Reg No: MAGB15/20211

Faculty of Health, Science and Technology
Mathematics

Syllabus

Numerical Methods

Course Code:	MAGB15
Course Title:	Numerical Methods *Numeriska metoder*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
MAA (Mathematics)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2020-08-28, and is valid from the Spring semester 2021 at Karlstad University.

Prerequisites
Registered on Mathematics and Programming 30 ECTS credits, including either Foundation Course in Mathematics, Calculus and Geometry, and Linear Algebra, or Foundation Course in Mathematics, Calculus and Geometry, and Fundamental Concepts and Proofs in Mathematics, or the equivalent knowledge of calculus in one variable and matrix algebra

Learning Outcomes
The aim of the course is to familiarise students with basic numerical and computational principles and provide them with a toolbox of numerical computational methods to utilise for engineering problems.

Upon completion of the course, students should be able to:
- identify mathematical problems that are impossible to solve with analytical methods and, if needed, rewrite the problems in a form suitable for a numerical solution method,
- derive, analyse, and apply standard numerical methods, and
- implement numerical algorithms in MATLAB.

Content
Numerical solution methods are discussed from a theoretical viewpoint in lectures and exercises, and are illustrated by basic examples. Supervised computer sessions give students an opportunity to implement the methods and investigate how more advanced engineering problems in different areas of technology can be solved.

Direct numerical solution methods for large systems of linear equations. Numerical solution of eigenvalue problems. Numerical solution of non-linear equations. Numerical integration. Linear and non-linear least squares methods. Numerical solution of ordinary differential equations.

Reading List
See separate document.

Examination
Examination is in the form of a written exam and mandatory assignments presented in written reports and orally. The number of examination opportunities for passing the course is limited to three per academic year.

As an alternative to completing a retake assignment, a student who is very close to a passing grade may submit a supplementary version of the original assignment to receive a passing grade. This is not possible for written exams. Supplementary work should normally be submitted within one week.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades
One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For students in Engineering programmes, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), U (Fail) is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.