

Syllabus

The first Meeting: March 11 (Thursday) 16:00

(presentation of the course and fixing time of lectures convenient for registered students)

1. Differentiable Manifolds. Smooth maps. Submanifolds.
2. Tangent and cotangent vectors. Differential of a map. Immersions and submersions.
3. Vector fields. Tensor fields.

----- Midterm 1 April 7

4. Differential forms.
5. Orientations.
6. Integration. Stokes' theorem.

----- Midterm 2 May 5

7. Lie bracket.
8. Flow of a vector field.
9. Lie derivative, Cartan's formula.
10. Lie algebra of a Lie group.

----- Midterm 3 June 2

11. Symplectic and contact forms.
12. Frobenius theorem.
13. Hamiltonian vector fields, Liouville theorem.
14. Almost complex structures, their integrability.
15. Optional: De Rham cohomology

----- Final (around June 28)

Reference Books

N.Hitchin (Oxford) [Hitchin-DifferentiableManifolds.pdf \(ox.ac.uk\)](#)

J.Lee (Springer)

[https://www.dropbox.com/s/d19bnxlzhmak94t/%5BJohn M. Lee%5D Introduction to Smooth Manifolds %28Gr%28BookFi%29.pdf?dl=0](https://www.dropbox.com/s/d19bnxlzhmak94t/%5BJohn%20M.%20Lee%5D%20Introduction%20to%20Smooth%20Manifolds%28Gr%28BookFi%29.pdf?dl=0)

F.Warner (Springer) <https://www.dropbox.com/s/4qv9jxncikek625/10.1007-978-1-4757-1799-0.pdf?dl=0>

A.Kosinski (Rutgers) Differential Manifolds (ed.ac.uk)

H.Schlichtkrull (Copenhagen) [manusgeom2.pdf \(ku.dk\)](#)

Reyer Sjamaar (Cornell) [6520notes.pdf \(cornell.edu\)](#)

M.Lubke [Introtomanifolds\(2\).pdf \(leidenuniv.nl\)](#)

W.Boothby (Columbia) [An Introduction to Differentiable Manifolds and Riemannian Geometry \(Pure and applied mathematics, a series of monographs and textbooks\) \(iut.ac.ir\)](#)

T.Voronov (Manchester) [1-manifolds.pdf \(manchester.ac.uk\)](#)

Grading:

There will be 3 Midterm exams and a Final. Midterm exams consist of Quiz-type question in Odtuclass (about 30 min time limit) and an Essay-type questions to be uploaded within one day.

An Oral Final Exam is planned if the rules of online education will not be changed.

By request, only one Makeup exam is possible. In case of coincidence of exam time with another exam, you should inform me in advance.