

Special Lecture Series

(lecture period: 11.6. – 31.7.2012)



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Differential Geometry for Physicists (4st Lecture + 2st Recitations)

Lectures:	Tuesday 14:15 PHY 4.1.13
	Thursday 14:15 PHY 4.1.13
Recitations	Date/Time To be announced

The first lecture starts *Thursday 14. 6. at 14:15 in PHY 4.1.13*

Syllabus

The lectures are intended for Bachelor and Master and PhD students as well as interested junior researchers.

1 Smooth manifolds

- vector and tensor fields on manifolds
- mapping of tensors induced by mapping of manifolds
- flows and Lie derivative, isometries and Killing vectors

2 Differential forms

- exterior algebra
- differential calculus of forms, exterior derivative
- integral calculus of forms, Stokes theorem
- vector analysis in the language of forms
- Poincare lemma

3 Hamiltonian mechanics and symplectic manifolds

- Poisson and symplectic manifolds
- Hamiltonian fields and their properties
- symmetries and conserved quantities
- action integral and variational formulation

4 Field theory in the language of forms

- Maxwell equations in the language of forms
- gauge transformations
- Action integral and variation procedure

Course Text:

1. M. Fecko, *Differential Geometry and Lie Groups for Physicists*, Cambridge University, 2006. 2011, <http://sophia.dtp.fmph.uniba.sk/~fecko/book.html>
2. M. Fecko, *Differential Geometry in Physics, An Introductory Exposition for True Non Experts*, Lecture Notes, Regensburg 2007:
<http://sophia.dtp.fmph.uniba.sk/~fecko/referaty/regensburg.pdf>

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