Course Specifications
Valid in the academic year 2018-2019

Course size
Credits 4.0
Study time 110 h
Contact hrs 36.0 h

Course offerings and teaching methods in academic year 2018-2019
A (semester 2) Dutch lecture: plenary exercises 16.0 h lecture 16.0 h seminar: practical PC room classes 4.0 h

Lecturers in academic year 2018-2019
De Baets, Bernard LA26 lecturer-in-charge

Offered in the following programmes in 2018-2019
Bachelor of Science in Bioscience Engineering Technology 4 A

Teaching languages
Dutch

Keywords
Probability, statistics, probability distributions, estimation theory, test of hypotheses.

Position of the course
The aim of the course is to provide insight into the concepts and reasoning inherent to probability.
In the sections dedicated to statistics the student learns how to use standard statistical methods and how to solve problems in a rigorous manner.
In the end the student must be able to handle theoretical and practical aspects linked to probability and statistics independently.
During the course emphasis is also placed on the correct use of these methods in problems related to the field of engineering.

Contents
Probability: definitions, combinatorics, sets, rules, properties, Bayes' theorem.

Descriptive statistics, population and sample, discrete and continuous random variables, parameters of a sample.

Probability and distribution functions: definitions, properties, parameters of a population, Chebyshev’s inequality, moment generating function.

Discrete distributions: uniform discrete, Bernoulli, binomial, geometric, hypergeometric and Poisson distribution.

Continuous distributions: uniform continuous, exponential, normal, Chi-squared, Student- and F-distribution.

Approximation theorems and the central limit theorem.

Estimation theory: unbiased and efficient estimates, maximum likelihood estimates, confidence and prediction intervals.

Test of hypotheses: general methodology, type I and II errors, testing of population parameters, Goodness-of-Fit tests, Wilcoxon tests.

Initial competences

(Approved)
Limits, derivatives, integrals and series

Final competences
1. Obtain a profound insight into the basic principles of probability and statistics and being able to calculate the probability of simple events.
2. Represent data in an appropriate way and being able to calculate the corresponding statistical parameters.
3. Deduce statistical parameters of discrete and continuous distribution functions and use them to calculate probabilities.
4. Understand the methods to estimate statistical parameters and being able to deduce and apply them.
5. Understand the methodology of testing a hypothesis, being able to work out and test a hypothesis.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract
This course unit cannot be taken via an exam contract

Teaching methods
Lecture, lecture: plenary exercises, seminar: practical PC room classes

Extra information on the teaching methods
During the lectures the statistical concepts and methods are introduced and clarified with examples and applications.
During the coached exercises the students are further trained using standard and similar exercises.

Learning materials and price
Lecture notes in Dutch.
Additional exercises available through Minerva.

References
Mendenhall, W., Introduction to Probability and Statistics, Duxbury Press.

Course content-related study coaching
The lecturer can be asked questions immediately after the course or by appointment.

Evaluation methods
end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
Written examination with open questions

Examination methods in case of periodic evaluation during the second examination period
Written examination with open questions

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
not applicable

Extra information on the examination methods
Exam (theory and exercises) and in between term evaluation (only exercises): written, closed-book examination.
A formulary and a basic calculator are at the disposal of the students.

Calculation of the examination mark
First session:
Final score = \( \frac{1}{4} \times \text{score BTE} + \frac{3}{4} \times \text{score E1} \)
BTE = score ‘in between term evaluation’ (/20);

(Approved)
E1 = score exam first session (/20)

Second session:
Final score = Maximum(1/4 * score BTE + 3/4 * score E2 , score E2)
E2 = score exam second session (/20)

Remark:
If the examination score (E1 or E2) is less or equal than 7/20 and the final score 10/20 or more, the final score will be set equal to 9/20.