



# 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

<b>Level</b>	G1N
<b>Education level</b>	First cycle
<b>Course identifier</b>	MAG034
<b>Credits</b>	7.5 cr
<b>Main field of study</b>	Mathematics
<b>Subject group</b>	Mathematics
<b>Disciplinary domain</b>	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

<b>Teaching</b>	Teaching on campus is given as lectures, teaching sessions and supervised computer exercises. The course can also be web-based.		
<b>Prerequisites</b>	General entry requirements + Mathematics 4 or Mathematics D or Algebra and Geometry, 7.5 cr.		
<b>Examination</b>	Written examination and computer exercises		
<b>Grade</b>	A, B, C, D, E, Fx, F		
<b>Other regulations</b>	Grading criteria are provided by the course coordinator or examiner at the beginning of the course.		
<b>Sustainable environment</b>	Content with sustainable development is not relevant to this course.		
<b>Module</b>	0010 Examination	6 cr	Grade: AF
	0020 Examination	1.5 cr	Grade: UG