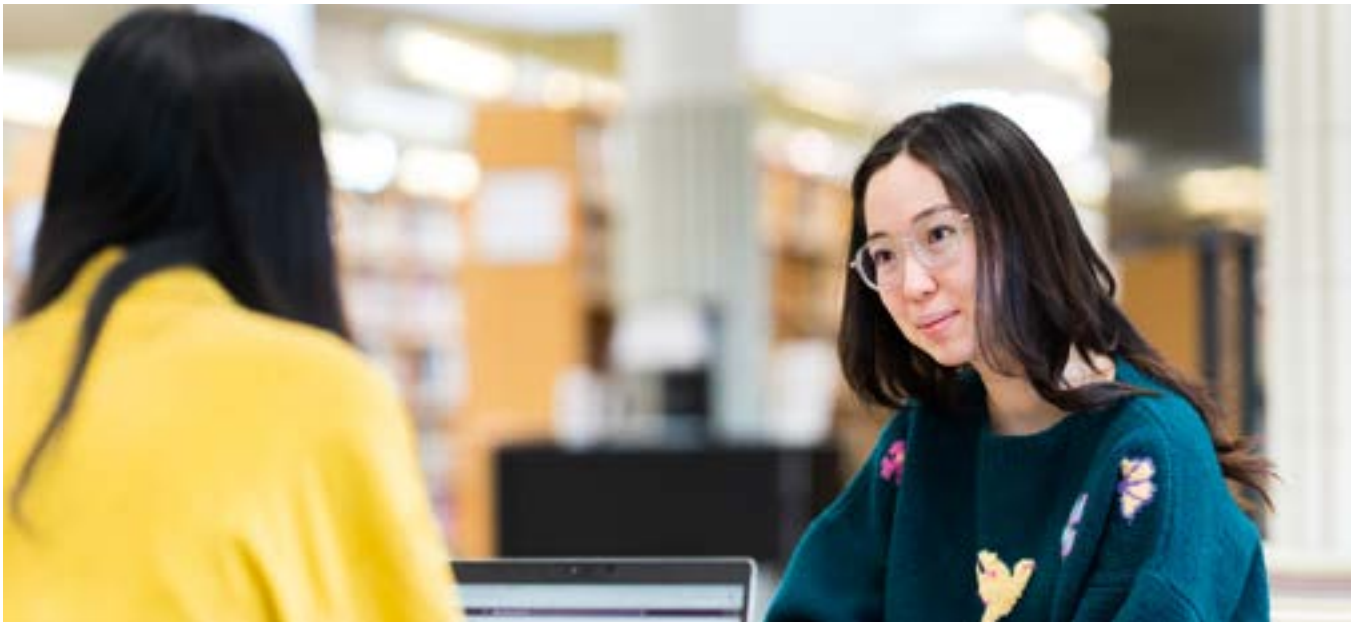
-> Online video lectures 14 hrs (study time including study material approximately 42 hrs)
-> Synchronous online classes 14 hrs (study time including preparation for classes 42 hrs)
-> Math clinic 14 hrs
-> Self-study assignments 21 hrs
-> Practise, repetition and exam 16 hrs

Mathematics:
Differential and Integral Calculus
5 ECTS

Teaching period and exams: 9.1. – 26.2.2023
Teaching times: Mondays and Wednesdays 10-12

Course Content

Sequences, series, power series, derivatives and integrals, basic types of differential equations

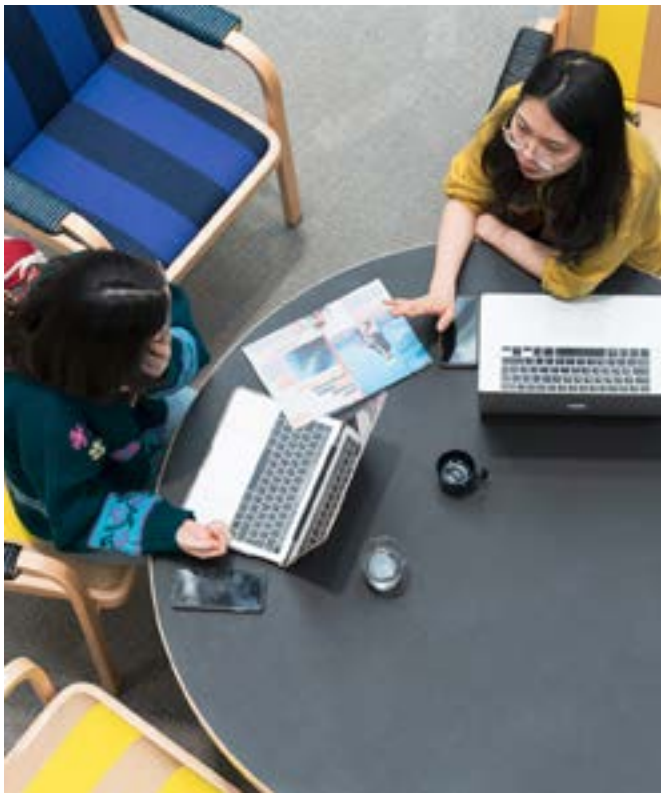


Learning outcomes

After the course, the student will

- be able to analyse the convergence of sequences and series
- be familiar with the series expansions and approximations of elementary functions
- master the most important properties, calculation methods, and applications of the derivative and the integral
- be able to solve a first order differential equation in the linear and separable cases
- be able to solve a linear second order differential equation in the case of constant coefficients.

Mathematics:
Differential and Integral Calculus
5 ECTS



Completion and grading:

- Attending online classes (80 % attendance)
- Completing assignments
- Written and oral exam
- Grading on scale 1-5
- The exam can be re-taken once

Course workload

-> Online video lectures 10 hrs (study time including study material approximately 36 hours)
-> Synchronous online classes 12 hrs (study time including study material approximately 40 hours)
-> Math clinic 12 hrs
-> Self-study assignments 32 hrs
-> Practice, repetition and exam 16 hrs

Languages:
Survival Finnish 3 ECTS

Teaching period and exams: **27.2.–23.4.2023**
Teaching times: **Mondays and Wednesdays 10-12**

Course Content

In this course, you will practise all four modalities of the Finnish language: speaking, understanding, reading and writing. The course will also expose you to the Finnish people and culture. The language module consists of asynchronous independent online studies and synchronous online group work with a teacher, discussions, and other online activities.

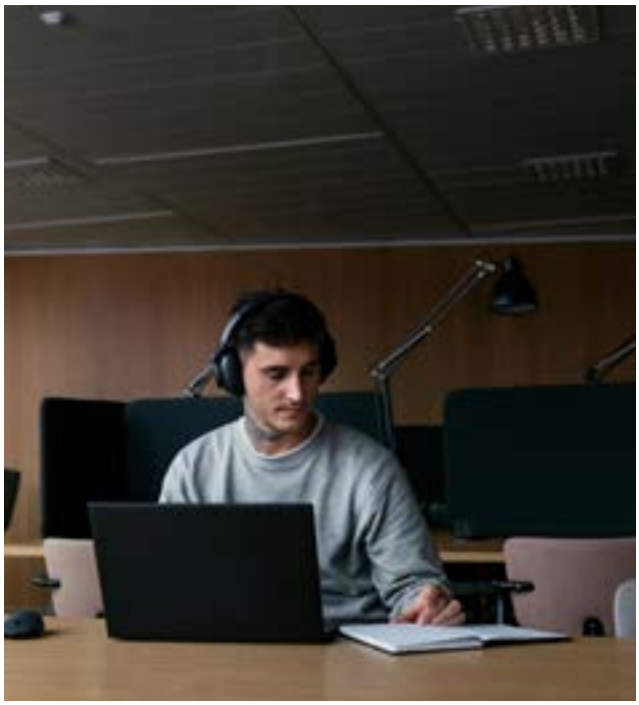
The course will cover the following topics:

- Greetings and introducing yourself
- Telling about your background and current situation
- Asking and answering typical questions in social situations and services on and off campus
- Knowledge of the city regions of Helsinki, Espoo and Tampere
- The essential characteristics of the Finnish way of life and culture

Languages:
Survival Finnish 3 ECTS

Learning outcomes

After the course, the student is familiar with the basics of Finnish language and culture. The student will be able to introduce oneself in Finnish, talk about their general background and current situation using ordinary phares. The student will have tools to manage in common social situations and services on and off campus in Finnish. They will also have tools and strategic skills to learn more Finnish on their own. The student will recognize the main characteristics of Finnish way of life and culture, be able to talk about them, and compare their own culture with that of Finland.



Completion and grading:

- Attending online classes (80 % attendance)
- Completing assignments and exam at the end of the course
- Grading on scale 1-5
- The exam can be re-taken once

Course workload

-> Synchronous online classes 24h
-> Self-study assignments and homework 42 h
-> Course portfolio and self-evaluation 10 h
-> Exam and preparation for the exam 5h

Languages:
Finland Studies 2 ECTS

Teaching period and exams: **27.2.–23.4.2023**
Teaching times: **Mondays and Wednesdays 10-12**

Course Content

Studying at a Finnish university may differ from studying in another country. This course will familiarize you with the Finnish education system and help you gain the study skills you will need when studying in Finland.

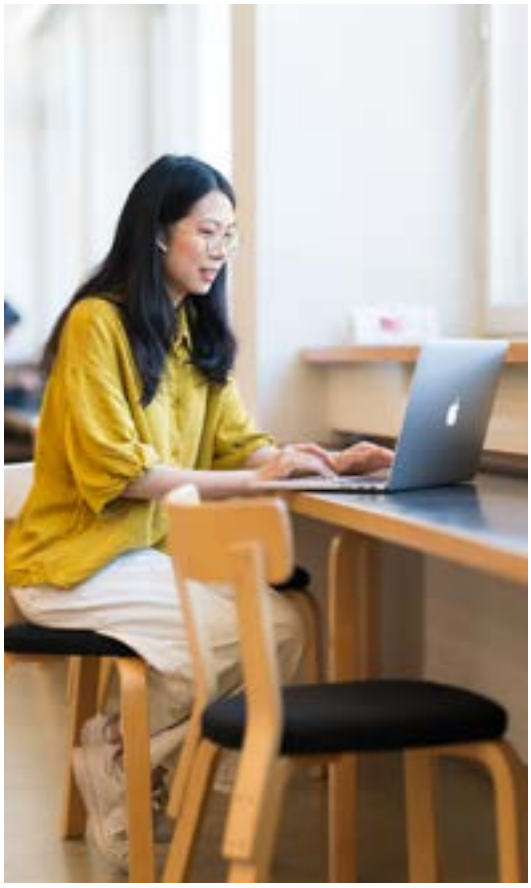
The course will cover the following topics:

- The Finnish education system and the Nordic welfare state
- The key elements of studying at a Finnish university
- Study strategies
- Studying in a foreign language
- Student wellbeing and study support
- Extracurricular activities and student life in Finnish universities
- Practical advice for everyday living in Finland

Languages:
Finland Studies 2 ECTS

Learning outcomes

After the course, the student understands what studying at a Finnish university is like and knows the values on which the Finnish education system is based. The student will be able to apply study strategies and time management into their studies and critically reflect upon themselves as learners. The student will have tools to find more information on their future studies in Finland.



Completion and grading:

- Attending online classes (80 % attendance)
- Completing assignments
- Grading pass/fail

Course workload

-> Synchronous online classes 8h
-> Asynchronous online lectures 4h
-> Self-study assignments and homework 32 h
-> Presentation and preparation for the presentation 8 h
-> Peer and self-evaluation 2h

University Pathway Finland

(Science & Technology)

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https://www.aalto.fi/en/university-pathway-finland-science-technology

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