Integration and Measure

Academic Year: (2019 / 2020) **Review date: 16-05-2019**

Department assigned to the subject: Mathematics Department

Coordinating teacher: PESTANA GALVAN, DOMINGO DE GUZMAN

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Linear Algebra, Differential Calculus, Integral Calculus, Vector Calculus.

OBJECTIVES

1) Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
2) Students have the ability to gather and interpret relevant data to inform judgments that include reflection on relevant scientific issues.
3) Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
4) Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy.
5) Students are able to demonstrate knowledge and understanding of concepts in mathematics and to apply them to solve problems in science and engineering with an ability for analysis and synthesis.
6) Students are able to formulate in mathematical language problems that arise in science, engineering, economy and other social sciences.
7).Students can synthesize conclusions obtained from analysis of mathematical models coming from real world applications and they can communicate in verbal and written form in English language, in an clear and convincing way and with a language that is accessible to the general public.
8) Students can search and use bibliographic resources, in physical or digital support, as they are needed to state and solve mathematically and computationally applied problems arising in new or unknown environments or with insufficient information.
9) Students have shown that they know and understand the mathematical language and abstract-rigorous reasoning as well as to apply them to state and prove precise results.
10) Students have shown that they understand the fundamental results from real mathematical analysis.
11) 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.
12) To be able to successfully manage themselves in the complex situations that might arise and that might require the development of novel approaches or solutions.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Integrals over paths and surfaces
2. Green's, Stokes' and Gauss' theorems
3. Set measure
4. The Lebesgue Integral
5. Monotone and dominated convergence
6. Lp spaces
7. Parametric integrals
8. Integral transforms: Laplace and Fourier

LEARNING ACTIVITIES AND METHODOLOGY

1) THEORETICAL-PRACTICAL CLASSES. The students will receive course notes and will have basic reference texts to facilitate following the classes and carrying out follow up work. Students partake in exercises to resolve practical problems and will realize two evaluation tests.
2) TUTORING SESSIONS. Individualized attendance (individual tutoring) or in-group (group tutoring) with the teacher. A total of 4 hours per week will be devoted to these tutorials.

3) STUDENT INDIVIDUAL WORK. The student is expected to devote a total of 98 hours of individual work to the subject.
4) THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject`s main concepts are developed, while providing material and bibliography to complement student learning.
5) PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group.

ASSESSMENT SYSTEM

1) FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. This exam will have a weight of 60% in the final grade.
2) CONTINUOUS EVALUATION. Two partial tests will be carried out throughout the semester. The weight of these tests will be 40% of the final grade.

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

BASIC BIBLIOGRAPHY

- Folland, G.B. Fourier Analysis and its Applications, Wadsforth & Brooks/Cole, 1992
- Marsden, J.E., Tromba, A,J. Vector Calculus, W.H. Freeman and Company, 2003
- Rudin, W. Real and complex Analysis, Mc Graw-Hill (International Student Edition), 1970

ADDITIONAL BIBLIOGRAPHY

- Apostol, T.M. Mathematical Analysis, Addison-Wesley, 1974
- Bauer, H. Measure and Integration Theory, Walter De Gruyter, 2001
- Beerends, R.J., ter Morsche, H.G., vanden Berg, J.C., van de Vrie, E.M. Fourier and Laplace Transforms, Cambridge University Press, 2003
- Bogachev, V.I. Measure Theory, Volume I, Springer, 2007
- Gamkrelidze (Ed.) Analysis I (Encyclopaedia of Mathematical Sciences, Volume 13), Springer-Vergal, 1989
- Leadbette, R., Cambanis, S., Pipiras, V. A basic course in measure and probability, Cambridge University Press, 2014
- Pao, K., Soon, F., Marsden, J.E., Tromba, A.J. Vector Calculus (Solved Problems), W.H.Freeman & Co Ltd, 1989
- Pestana, D., Rodriguez, J.M., Marcellán, F. Curso Práctico de Variable compleja y teoría de transformadas, Pearson, 2014