课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	**课程名称 Course Title**	微分几何初步 Introduction to differential geometry
2.	**授课院系 Originating Department**	物理系 Department of Physics
3.	**课程编号 Course Code**	PHYS007
4.	**课程学分 Credit Value**	1
5.	**课程类别 Course Type**	专业选修课 Major Elective Courses
6.	**授课学期 Semester**	夏季 Summer
7.	**授课语言 Teaching Language**	英语 English
8.	**授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation& Contact （For team teaching, please list all instructors）**	万义顿、复旦大学物理系、ydwan@fudan.edu.cn
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	待公布 To be announced
10.	**选课人数限额(可不填) Maximum Enrolment （Optional）**	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other（Please specify）	总学时 Total
学时数 Credit Hours	16				16

12.	先修课程、其它学习要求 **Pre-requisites or Other Academic Requirements**	高等数学（下）Calculus II A（MA102B）， 线性代数 A Linear Algebra A (MA107A)， 电动力学 II Electrodynamics II（PHY208）
13.	后续课程、其它学习规划 **Courses for which this course is a pre-requisite**	无 N/A
14.	其它要求修读本课程的学系 **Cross-listing Dept.**	无 N/A

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

微分几何与拓扑是现代理论物理的基础，在广义相对论、场论，以及凝聚态物理等领域应用广泛。而爱因斯坦引力理论更是可以等价位黎曼微分几何。本课程着重介绍微分几何的各种基本概念，有时间的话还会涉及相关应用，旨在为将来深入学习和运用微分几何打下基础。

Geometry and Topology are foundations of modern theoretical physics. They have broad applications in General Relativity, Field Theory, and Condensed Matter Physics. In particular, Einstein Gravity is essentially Riemann Geometry. This course will introduce various basic concepts of Differential Geometry and touch upon relevant applications, building the foundations for deeper studies of the subject.

16. **预达学习成果 Learning Outcomes**

学生能够基本掌握课程教授的内容。

The students will be able to grasp the content of the lectures.

17. **课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）**
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Lecture 1： Formal introduction to maps, vector spaces, topological spaces, etc. （ 2 hours）

Lecture 2： Homotopy （ 2 hours）

Lecture 3： Homology（ 2 hours）

Lecture 4: Manifolds: basics (2 hours)

Lecture 5: Differential forms and de Rham cohomology（2 hours）

Lecture 6：Manifolds: Lie groups and Lie algebras （2 hours）

Lecture 7：Fiber bundles: basics （2 hours）

Lecture 8: Connections on fiber bundles (2 hours)

18. **教材及其它参考资料 Textbook and Supplementary Readings**

1.	Mikio Nakahara	Geometry, Topology, and Physics, 2nd edition	CRC Press	2003
2.	Theodore Frendel	The geometry of physics: an introduction, 3rd edition	Cambridge	University Press 2011
3.	John Baez	Gauge fields, knots, and gravity	World Scientific	1994
4.	梁灿斌、周彬	微分几何入门与广义相对论第二版上册	University Of Chicago Press	1984
5.	Chris J. Isham	Modern Differential Geometry for physicists	World Scientific	1999

课程评估 ASSESSMENT

19.

评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz		100%		
课程项目 Projects				
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation				
其它（可根据需要改写以上评估方式） Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

☑ A. 十三级等级制 Letter Grading
☐ B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

物理系教学指导委员会
Education Instruction Committee of Physics department