

Academic Year: (2024 / 2025)

Review date: 23-04-2024

Department assigned to the subject: Statistics Department

Coordinating teacher: MEILAN VILA, ANDREA

Type: Electives ECTS Credits : 6.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Probability and Data Analysis

SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.

CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.

CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.

CG2. Learn new methods and technologies from basic scientific and technical knowledge, and being able to adapt to new situations.

CG3. Solve problems with initiative, decision making, creativity, and communicate and transmit knowledge, skills and abilities, understanding the ethical, social and professional responsibility of the engineering activity. Capacity for leadership, innovation and entrepreneurial spirit.

CG5. Use the theoretical and practical knowledge acquired in the definition, approach and resolution of problems in the framework of the exercise of their profession.

CG6. Develop new products and services based on the use and exploitation of new technologies related to physical engineering.

CG7. Undertake further specialized studies, both in physics and in the various branches of engineering.

CT1. Work in multidisciplinary and international teams as well as organize and plan work making the right decisions based on available information, gathering and interpreting relevant data to make judgments and critical thinking within the area of study.

RA1. To have acquired sufficient knowledge and proved a sufficiently deep comprehension of the basic principles, both theoretical and practical, and methodology of the more important fields in science and technology as to be able to work successfully in them.

RA2. To be able, using arguments, strategies and procedures developed by themselves, to apply their knowledge and abilities to the successful solution of complex technological problems that require creating and innovative thinking.

RA3. To be able to search for, collect and interpret relevant information and data to back up their conclusions including, whenever needed, the consideration of any social, scientific and ethical aspects relevant in their field of study.

RA4. To be able to successfully manage themselves in the complex situations that might arise in their academic or professional fields of study and that might require the development of novel approaches or solutions.

RA6. To be aware of their own shortcomings and formative needs in their field of specialty, and to be able to plan and organize their own training with a high degree of independence.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Stochastic Processes
2. Discrete Markov Chains
3. Continuous time Markov Chains
4. Renewal Processes
5. Queuing theory
6. Random Graphs
7. Case studies:
Monte Carlo Algorithm, PageRank Algorithm, Call centers, Social networks.

LEARNING ACTIVITIES AND METHODOLOGY

Theory (4 ECTS). Theory classes with additional material available on the Web.
Practical classes (2 ECTS) Problem solving classes. Problem based learning classes.

ASSESSMENT SYSTEM

% end-of-term-examination:	60
% of continuous assessment (assignments, laboratory, practicals...):	40

Final exam (60% of the final grade). Partial exams, problem lessons and homeworks (40% of the final grade).

BASIC BIBLIOGRAPHY

- R. Durrett Essentials of stochastic processes, Springer, 2012 (2nd ed.)

ADDITIONAL BIBLIOGRAPHY

- S.M. Ross Stochastic Processes, John Wiley & Sons, inc., 1996 (2nd. ed.)

BASIC ELECTRONIC RESOURCES

- R. Durrett . Essentials of Stochastic Processes: <http://www.math.duke.edu/~rtd/EOSP/EOSP2E.pdf>