JÖNKÖPING UNIVERSITY
Jönköping University Enterprise

COURSE SYLLABUS

Pathway Mathematics, 7.5 credits

Pathway Mathematics, 7.5 högskolepoäng

Course Code:	PMAX13	Education Cycle:	First-cycle level
Confirmed:	Jun 24, 2025	Disciplinary domain:	Natural sciences
Valid From:	Jul 01, 2025	Subject group:	Mathematics
		Specialised in:	GXX First cycle, in-depth level of the course cannot be classified

Intended Learning Outcomes (ILO)

On completion of the course the student shall:

Knowledge and understanding

1. Display knowledge and understanding of elementary mathematical functions.
2. Display knowledge and understanding of basic trigonometry.
3. Display knowledge and understanding of sequences and series, especially the geometric series.
4. Display knowledge and understanding of basic single variable differential- and integral calculus.
5. Display knowledge and understanding of basic numerical methods and mathematical modelling.
6. Display knowledge and understanding of the concept of vectors.
7. Display basic knowledge of complex numbers.

Skills and abilities

8. Demonstrate ability to transform and simplify algebraic expressions.
9. Demonstrate skills of solving equations and inequalities of various sorts.
10. Demonstrate skills of calculating derivatives and basic integrals for elementary functions.
11. Demonstrate ability to use derivatives to analyze the properties of a given function and to methodically solve optimization problems.
12. Demonstrate ability to use integrals to calculate.
13. Demonstrate ability to use numerical methods and mathematical software.
14. Demonstrate skills of using trigonometric formulas to solve geometric problems concerning triangles.
15. Demonstrate ability to transform and simplify trigonometric expressions.
16. Demonstrate skills of solving trigonometric equations.
17. Demonstrate skills to represent complex numbers in different ways and to solve simple equations with complex solutions.
18. Demonstrate skills to handle vectors geometrically and algebraically.
19. Demonstrate ability to document, analyze and present solutions to a given problem in a scientific way.

Judgement and approach

Lectures and tutorials, computer lab work and mentoring sessions.

Content

The course includes the following elements:

- Basic algebra including absolute values, inequalities and rational expressions.
- Sequences and series.
- Polynomials, power functions, rational functions and exponential functions.
- The factor theorem.
- Compound functions and inverse functions.

- Logarithms and logarithmic functions.
- Definition of the derivative.
- Derivatives and differentiation rules for the type of functions mentioned above.
- Applications using the derivative to analyze functions and to solve optimization problems.
- The Riemann sum and the concept of integrals.
- Integral calculus for the functions mentioned above.
- Trigonometric formulas and identities.
- Vectors.
- Introduction to complex numbers.
- Examples of basic numerical methods.
- Mathematical software for visualization, graphing and numerical calculations.

Pathway Mathematics 1 is a course for students who do not meet the level of required mathematics for university studies. The purpose of the course is to support the student's understanding of mathematics at a level needed for studies at university programmes, including content equivalent to the Swedish upper secondary school course Matematik 3c, as well as providing an understanding of important mathematical terminology and concepts in an academic, English-speaking environment. The horizontal aim is to develop and strengthen student skills for participating in higher education, life-long learning and global citizenship through group work, social engagement, peer learning, reflective learning and autonomous learning whilst developing agency, ability to reconcile tensions and dilemmas, intercultural communication skills, metacognitive skills, information literacy and critical thinking.

Type of instruction

Lectures and tutorials, computer lab work and mentoring sessions.

Language of instruction is in English.

Entry requirements

High School Diploma and English Language skills corresponding to: English IELTS 5.0 or the equivalent
Mathematics 2a, 2b, 2c or the equivalent

Examination and grades

The course is graded Pass (G) or Fail (U).

The examination consists of one paper and one written exam.

Registration of examination:

Name of the Test	Value	Grading
Written exam	6.5 credits	G/U
Laboratory report	1 credit	G/U

Other information

Qualification Requirements

To obtain the Course Certificate the student shall complete the course requirements of 7.5 credits.

Title of qualification

The course gives you skills equivalent to the Swedish upper secondary school course Matematik 3c for eligibility to programmes at Jönköping University.

Course literature

Please note that changes may be made to the reading list up until eight weeks before the start of the course.

Selected parts of: https://openstax.org/subjects/math

Additional handouts from JU