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<tr><td colspan="3" align="center"># 课程大纲<br>COURSE SYLLABUS</td></tr>
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| **1.** | 课程代码/名称<br>**Course Code/Title** | MAT7093 随机分析  Stochastic Analysis |
| **2.** | 课程性质<br>**Compulsory/Elective** | 选修 Elective |
| **3.** | 课程学分/学时<br>**Course Credit/Hours** | 3/48 |
| **4.** | 授课语言<br>**Teaching Language** | 中英双语<br><br>Chinese-English bilingual |
| **5.** | 授课教师<br>**Instructor(s)** | 孙景瑞，助理教授<br><br>Jingrui Sun, Assistant Professor |
| **6.** | 是否面向本科生开放<br>**Open to undergraduates or not** | 是<br>Yes |
| **7.** | 先修要求<br>**Pre-requisites** | MA212 概率论与数理统计（或 MA215 概率论），MA208 应用随机过程，MA201a 或 MA201b 常微分方程，MA411 测度论与积分，MA302 泛函分析<br><br>Probability Theory, Applied Stochastic Processes, Ordinary Differential Equation, Measure Theory and Integration, Functional Analysis. |
| **8.** | 教学目标<br>**Course Objectives** | |
| | 　　在概率论和随机过程论基础上，掌握随机分析的基础理论与方法，为进一步研究随机控制、金融数学、金融工程等学科提供必要的随机分析基础。<br><br>The main objectives of this course are, based on the preliminary knowledge of Probability Theory and Stochastic Processes, to master the basic theory and methods in stochastic analysis and to provide necessary foundations and background in further learning on stochastic control, financial mathematics and financial engineering. | |
| **9.** | 教学方法<br>**Teaching Methods** | |
| | PPT 结合板书授课。<br><br>Teach with PPT and blackboards. | |
| **10.** | 教学内容<br>**Course Contents**<br>（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.） | |
| | **Section 1 (10 hours)** | 鞅与布朗运动：停时；连续时间鞅；Doob-Meyer 分解定理；连续平方可积鞅；布朗运动。<br><br>**Martingales and Brownian Motion**：Stopping Times; Continuous Time Martingales; The Doob-Meyer Decomposition; Continuous, Square- |

| | | Integrable Martingales; Brownian Motion. |
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| | **Section 2 (16 hours)** | **伊藤积分**：伊藤积分的构造；变量替换公式；鞅表示定理； Girsanov 定理。<br><br>**Ito Integrals:** Construction of the Stochastic Integral; The Change-of-Variable Formula; Representations of Continuous Martingales in Terms of Brownian Motion; The Girsanov Theorem. |
| | **Section 3 (14 hours)** | **随机微分方程**：强解；弱解；强解的存在唯一性；线性方程；Feynman-Kac 公式。<br><br>**Stochastic Differential Equations:** Strong Solutions; Weak Solutions; Existence and Uniqueness of Strong Solutions; Linear Equations; Feynman-Kac Formula. |
| | **Section 4 (8 hours)** | **倒向随机微分方程**：适应解的定义；适应解的存在唯一性；线性方程。<br><br>**Backward Stochastic Differential Equations:** Definition of an Adapted Solution; Existence and Uniqueness of Adapted Solutions; Linear Equations. |
| **11.** | 课程考核<br>**Course Assessment** | |

10%考勤 + 30%期中测试 + 60%期末测试

10% Attendance + 30% midterm exam + 60% final exam

| **12.** | 教材及其它参考资料<br>**Textbook and Supplementary Readings** |
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1.  I. Karatzas and S.E. Shreve. Brownian Motion and Stochastic Calculus, 2nd ed., Springer-Verlag, New York, 1998.

2.  J. Yong and X. Y. Zhou. Stochastic Controls: Hamiltonian Systems and HJB Equations, Springer-Verlag, New York, 1999.

3.  D. Revuz and M. Yor. Continuous Martingales and Brownian Motion, 3rd ed., Springer-Verlag, New York, 1999.

4.  N. Ikeda and S. Watanabe. Stochastic Differential Equations and Diffusion Processes, North-Holland Publishing Company, New York, 1981.