COURSE SYLLABUS
Mathematics for Intelligent Systems, 7.5 credits

Matematik för intelligenta system, 7,5 högskolepoäng

Course Code:	TMAR21	**Education Cycle:**	Second-cycle level
Confirmed by:	Dean Mar 1, 2021	**Disciplinary domain:**	Natural sciences
Revised by:	Director of Education Oct 25, 2023	**Subject group:**	MA1
Valid From:	Aug 1, 2024	**Specialised in:**	A1N
Version:	3		

Intended Learning Outcomes (ILO)

After a successful course, the student shall

Knowledge and understanding
- show familiarity with the mathematical language used in set, vector and matrix calculations, as well as in probability and statistics theory

Skills and abilities
- demonstrate the ability to compute partial derivatives, find directional derivatives and identify the directions of fastest increase and decrease of a differentiable function
- demonstrate the ability to identify and classify local critical points of a function
- demonstrate the ability to perform basic probability calculations involving random variables
- demonstrate the ability to compute point and interval estimates of relevant statistical parameters from a random sample
- demonstrate the ability to perform hypothesis tests of various kinds
- demonstrate the ability to design an experiment using a single facor design

Judgement and approach
- demonstrate an understanding of the concept of random variability and judge the benefits and risks of using different statistical models

Contents

The course contains elements from various fields of mathematics and mathematical statistics used when intelligent systems and machine learning are developed, used and analyzed.

The course includes the following elements:
- Vector and matrix calculations, linear maps Rn to Rm, eigenvectors and eigenvalues.
- Partial and total order relations, complexity, Big-O notation
- Partial derivatives, gradients, local convexity and extrema for smooth functions Rn to R
- Basic probability theory, Bayes' theorem
- Discrete and continuous random variables
- Probability distributions, in particular binomial and normal distribution

- Point and interval estimation
- Hypothesis tests
- Single factor design experiments

Type of instruction

Lectures and tutorials.

The teaching is conducted in English.

Prerequisites

The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in Computer Engineering, Computer Science or Electrical Engineering (with relevant courses in computer engineering), or equivalent. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

Examination and grades

The course is graded 5,4,3 or Fail.

Registration of examination:

Name of the Test	Value	Grading
Examination	7.5 credits	5/4/3/U

Course literature

Literature
The litterature list for the course will be provided 8 weeks before the course starts.

Course material will be distributed during the course.