# 课程大纲
## COURSE SYLLABUS

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| **1.** | 课程代码/名称<br>**Course Code/Title** | **MAT8024 微分流形  Differentiable manifolds** |
| **2.** | 课程性质<br>**Compulsory/Elective** | **Compulsory** |
| **3.** | 课程学分/学时<br>**Course Credit/Hours** | 3/48 |
| **4.** | 授课语言<br>**Teaching Language** | English |
| **5.** | 授课教师<br>**Instructor(s)** | Stavros Garoufalidis |
| **6.** | 是否面向本科生开放<br>**Open to undergraduates or not** | Yes |
| **7.** | 先修要求<br>**Pre-requisites** | （如面向本科生开放，请注明区分内容。If the course is open to undergraduates, please indicate the difference.）<br>**Some knowledge of basic topology**<br>MA323 拓扑学 |

**8.** 教学目标
**Course Objectives**

（如面向本科生开放， 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

This is a first graduate course on smooth manifolds, introducing various aspects of their topology, geometry, and analysis. We will start at the beginning with the definition of a smooth manifold, look at some examples, and then explore the basic associated objects, including submanifolds, tangent vectors, bundles, and derivatives. We will apply the inverse function theorem to geometric issues like transversality, and then look at vector fields, associated flows, and the Lie derivative. Differential forms on manifolds will also be a focus, including how to differentiate and integrate them. Time permitting, we might look at the very basics of Lie groups, foliations (the Frobenius theorem), Morse theory, or de Rham cohomology. In addition to treating the foundations of the subject carefully, this course aims to emphasize examples and geometric intuition throughout.

**9.** 教学方法
**Teaching Methods**

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Guides and facilitates student learning and overall understanding of the material. Student learning is measured through formal and informal forms of assessment, including group projects, student portfolios, and classroom participation. Teaching methods may include classroom participation, demonstration, rote memorization, memorization, or a combination of these.

**10.** 教学内容
**Course Contents**
（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

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| **Section 1** | smooth manifolds |
| **Section 2** | Smooth maps |
| **Section 3** | Tangent Vectors |
| **Section 4** | Submersions, Immersions, and Embeddings |

| Section 5 | Submanifolds |
|-----------|--------------|
| Section 6 | Sard's Theorem |
| Section 7 | Lie Groups |
| Section 8 | Vector Fields |
| Section 9 | Intergral Curves and Flows |
| Section 10 | Vector Bundles |
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| 11. | 课程考核<br>**Course Assessment** |
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（①考核形式 Form of examination；②.分数构成 grading policy；③如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）
Weekly homework assignments: (30%)
Midterm Exam: (30%)
Final Exam: (40%)

| 12. | 教材及其它参考资料<br>**Textbook and Supplementary Readings** |
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Lee, John M. Introduction to smooth manifolds. Second edition.
  Graduate Texts in Mathematics, 218. Springer, New York, 2013. xvi+708 pp.