Study programme(s): Mathematics (MD)

Level: doctoral studies

Course title: Semi-Riemannian Geometry (AN-25)

Lecturer: Sanja Konjik

Status: elective

ECTS: 10

Requirements: none

Learning objectives:

Learning outcomes:

Syllabus:

- The theory of manifolds (smooth manifolds, smooth maps, tangent vectors, curves, vector fields, 1-forms, submanifolds, immersion and submersion, topology of manifolds, integral curves)
- Tensors (tensor fields, components, contractions, covariant tensors, feed, symmetric bilinear form, the scalar product)
- Semi-Riemannian manifolds (isometrics, Levi-Civita connection, parallel move, geodesics, exponential map, curvature (sectional, Ritchie, scalar), semi-Riemannian surfaces of semi-Riemannian submanifolds)
- Lorentz and Riemannian geometry

Literature:

- O'Neil, B., *Semi-Riemannian Geometry with Applications to Relativity,* Academic Press, NY, 1983
- Abraham, R., Marsden, J.E., *Foundation of Mechanics*, Benjamin/Cummings, 1978
- Boothby, W. M., *An introduction to Differentiable Manifolds and Riemannian Geometry*, revised 2nd ed., Academic Press, San Diego, 2003
- Do Carmo, M. P., *Riemannian Geometry*, Birkhäuser, Boston, 1992
- Lee, J. M., *Riemannian Manifolds, An Introduction to Curvature*, Springer-Verlag, NY, 1997

Weekly teaching load				Other: 0
Lectures: 2	Exercises	Other forms of teaching:	Student research: 6	

Teaching methodology

Lecturing theory with constant student interaction.

Grading method (maximal number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	Oral exam	50