Study programmes: PhD – Mathematics

Course name: Differential geometry of vector bundles

Lecturers: Miroslava Antić, Mirjana Đ. Đorić, Zoran P. Rakić

Status: Optional

ECTS: 9

Attendance prerequisites: Riemannian geometry A, Riemannian geometry B

Course aims: Acquisition of general and specific knowledge in differential geometry of vector bundles. Preparing student for individual scientific work: studying of literature in this theory and gradually including student for individual research work.

Course outcome: Upon completion of the course, the student has necessary knowledge about: connectedness in vector bundles, characteristic classes of complex and real bundles, invariance theory, the Pontrjagin classes, the Gauss-Bonnet theorem for manifolds with boundary. Student is qualified to individual understanding basic examples and solving problems from this area. Also, student is qualified for individual studying of scientific papers from this area.

Course content: Connections in vector bundles. Characteristic classes of complex bundles. Characteristic classes of real bundles. Invariance theory. The Gauss-Bonnet theorem. Invariance theory and Pontrjagin classes. the Gauss-Bonnet theorem for manifolds with boundary.

Literature:

1. P. B. Gilkey, Invariance Theory, the Heat Equation, and the Atiyah-Singer Index Theorem, 1995, Second Edition, Studies in Advances Mathematics, CRC Press
2. S. Kobayashi, Differential Geometry of Complex Vector Bundles, 1987, The Mathemaical Society of Japan, Iwanami Shouten, Publishers and Princeton Univ. Press, Princeton.
3. A. Hutcher, Vector Bundles and K-Theory, 2003, free web draft
4. J. D. Moore, Lectures on Seiberg-Witten Invariants, 2001, Springer, New York etc., Second Edition, in Russian

Number of hours: 10	**Lectures: 4**	**Tutorials: -**	**Laboratory: -**	**Research: 6**

Teaching and learning methods: Lectures/ Tutorials

Assessment (maximal 100 points)

Course assignments	**points**	**Final exam**	**points**
Lectures	-	Written exam	-
Exercises / Tutorials	20	Oral exam	60
Colloquia	-	Written-oral exam	-
Essay / Project	20		