

UNIVERSITY OF CRAIOVA
Faculty of Mathematics and Natural Sciences
Department of mathematics
Fundamental domain : Mathematics
Specialization: Mathematics
Education form: full time
Duration of studies : 3 years
Academic year : 2013-2014

Subject : *Real Analysis*

Code: M2401

Instructor : Lect.dr. Monica Roşiu

Number of credits : 5

Year/Semester : Year II, Semester I

Number of hours/week : 2 Classes + 2 Seminar classes

Number of weeks : 14

Type discipline: Fundamental

Objectives: The course presents the fundamental principles, basic ideas and methods of the theory of measure and integral through the detailed study of specific topics with enough applications to help students to be able to specialize in this field. This course presents new knowledge necessary for other mathematical disciplines such as probability theory and functional analysis.

Content :

1. **Measures (4 courses)**
 - 1.1. Families of sets.
 - 1.2. Additive and countable additive set functions.
 - 1.3. Outer measure. Measurable sets.
 - 1.4. Regular measures.
 - 1.5. Lebesgue measure.
2. **Measurable functions (3 courses)**
 - 2.1. Measurable functions. Measurability criteria.
 - 2.2. Asymptotic convergence and convergence in measure.
3. **The integral (5 courses)**
 - 3.1. Integrable functions.
 - 3.2. Basic theorems of integral calculus.
 - 3.3. Riemann integral and Lebesgue integral.
 - 3.4. Lebesgue-Radon-Nikodym theorem.
 - 3.5. Integration on product spaces.
4. **Spaces of integrable functions (2 courses)**
 - 4.1. Normed linear spaces.
 - 4.2. L_p , $1 \leq p < \infty$, spaces.
 - 4.3. L_∞ space.
 - 4.4. Dual spaces of L_p , $1 \leq p < \infty$, spaces.

Bibliography :

1. Halmos, P., *Measure Theory* , D.Van Nostrand comp. Inc., Princeton, N.J.,1950.
2. Hewitt, E., Stromberg, K., Real and Abstract Analysis, Springer Verlag, Berlin-Heidelberg-New York, 1969.
3. Kessler, P., Roşiu, M., *Introducere în Teoria Măsurii*, Editura Universitaria Craiova, 2006.
4. Kessler, P., Roşiu, M., *Exerciţii şi probleme de Teoria Măsurii*, Editura Universitaria Craiova, 2006.

Working language : Romanian

Evaluation : Exam (partial exam)

Evaluation mode : Written examination