GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2019-2020

Applied Probability (E003110)

Course size (nominal values; actual values may depend on programme)

Credits	3.0	Study time	90 h
Contact hrs	30.0 h		

Course offerings and teaching methods in academic year 2019-2020

A (semester 2)	Dutch	seminar	15.0 h
		lecture	15.0 h

Lecturers in academic year 2019-2020

Wittevrongel, Sabine	TW07	lecturer-in-charge

Offered in the following programmes in 2019-2020	crdts	offering
Bachelor of Science in Engineering (main subject Computer Science Engineering)	3	A
Bachelor of Science in Engineering (main subject Electrical Engineering)	3	A
Bachelor of Science in Computer Science Engineering	3	A
Bachelor of Science in Electrical Engineering	3	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	3	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	3	A
Master of Science in Industrial Engineering and Operations Research	3	A
Preparatory Course Master of Science in Bioinformatics (main subject Engineering)	3	A
Preparatory Course Master of Science in Industrial Engineering and Operations Research	3	A

Teaching languages

Dutch

Keywords

Probability theory, random variables, distributions, entropy, random processes, stochastic signals

Position of the course

The course aims at the introduction and practical use of the principal concepts and properties from probability theory that are required for the stochastic modelling of (engineering) systems. Specifically, the course discusses concepts and properties from probability theory, basic concepts and properties from information theory, properties of various types of stochastic processes (such as birth-death processes, Poisson processes, Markov chains and renewal processes) and basic concepts w.r.t. stochastic signals. The course builds upon the bachelor courses Probability and Statistics and Analysis of systems and signals and gives a mathematical, theoretical basis for various other courses of a more applied nature such as Communication Theory, Information Theory and Queueing Theory.

Contents

- Probability theory: Random variables and their distributions, Functions of random variables, Laplace transform of the density of a continuous random variable, Probability generating function of a discrete random variable
- Uncertainty and entropy: Entropy of a discrete random variable, Principle of maximum entropy
- Random processes: Definition, Basic properties, Classification
- Point processes: Birth-death processes, Poisson processes, Renewal processes,

Markov chains
- Stochastic signals: Stationarity, Ergodicity, Correlation functions, Energy and power spectra, Filtered signals

Initial competences

Basic probability theory (see e.g. course 'Probability and Statistics'); z transform, Laplace transform, basic knowledge signals (see e.g. course 'Analysis of Systems and Signals')

Final competences

1 To determine distributions of (functions of) random variables
2 To calculate and to interpret characteristics of random variables as moments and entropies
3 To understand and to apply the properties of random processes such as birth-death processes, Poisson processes, renewal processes and Markov chains
4 To analyse the time-dependent and limiting behavior of random processes
5 To calculate and to interpret characteristics of random processes and stochastic signals

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, seminar

Learning materials and price

Dutch syllabus (about 8 euro); additional course material (available via the electronic learning platform)

References

- A. Leon-Garcia: "Probability, Statistics, and Random Processes for Electrical Engineering", Pearson Education, 2009
- A. Papoulis, S.U. Pillai: "Probability, Random Variables and Stochastic Processes", McGraw-Hill, 2002

Course content-related study coaching

By the lecturer and assistants: contacts are possible during or after the lectures and problem solving sessions, by means of email or after making an appointment

Evaluation methods

end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period

Open book examination

Examination methods in case of periodic evaluation during the second examination period

Open book examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Written open-book exam (only syllabus)

Calculation of the examination mark