

UNIVERSITY OF CRAIOVA
Faculty of Mathematics and Computer Science
Department of mathematics
Fundamental domain : Exact sciences
Domain: Mathematics
Master : Applied mathematics
Form : Day classes
Duration of studies : 2 years
Approved with academic year 2009-2010

Riemannian geometry Syllabus

Course coordinator: Lect.dr. Vladimir Slesar
Code: MA221
Second Cycle: MASTER
Second Year, Semester 2, Course 28 hours, Seminar 14 hours
No. of credits: 6
Domain: Mathematics
Type: compulsory
Category: fundamental

Objectives: To generalize knowledge of differential calculus in the particular frame of differentiable Riemannian manifolds. To present the manifold with constant curvature as examples of noneuclidean geometries. To generalize notions such as integral, divergence operator, gradient operator, Laplace operator.

Necessary background: Analysis, Analytical geometry, Linear and abstract algebra

Evaluation: Colloquium (C).

Contents:

- A. Differentiable manifolds.
- B. Lie groups as examples of differentiable manifolds.
- C. Tangent vectors to a differentiable manifolds
- D. Linear connections. Curvature and torsion tensors.
- E. Riemannian manifolds. Levi-Civita connection.
- F. Canonical manifolds with constant curvature (S^n , R^n , H^n).
- G. Integrals on compact Riemannian manifolds.
- H. Canonical differential operators on Riemannian manifolds.
- I. Green formula on compact Riemannian manifolds.

Bibliography:

1. M. Craioveanu, M. Puta and Th.M. Rassias, *Introducere în Geometria Diferențială*, Edit. Mirton, Timișoara, 2004.
2. T. Sakai, *Riemannian Manifolds*, Trans. of Math. Monographs, vol 149, 1996.
3. M. do Carmo, *Riemannian Geometry*, Birkhauser Verlag, 1992.
4. W. A. Poor, *Differential Geometric Structures*, McGraw-Hill, 1981.