



HÖGSKOLAN I GÄVLE

Calculus 7.5 cr

Envariabelanalys 7,5 hp

Set by Faculty of Engineering and Sustainable Development

Version

Set at

Valid from

9/30/14

HT2015

Level	G1N
Education level	First cycle
Course identifier	MAG034
Credits	7.5 cr
Main field of study	Mathematics
Subject group	Mathematics
Disciplinary domain	Natural sciences 100.0 %

Learning outcomes

After completion of the course the student shall be able to

1. account for basic concepts and theorems in one-variable calculus and illustrate the concepts by describing basic applications in other sciences, such as geometry, technology, physics and economics
2. work with functions in one variable, their derivatives and integrals in connection with solving standard problems formulated both from concrete and abstract starting points
3. use differential calculus and integral calculus to analyse and solve basic application problems such as optimisation and area determination and model and solve application problems by means of mathematical computer software
4. account for and discuss theory sections
5. give a general account of the theoretical structure for one-variable calculus.

Course content

The function concept, injective, surjective and bijective functions, inverse functions, monotony, extreme values Compositions of functions

The concept of limit, l'Hôpital's rules, standard limits, arithmetical rules, the concept of continuity

Differential calculus, the definition of the derivative, differentiation rules, the chain rule, implicit differentiation, the mean value theorem, higher derivatives, the derivative of inverse functions

Interpretation of the derivative concept in applications: such as rate of change, speed, acceleration and marginal price, etc
 Elementary functions: Polynomial functions, rational functions, trigonometric and inverse trigonometric functions, exponential and logarithmic functions
 Optimisation problems in one variable
 Linear approximation and Taylor series
 Differential equations and primitive functions
 Integration calculus: anti-derivative, integrals over finite intervals, improper integrals
 The mean value theorem for integrals
 Applications of integrals, area determination, solids of revolution, centre of mass

Teaching Teaching on campus is given as lectures, teaching sessions and supervised computer exercises. The course can also be web-based.

Prerequisites Ma 4 or Algebra and Geometry, 7.5 cr.

Examination Written examination and computer exercises

Grade A, B, C, D, E, Fx, F

Other regulations Grading criteria are provided by the course coordinator or examiner at the beginning of the course.

Sustainable environment Content with sustainable development is not relevant to this course.

Module	0010 Examination	6 cr	Grade: AF
	0020 Examination	1.5 cr	Grade: UG