南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

南方科技大学课程简介

SUSTech Course Catelogue

目录

生物系

BIO331. 蛋白质结构与功能（3）

理论课 2 学分，实验课 1 学分，4 学时/每周。先修课程：生物化学 I（BIO201）。本课程主要介绍蛋白质结构与功能之间关系，帮助学生在前期课程的基础上进一步了解蛋白质如何行使其功能。同时，本课程也强调结构与功能研究的实验基础和技能。教学内容：“从序列到结构”、“从结构到功能”、“蛋白质功能的控制”以及“实例研究”。

BIO331. Protein Structure and Function (3)

Lecture – 2 credits, experiment – 1credit, 4 hours per week. Pre-requesites：BIO201. Introduction to the basic principles governing protein structure-function relationship and the common techniques used in structural studies, effectively combining theory learning and experiment. The teaching contents includes “From sequence to structure”, “From structure to function”, “Control of protein function” as well as “Case studies”.

BIO311. 动物生理学 （3）

理论课， 3 学分， 3 学时/每周。先修课程：普通生物学（BIO102），生物化学（BIO201，BIO202）。本课程是生命科学的核心， 为一门研究动物机体基本生命活动及其规律的学科，是医学，动物医学、生物学、生物技术、生物医学工程等专业基础课。通过本课程的学习，使学生掌握动物在适应环境变化的过程中所发生的行为、各器官系统、细胞及其组成物质分子在内的活动变化与机制的基本规律和基本理论；通过学习本课程，了解《动物生理学》的理论在动物医学、动物生产、动物资源保护与利用等实践活动中的作用；了解《动物生理学》和其它相关学科间的相互关系及该学科发展的前沿热点问题，为后续课程的学习和今后从事动物生理学及其相关学科的研究、发展打下宽厚的理论基础。

BIO311. Animal Physiology （3）

Lecture. 3 credits, 3 hours per week. Pre-requisites: General Biology （（BIO102），Biochemistry （BIO201，BIO202）. This course examines the fundamental mechanisms of basic

life activities and the law of animal body. It is a compulsory course for students studying Medicine, Veterinary Medicine, Biology, Biotechnology, and Bioengineering. Through the study of animal physiology, students master the basic theories and mechanisms of animal physiological changes in the process of adapting to the environment.

BIO323 高级细胞生物学（2）.

理论课，2 学分。先修课程：细胞生物学。本课程注重细胞生物学与病理学的结合。我们选择目前分子细胞生物学的前沿领域讲授细胞失调如何引起疾病的发生。
涵盖的领域包括细菌及病毒病理和细胞免疫应答；发育过程中的信号调控及在癌症中的失调；细胞自噬；细胞迁移和癌症转移；DNA 损伤修复；基因的转录后调控及蛋白质泛素化；细胞重编程和多功能干细胞等。 学生需要参与小组讨论并做一篇文献报告，学期末学生设计一个科研墙报，讲诉如何设计针对特殊疾病的药物靶点。

BIO323 Advanced Cell Biology (2)

Lecture，2 credits. Prerequisite: Cell Biology. This course focuses on cell biology in pathology. We choose topics that are currently in the frontiers in cell biology and their deregulation is linked to human diseases. The topics include bacterial and virus pathogenesis, immune response； cellular signaling during development as well as its dysregulation in cancer； autophagy；cell migration and cancer metastasis； Post-transcriptional gene regulation; DNA damage repair; cell programming and pluripotent stem cells. Students are required to participate in group discussion and should give one research article presentation based on his interest. Student is also required to prepare a scientific poster at the end of this course. The poster will summarize his strategy of identification and evaluation of a drug target to treat a disease of interest.

BIO319. 干细胞与再生生物学（2）

理论课，2 学分，2 学时/每周。先修课程：模式生物和发育生物学（BIO305）. 内容简介：介绍组织器官损伤后再生的过程，通过比较不同器官，不同物种再生能力的差别，引导学生分析归纳出再生的基本特征。围绕需要再生医学手段治疗的重大疾病，包括：心血管疾病、自身免疫性疾病、糖尿病、阿尔兹海默病、帕金森病等展开教学，主要讲授基于干细胞和发育路径的研究思路和成果，并介绍组织工程，器官移植等领域的最新进展。

BIO319 Stem Cell and Regenerative Biology（2）.

Lecture，2 credits, 2 hours per week. In this course, we will explore basic mechanisms of how cells differentiate into specific tissues in response to a variety of biologic signalling molecules. We will discuss the use of such factors for in vitro tissue production. For example, bone morphogenetic proteins can be used in vitro to drive the differentiation of adult stem cells towards bone and heart. We will also study the cellular mechanisms involved in the cloning of animals and how Scottish researchers produced the sheep Dolly using the nucleus of a mammary gland cell from an adult sheep. We will read papers describing organ production, such as the in vitro formation of beating heart cells. We will discuss how studies of the developmental, cellular and molecular biology of regeneration have led to the discovery of new drugs.

BIO102 普通生物学（4）

课堂授课，2 学分，2 学时/每周。62 学时；口头报告及讨论， 8 学时；先修课：无。介绍分子细胞生物学、遗传学、进化、生态学、动物生理学、植物生理学，以及生命科学前沿进展。

BIO102 General Biology. (4)

Lecture, 4 credits, 4 hours per week. 62 hours; Presentation & discussion, 8 hours; Enforced

requisites: none. Introduction to molecular and cellular biology, genetics, evolution, ecology, animal physiology and plant physiology, and the latest biological discoveries. Dr. Deng Y.

BIO401, 基因工程学 （2）

理论课，2 学分，2 学时/每周。先修课程：生物化学 I & II (BIO201, BIO202)，微生物学（BIO203）,细胞生物学（BIO206）,遗传学（BIO301）。本课程为本科生介绍在分子水平对遗传物质进行操作，实现改造和利用生命体系为研究和生产服务的理论和技术。

BIO401, Genetic Engineering (2)

Lecture，2 credits, 2 hours per week. Pre-requesites：BIO201, BIO202, BIO203, BIO206 and BIO301. This course starts from the introduction of basic concepts in genetic engineering, then the technologies frequently used in the laboratories to manipulate genetic materials. It then introduces the real cases of modifying and using living systems in research, agriculture and industry. Finally the impact of genetic engineering on human beings' wellbeing will be discussed.

BI309 计算生物学 (3(1))

讲座 36 学时，实验 36 学时。计算生物学是一门强调实践能力的课程，尤其是在计算分子生物学领域。这门课适合于分子生物学和计算机科学的学生，并且对理解基因组，序列和蛋白质结构的分析有兴趣的人。多种计算分析方法将会包含。每一个计算工具将会布置实践作业，并且所有的作业和实验都将在大型计算机服务器上完成。前修课程包括基础的分子生物学课程，或者获得任课教师的许可。

BI309 Computational biology (3(1))

Lecture 36 hours, lab 36 hours. Computational Biology is a practical, hands-on approach to the field of computational molecular biology. The course is recommended for both molecular biologists and

computer scientists desiring to understand the major issues concerning analysis of genomes, sequences and structures. Various existing methods will be critically described and the strengths and limitations of each will be discussed. There will be practical assignments utilizing the tools described. All homework and coursework will be submitted electronically. Prerequisites include an introductory molecular biology course or permission of the instructor.

BIO405. 免疫学（3）.

理论课，3 学分，3 学时/每周。先修课程：生物化学 I & II (BIO201, BIO202)，微生物学（BIO203）,细胞生物学（BIO206）,遗传学（BIO301）。本课程介绍基本的免疫学概念，免疫反应过程，免疫失调和相关疾病的发生机理，以及免疫学领域的重大问题。

BIO405. Immunology (3)

Lecture，3 credits, 3 hours per week. Pre-requesites：BIO201, BIO202, BIO203, BIO206 and BIO301. This course starts from introduction of basic immunological concepts, and then the detailed processes of immune response and the mis-regulation of this response. It then introduces the immune related diseases and some significant questions in the immunology research field will be discussed.

BIO306 生物信息学 （4（2））

讲座 40 学时，实验 60 学时。本课程的学习目标位理解高通量测序相关的基本原理和计算方法。包括基本的生物学应用，数据处理基础，统计和信息学理论在数据分析中的应用。不同方法的优势和局限，以及对结果的生物学解读。

BIO306，Bioinformatics4（4（2））

Lecture 40 hours, lab 60hours.Understanding the basic principles of next generation sequencing technology. This includes basic biological applications, basics in data processing, statistical and informatics theories in data analysis, advantages, limitations, and assumptions of different methodologies, and biological interpretation of the results.

BIO305. 模式生物和发育生物学（3）

理论课，3 学分，3 学时/每周。先修课程：普通生物学(BIO102)。介绍小鼠，鸡，斑马鱼，果蝇，线虫，和海胆等模式生物的生物学特性及用它们获得的代表性研究成果。讲授个体的发育过程，包括：精子和卵子的发生，受精，胚胎发育，个体生长，衰老，和再生，讲授发育过程受调控的分子机理。在进化的背景下，探讨发育的规律。

BIO305. Model organisms and developmental biology（3）

Lecture，3 credits, 3 hours per week. Pre-requisites: BIO102. Introduce the biological characteristics of model organisms, including mouse, chick, zebrafish, Drosophila, C.elegans, and Sea urchin, and great achievements obtained with these animal models. Teach the development process: generation of sperm and egg, fertilization, embryogenesis, growth, aging, and regeneration, and the mechanisms of regulation on molecular level. Discuss the rules of development under the evolutionary background."

BIO211. 合成生物学导论与实验基础. (2)

授课 6 hours，讲座和学生报告 30 小时，集体讨论 30 小时，实验课 28 小时. 预修要求: BIO102. 介绍合成生物学的基本概念和经典案例，以及将来合成生物学的发展方向;国际遗

传工程机器设计大赛(iGEM)；合成生物学基本实验技能的培训；批判性讨论以往的优秀 iGEM 项目；批判性学习关于大肠杆菌和酵母的经典合成生物学文献；批判性学习最新的哺乳动物细胞及多细胞生物的合成生物学文献及其技术手段；进行 iGEM 项目设立和科学假设的头脑风暴. 本课程是选修课，由于空间有限，将根据学习动力和参与的积极性对选课同学进行遴选。最低成绩要求是 GPA3.0. 最终打分是优秀和通过，不通过不打分。课程负责人生物系黄巍教授。

BIO211. Basic Synthetic Biology and Laboratory. (2)

Lecture 6 hours, seminar and student presentations 30 hours, Group discussion 30 hours, laboratory 28 hours. Prerequisites: BIO102. Introduction basic concepts and class examples of synthetic biology, and the potential area of future development in synthetic biology; international genetic engineered machine (iGEM) competition; basic laboratory training in synthetic biology; critical discussions of previous iGEM projects; critical studying classic synthetic biology papers in E coli and yeast; critical study of the most recent synthetic biology and related technologies in mammalian cells and multicellular organisms; braining storming and developing work projects and specific hypotheses for iGEM competition. The course is elective. Due to the limited space, the students elected the courses will be screened for motivation and participation. Minimum GPA of 3.0 is required. Letter grading. Organizer: Prof. Wei Huang

BI0304. 系统生物学. (3)

授课 36 小时，学生讲座和讨论 18 小时. 预修要求: GE103, BIO102, BIO201, and BIO206 (or MA202). 课程内容包括：平衡结合，米氏动力学与协同性；网络图案、多稳态、开关和振动器；网络性能和化学趋向性；基因调控和信号转导网络的解析和分析；空间上细胞间相互作用和生物图式形成；细胞生长于分化，噪声和鲁棒性. 本课程同时将介绍稳定性分析、数据分析与处理、数学模拟及其在系统生物学中的应用. 学生将组成多学科小组，通过合作做经典系统生物学文献的讲座和讨论家庭作业。同时他们将做一个小的系统生物学科研项目，其中将运用数据分析、图像处理及数学建模对一个特点的科学问题进行研讨. 最后分数由家庭作业、学生讲座和讨论的参与、在研究项目的表现及期末的文献综述进行综合评分.

授课老师生物系黄巍教授。

BI0304. Systems Biology. (3)

Lecture 36 hours, Student presentations & discussions 18 hours. Prerequisites: GE103, BIO102, BIO201, and BIO206 (or MA202). Introduction to equilibrium binding, michaelis-menten kinetics, and copperativity; network motifs, multistability, switch and oscillator; network performance and chemotaxis; derivation and analysis of large gene regulatory and signal transduction networks; spatial cell-cell interaction and pattern formation; cell growth and differentiation, noise and robustness. Also introduce basic stability analysis, data analysis, mathematic simulations and their applications in systems biology. Students will form interdisciplinary teams to present classic systems biology papers, discuss home works, and conduct small research projects with data analysis, image processing and mathematic modeling. Grading is consisted of home works, contribution to student presentation, involvements in discussion, research projects, and final literature review paper. Instructor Prof. Wei Huang

BIO302. 现代生物技术. (3（1）)

授课 18小时, 学生讲座和讨论18 小时, 实验课36 小时. 预修要求: BIO104, BIO201, BIO204, BIO206, and BIO301. 介绍最先进的多学科研究方法及其设计解决的重大生物问题, 包括全新的方法和经典方法的全新演化, 具体包括pulse-chase, lineage tracing, 超分辨显微镜和其它在细胞和发育生物学中起到重大作用的显微技术, 光遗传学, 生物力学, 蛋白组学, 基于定向进化和全新设计的蛋白质工程.
实验课部分包括学生根据指定的一项现代生物技术设计并完成一个小的科研课题.
最终分数取决于对学生讲座和讨论的贡献、实验课表现、半期小论文和期末研究计划书及其口头答辩的综合评分.
这个多学科教学团队来自生物系、生物医学工程系及化学系的教授，负责人是生物系的黄巍教授.

BIO302. Modern Biotechnology. (3（1）)

Lecture 18 hours, student presentations & discussions 18 hours, laboratory 36 hours. Prerequisites: BIO104, BIO201, BIO204, BIO206, and BIO301. Introduction diverse and most advanced methodologies and the biological questions they help answered, including brand new biotechnologies and rebirth of classic ones, including pulse-chase, lineage tracing, super resolution microscopy and other microscopies in cell biology and development, optogenetics, mechanobiology, proteomics, and protein engineering by directed-evolution and de novo design. Laboratory is consistent of student designed small project utilizing an assign modern biotechnology. Grading is consisted of contribution to student presentation and discussion, laboratory performance, mid-term assay and final research proposal and its oral defense. The interdisciplinary teaching team, organized by Prof. Wei Huang, consisted of faculty from departments of biology, biomedical engineering, and chemistry.

BIO310. 神经生物学（3）

理论课，3 学分，3 学时/每周。主要为课堂讲授，另外还包括文献阅读、讲解和讨论。先修课程：BIO102, BIO201, BIO202, BIO206, BIO305。本课程主要内容包括神经系统的结构和组织；神经系统的发育和疾病；神经信号传递；感觉和运动系统；行为和认知神经科学；神经科学文献阅读、讲解和讨论。

BIO310. Neurobiology (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: courses BIO102, BIO201, BIO202, BIO206, BIO305. This course mainly includes structure and organization of nervous system; nervous system development and diseases; neural signaling; sensory and motor systems; behavioral and cognitive neuroscience; neuroscience journal club.

BIO411 生物动力系统模拟（3）

理论课，3 学分，3 学时/每周。先修课程：普通生物学、细胞生物学、生物化学 I、高等数学、线性代数（BIO102、BIO206、BIO201、GE101、GE102、GE103b ）。本课程从现代生物定量化及整体性出发，对基因调控、蛋白分子及相互作用、生理及代谢系统的动力学进行建模与仿真，以加深学生对生命现象复杂性的认识。

BIO411 Dynamical Systems Simulation in Biology（3）

Lecture，3 credits, 3 hours per week. Pre-requesites：General Biology, Cell Biology, Biochemistry I, Advanced Mathematics, Linear Algebr（BIO102、BIO206、BIO201、GE101、GE102、GE103b ）a. Starting from quantification of modern biology, as well as the holistic view of modern biology, this course offers the methods to model and simulate gene regulation networks, protein dynamics and interaction networks, physiological and metabolic systems dynamics. It aims at deepen the students' impression on biocomplexity.

BIO202. 生物化学 II (新陈代谢) (3)

理论课，3 学分，3 学时/每周。先修课程：BIO102、细胞生物、BIO201。本课程以新陈代谢作为重点，讲述生化反应的逻辑；糖代谢；柠檬酸循环；电子运输及氧化磷酸化；光合作用；脂肪代谢；细胞内的能量代谢协调；以及与之相关的信号传导机制等。

BIO202. Biochemistry II (metabolism) (3)

Lecture，3credits, 3 hours per week. Pre-requesites：General Biology, Biochemistry I. The course focuses on metabolism, introduces chemical logic of metabolism; glucose metabolism; citric acid cycle; electron transportation and oxidative phosphorylation; photosynthesis; lipid metabolism; interorgan and intracellular coordination of energy metabolism in vertebrates; and related

mechanisms of signal transduction.

BIO308. 生物科学前沿讲座与文献综述（2）

系列讲座课，2 学分，2 学时/每周。先修课程：无。本课程由生物系老师通过系列讲座介绍当前生物科学领域的研究前沿、所应用的尖端研究方法以及发展动态，结合学生口头报告和讨论有助于促使学生快速掌握相关内容。

BIO308. Frontier in Life Sciences Seminar and Journal Club (2)

Seminars，2 credits, 2 hours per week. Pre-requisites：None. This course introduces various forefront research areas in life sciences and cutting edge technologies used via seminar series given by our faculty members. In combination with a student-run journal club, the course will help students get familiar with forefront research areas in life sciences.

BIO330. 生物大分子晶体学原理与方法（2）.

理论课 1 学分，实验课 1 学分，3 学时/每周。先修课程：生物大分子结构与功能（BIO331）。本课程主要介绍生物大分子晶体学的基本原理和实验方法。教学内容：生物大分子结晶的过程、晶体衍射数据的收集与处理、生物大分子结构的解析与分析。理论与实验教学紧密结合，穿插进行。

BIO330. Biomolecular Crystallography (2)

Lecture – 1 credits, experiment – 1credit, 3 hours per week. Pre-requesites：BIO331. Introduction to the basic principle and methods in biomolecular crystallography, including biomolecule

crystallization, diffraction data collection and process, as well as biomolecular structure determination and analysis. The teaching emphasizes the combination of theory and experiment.

BIO307 模式生物与发育生物学实验（1）

授课方式：实验讲授，7 小时；实验操作，25 小时。先修课程：BIO305 和 BIO104。模式生物与发育生物学实验意在通过对模式动物的观察研究学习胚胎发育的原理。课程集中学习了早期胚胎发育、化学致畸、原位杂交、侧线毛细胞再生、微血管造影、体外受精及显微注射等发育生物学实验。通过本课程的学习，学生将熟悉常见的模式生物，如：斑马鱼、非洲爪蟾和果蝇，熟悉发育生物学实验相关的技术，包括：胚胎培养、原位杂交、体外受精及显微注射。

BIO307. Introduction to Model Organisms and Developmental Biology Laboratory (1).

Lecture, seven hours; experiment, twenty-five hours. Enforced requisites: courses BIO104 and BIO305. Model organisms and developmental biology laboratory aims to learn the principles of development through experiments with the model organisms. Experiments include early embryonic development, forebrain development with a small molecule GSK3 inhibitor BIO, in situ hybridization, regeneration of lateral line hair cell, microangiography with zebrafish embryos, in vitro fertilization and microinjection with Xenopus embryo and stain of zebrafish neutrophil. After completing this course, students will get familiar with most used animal model, such as zebrafish, Xenopus and Drosophila, learn the classical techniques of developmental biology, such as embryonic culture, ISH, in vitro fertilization and microinjection.

BIO201 生物化学 I(生物大分子）（3)

理论课，3 学分，3 学时/每周。本课程的目标是为生物学各专业的学生传授生物化学的基本知识和实验方法。讲授内容包括生物化学中各个反应的基本原理及各种生物大分子的结构与功能之间的关系等。通过课程的学习，让学生能够理解并掌握生物化学的研究对象、研究方法和研究思路，并最终学会应用这些知识和技巧来解决生物学中的研究问题。

BIO201. BiochemistryI(macro-biomolecules) (3)

Lecture, 3 credits, 3 hours per week. This course will teach the basic knowledge and techniques of biochemistry, including the basic principal governing the biochemical reactions and the structures of biomolecules and their relationship with functions. With this course, the students are able to understand the biochemical structures, methods, and theories, and also able to apply the biochemical knowledge and skills to solve problems in biological research.

BIO206. 细胞生物学(4)

理论课，4 学分，4 学时/每周。细胞生物学主要面向生物系本科生介绍细胞生物学的基本原理。它是生物化学，遗传学和分子生物学在细胞水平的整合。主要内容包括：1. 了解生物大分子的基本结构及功能，在细胞内的活动。2. 掌握细胞器的结构及功能。3. 掌握细胞如何维持自己的有序生命活动，这包括物质运输，细胞通讯，细胞周期，细胞生长和细胞凋亡。4. 了解细胞骨架的结构功能。5. 学习细胞与细胞，细胞与基质之间的连接，掌握细胞如何整合成组织。

BIO206. Cell Biology. (4)

Lecture，4 credits, 4 hours per week. Cell Biology introduces principles of Cell Biology to undergraduate students. It is the integration of biochemistry, genetics and molecular biology on the level of cell. The aim is to: 1. Understand the basic structure, function, activities of biomolecules. 2. Learn cellular organelles, their structure and functions. 3. Learn the basic concepts on how cells

maintain order through biomolecule transport, cell communication, cell cycle, cell growth and apoptosis. 5. Learn the structure and function for cytoskeleton, understand how cells integrate into tissues.

BIO205.微生物学实验课。（2）

实验课，2 学分，4 学时/每周。先修课程：普通生物学（BIO102），普通生物学实验（BIO104）和微生物学（BIO203）。本课程介绍微生物学基本实验技术，包括：微生物的染色及形态观察；微生物的生长和抑制；分离环境中的微生物；掌握微生物常用鉴定方法；真核微生物和食品制作；噬菌体的效价测定；利用 ELISA 技术检测血清中的抗体。

BIO205. Microbiology Laboratory (2)

Laboratory, 2 credits, 4 hours per week. Pre-requisites: course BIO102, BIO104, and BIO203. This course teaches Basic Microbiology Laboratory and Culture Techniques, includes Techniques for Isolation and Maintenance of Pure Culture; Isolating and purifying Microbes from Environment; Bacterial Morphology and Staining; Techniques for Identifying Bacterial Species; Bacteria Growth and Control; Eukaryotic Microbes and Food Production; Viruses; Immunoassay.

BIO203. 微生物学 （3）

理论课，3 学分，3 学时/每周。通过对本课程的学习，使学生能够了解和掌握如下几个方面：对微生物的历史与现状有初步了解；了解微生物的基本结构和特性；了解微生物的生长和代谢途径；了解微生物的分子生物学和遗传学特性；了解微生物与生态环境和人类的关系。

BIO203. Microbiology (3)

Lecture，3 credits, 3 hours per week. This course aims to introduce the history and development of Microbiology, the fundamentals of identification, structure, physiology, and genetics of

microorganisms. The contents of this course will also help students to understand importance of microorganisms in human health, food industry, the environment, and in biotechnology.

BIO313-15 动物生理学实验（2）

实验课，2 学分，4 学时/周（包括实验讲授，10 小时；课堂讨论：4 小时；实验操作，42 小时）。先修课程：BIO311 和 BIO104。动物生理学实验应用离体和在体实验方法，验证动物机体的生理功能。课程内容包括动物实验的基本技术方法、神经-肌肉标本的制备及生物电现象的观察、蛙心的期前收缩与代偿间歇，血液凝固的影响因素、血型鉴定、离体小肠平滑肌的生理特性，影响尿生成的因素、小鼠脑立体定位技术等实验。通过本课程的学习，学生将熟悉动物生理学实验相关的技术，包括：动物的抓取、灌胃、皮下注射、腹腔注射、静脉注射、肌肉注射、麻醉、气管插管、动脉插管、静脉插管、膀胱插管和动物处死。本实验的学习将提高学生的动手能力、分析解决问题的能力及团队合作能力。

BIO313-15. Introduction to Animal Physiology Laboratory (2)

Laboratory, 2 credits, 4 hours per week (including lecture, 10 hours; discussion 4 hours; experiment, 42 hours). Pre-requisites: BIO104 and BIO311. Animal physiology laboratory conducts in vitro and in vivo experiments to examine the physiological function of animals. Experiments include basic techniques of animal experiment, nerve-muscle activity, extra systole and compensatory pause, influences on blood coagulation, blood type test, smooth muscle motility, regulation of urine formation, mouse stereotaxic surgery, etc. After completing this course, students will get familiar with animal physiology techniques, such as handling and restraint, intragastric administration, subcutaneous injection, intraperitoneal infection, intravenous injection, intramuscular injection, anesthesia, trachea intubation, artery intubation, vein intubation, bladder intubation and execution of animals. This laboratory will improve the ability of manipulation, analysis, solving problem and team work.

BIO327. 分子细胞生学综合实验（1）

实验课，1 学分，4 学时/周（包括实验讲授，6 小时；实验操作，22 小时）或安排在小学期集中授课。先修课程：BIO102，BIO201，BIO203，BIO206，BIO208，BIO204。本课程面向对细胞生物学有浓厚兴趣及将要从事细胞生物学相关研究的同学开设，是一门进阶实验课。着重学习细胞生物学相关前沿技术，如流式细胞术，原代细胞培养等。并在此基础上，开设一定学时的开放性实验，锻炼学生实验设计、材料准备等多方面能力，全面提高学生的科研思维。

BIO327. Molecular Cell Biology Laboratory （1）

Laboratory, 1 credit, 4 hours per week (including lecture, 6 hours; experiment, 22 hours) or take intensive classes in summer. Pre-requisites: course BIO102, BIO201, BIO203, BIO206, BIO208 and BIO204. This lab is an advance course, faces to students which have keen interest in cell biology. Some techniques commonly used in research will be taught in this class, such as cytometry, primary cell culture, et al. Some open course will be included in this class, the students need to design the experiment, preparation, and analysis the results, to improve scientific thinking.

BIO222, 生物化学与分子生物学实验（2）.

实验课，2 学分，4 学时/周（包括实验讲授，12 小时；实验操作，44 小时）。先修课程：BIO102，BIO201，BIO203，BIO202。生物化学实验以核酸、蛋白质、糖类等生物化学分子为研究对象，通过对它们的结构、特性和功能的了解解读生命现象。课程内容分为五个模块：生化实验基本技能、核酸模块、蛋白模块，酶动力学模块，碳水化合物模块；内容涉及蛋白质、酶、糖类、核酸等常见生物大分子的提取、分离、检测、功能和应用等。本课程设置具有层次性，每部分内容能相互衔接，使整个生物化学实验课程形成一个有机的整体。

BIO222. Biochemistry and Molecular Biology Laboratory (2).

Laboratory, 2 credits, 4 hours per week (including lecture, 12 hours; experiment, 44 hours). Pre-requisites: course BIO102，BIO201，BIO203，BIO206. The experimental materials include nucleic acid, protein and carbohydrate, study the life phenomenon by their structure, characteristic and function. Five major topics including basic skills, nucleic acid, protein purification and characterization, enzyme kinetics and carbohydrates; it contains extract of bio-macromolecule (nucleic acid, protein, and enzyme) and functional detection (such as DNA melting curve and LDH kinetics). Experiments in this lab are integrity, and help the students to grasp modern biochemistry and molecular biology techniques, including molecular cloning, recombinant protein expression and purification in E. Coli system, protein quantitation, and enzyme kinetics analysis.

BIO322 细胞生物学实验（2）.

实验课，2 学分，4 学时/周（包括实验讲授，12 小时；实验操作，44 小时）。先修课程：BIO102，BIO201，BIO203，BIO206。细胞生物学实验以哺乳动物细胞系为实验材料，学习细胞的形态、培养及生理功能等。课程内容包括细胞形态观察、红细胞膜渗透性、细胞传代及转染、细胞吞噬、核型分析、细胞凋亡等实验。实验中介绍了一些常用的细胞生物学实用技术如细胞计数、哺乳动物细胞培养、荧光显微镜技术、荧光原位杂交、western blot 等。内容涵盖细胞生物学的多个方面，期望在实验过程中提高学生的动手能力及加深对理论知识的理解。

BIO322 Cell biology laboratory (2)

Laboratory, 2 credits, 4 hours per week (including lecture, 12 hours; experiment, 44 hours). Pre-requisites: course BIO102，BIO201，BIO203，BIO206. The lab provides experiments primarily based on mammalian cells, to study the morphology and physiology of cells, cell culture,

et al. The major contents include observation of cell morphology, red cell membrane permeability, cell culture and transfection, phagocytosis, karyotype analysis, and apoptosis. Some operation technology such as cell counting, mammalian cell culture, fluorescence microscopy, FISH, western blot, et al will be studied. This laboratory containing many aspects of cell biology, which will improve the ability of manipulation, analysis, solving problem and help them get a more intensity understanding of this subject.

BIO303 遗传学实验（2）

授课 12 小时，实验 44 小时。先修课程：BIO301（遗传学）。本课程以实验动物（如线虫）、植物、微生物、小鼠细胞等作为实验材料，学习遗传学理论与应用等相关知识。课程内容涵盖染色体结构、遗传学模式生物（线虫）、基因突变（如紫外诱变，定点突变，RNAi）、遗传多样性（分子标记如 SNP, RFLP, VNTR, ISSR）等。课程会利用线虫的杂交实验进行孟德尔遗传定律验证，统计学方法卡平方检测会用于杂交实验的数据分析。遗传多样性中 ISSR 分子标记获得的实验数据会用于系统发育关系分析。

BIO303 The genetic laboratory（2）

lecture,12 houres;experiments, 44 houres. Pre-requesites: course BIO301（genetics）. This course focuses on genetic applications and the basic genetic theories. The experimental materials include animals (such as Caenorhabditis elegans), plants, microbes, cell line of Mus musculus etc. Four major topics including the structure of chromosome, model organism in genetics (C. elegans), mutagenesis (such as UV mutagenesis, site-directed mutagenesis, RNAi etc.), genetic diversity (different molecular markers such as SNP, RFLP, VNTR, ISSR) are introduced. The basic genetic theories of Mendel's law will be prove by the mating of C. elegans and the fundamental statistical method of Chi-square test will be studied. The experimental data of molecular marker of ISSR will be used to construct a phylogenetic tree.

BIO301. 遗传学（3）.

理论课，3 学分，3 学时/每周。先修课程：细胞生物学（BIO208）及微生物学（BIO203）。本课程主要包括了孟德尔遗传学、现代遗传学及分子遗传学，从群体、个体、细胞和分子水平上阐述生物进化、性状遗传和变异、染色体、DNA、遗传信息的表达与调控等内容。通过本课程，学生将能充分掌握遗传学的基础理论及发展方向。

BIO301. Genetics（3）.

Lecture，3 credits, 3 hours per week. Pre-requesites：Cell Biology (BIO203) and Microbiology (BIO206). This course discusses the principle of Mendelian genetics and modern genetics at the level of molecules, cells and multicellular organisms. Evolution, principle of inheritance, linkage and mapping, mutation, recombination, structure of chromosomes and DNA, gene expression and regulation will be covered for the fully understanding of the principle of heredity.

BIO209 植物生理学实验(2)

授课 14 小时，实验 42 小时。先修课程：BIO209（植物生理学）。植物生理学实验涵盖了传统和现代的实验主题。课程内容主要包括矿质营养与植物缺素症状的观察，激素对植物形态建成的影响，植物组织制片，原生质体瞬时转化，植物胁迫生理，植物组织水势测定，种子及根系活力检测等等。实验中介绍了一些常用的植物学实用技术如植物水培技术、植物组织培养技术、石蜡切片制片技术、植物转基因技术及常用的植物生理学指标检测手段。

BIO209 Plant physiology laboratory（2）

Lecture, 14 hours, experiments, 42 hours. Pre-requesites: course BIO209（ Plant physiology）. Plant physiology laboratory provides traditional and modern experimental trainings. The major contents include the mineral nutrition and nutrient deficiency symptoms, effects of hormones on

morphogenesis in plant, organizations of plant tissues and cells, transient transformation in protoplasts, stress physiology, water potential determination, testing for seeds and roots viability etc. Some operation technology such as hydroponic plants, plant tissue culture, plant cell culture, aseptic techniques, paraffin section, plant transgene etc. will be studied. Some basic equipment and methods for plant physiology laboratory will be used. The testing methods for Malondialdehyde, water potential, cell membrane permeability etc. will be introduced.

BIO207. 植物生理学（3）

理论课，3 学分，3 学时/每周。先修课程：普通生物学（BIO102）。本课程旨在帮助学生了解植物的主要生理过程、基本生命活动规律及相关的分子调控机制。其内容涵盖植物生理学的主要主题，包括植物水分吸收与运输、矿物质营养、植物能量代谢与光合作用、激素与植物生长发育、植物与环境相互作用、光形态建成与光周期、生殖等内容。植物生理学实验课（BIO209）同期进行。

BIO207. Plant Physiology (3)

Lecture, 3 credits, 3 hours per week. Pre-requesites: General biology (BIO102). This course helps students understand how plants work, involving the basic physiological processes and the underlying molecular mechanisms. The topics cover plant water relations, mineral nutrients, plant photosynthesis and bioenergetics, hormone and plant growth, plant response to different environmental factors, photomorphogenesis and photoperiod, reproduction，etc. Concurrently scheduled with laboratory course BIO209.

生物医学工程系

BME201 定量生理学 I（3）

理论课，3 学分，3 学时/每周。先修课程：生物学导论 I：生物化学，遗传学以及分子生物学（BIOL C2005）、生物学导论 II：细胞生物学，发育以及生理（BIOL C2006）。本课程是对细胞层次和分子层次的生物系统进行高度定量分析，课程内容包括化学动力学，分子键联，酶催化过程，分子马达，生物膜以及肌肉。

BME201 Quantitative Physiology I (3)

Lecture,3 credits,3 hours per week. Prerequisites: BIOL C2005 and C2006. Physiological systems at the cellular and molecular level are examined in a highly quantitative context. Topics include chemical kinetics, molecular binding and enzymatic processes, molecular motors, biological membranes, and muscles.

BME202 定量生理学 II（3）

理论课，3 学分，3 学时/每周。先修课程：生物学导论 I：生物化学，遗传学以及分子生物学（BIOL C2005）、生物学导论 II：细胞生物学，发育以及生理（BIOL C2006）。课程介绍了细胞生物学和哺乳动物生理学的定量和工程化实现方法，并从细胞出发，继而讲述了人体的主要生理系统（神经、循环、呼吸以及肾）

BME202 Quantitative Physiology II(3)

Lecture,3 credits,3 hours per week. Prerequisites: BIOL C2005 and C2006. Students are introduced to a quantitative, engineering approach to cellular biology and mammalian physiology.

Beginning with biological issues related to the cell, the course progresses to considerations of the major physiological systems of the human body (nervous, circulatory, respiratory, renal).

BME203 生物医学工程 I（3）

理论课，3 学分，3 学时/每周。先修课程：生物学导论 I：生物化学，遗传学以及分子生物学（BIOL C2005）、生物学导论 II：细胞生物学，发育以及生理（BIOL C2006）。本课程介绍了生物力学、生物材料和细胞与组织工程中的各种概念以及工程方法的基础知识。

BME203 Biomedical Engineering I(3)

Lecture,3 credits,3 hours per week. Prerequisites: BIOL C2005 and BIOL C2006. Various concepts within the field of biomedical engineering, foundational knowledge of engineering methodology applied to biological and/or medical problems through modules in biomechanics, biomaterials, and cell & tissue engineering.

BME204 生物医学工程 II (3)

理论课，3 学分，3 学时/每周。先修课程：生物学导论 I：生物化学，遗传学以及分子生物学（BIOL C2005）、生物学导论 II：细胞生物学，发育以及生理（BIOL C2006）。本课程介绍了生物力学、生物仪器以及生物医学成像中的各种概念以及工程方法的基础知识。

BME204 Biomedical Engineering II (3)

Lecture, 3 credits,3 hours per week. Prerequisites: BIOL C2005 and BIOL C2006. Various concepts within the field of biomedical engineering, foundational knowledge of engineering methodology applied to biological and/or medical problems through modules in biomechanics,

bioinstrumentation, and biomedical Imaging.

BME211 生物医学工程实验 I (3)

实验课，3 学分，3 学时/每周。本课程包括基于波动力学的若干考虑，设计理念，可靠性和风险控制，流体力学的基本知识，防爆结构设计，抗震设计，消防设计;防洪考虑，高等结构设计分析。

BME211 Biomedical Engineering Lab I (3)

Laboratory, 3 credits,3 hours per week. Fundamental considerations of wave mechanics; design philosophies; reliability and risk concepts; basics of fluid mechanics; design of structures subjected to blast; elements of seismic design; elements of fire design; flood considerations; advanced analysis in support of structural design.

BME212 生物医学工程实验 II (3)

实验课，3 学分，3 学时/每周。本课程包括生物医学的实验设计和假设检验、实验测量的统计分析、实验测量分析、方差分析、事后检验、流体剪切和细胞粘合，神经电生理学，软组织生物力学，生物医学成像和超声，可兴奋组织的特征，微流体

BME212 Biomedical Engineering Lab II (3)

Laboratory, 3 credits, 3 hours per week. Biomedical experimental design and hypothesis testing. Statistical analysis of experimental measurements. Analysis of experimental measurements. Analysis of variance, post hoc testing. Fluid shear and cell adhesion, neuro-electrophysiology, soft tissue biomechanics, biomecial imaging and ultrasound, characterization of excitable tissues, microfluidics.

BME221 生物医学工程设计 I (4)

理论课，4 学分，4 学时/每周。本课程是针对大四年级的学生开设的为时 2 学期的毕业设计课程。课程通过具体的应用讲述了生物医学工程设计过程中的要素：概念组成、系统综合、设计分析、优化以及生物相容性，这些要素关系到患者的健康及舒适度、医疗保健成本、监管问题和医学伦理。课程设置的课题从选题到实施就是一个设计实际的工程设备或系统的过程。该课程还提倡创业和风险精神。第一个学期涉及到统计分析检测，分类体系（接受器的工作特性分析、逻辑回归），设计标准开发、需求、方法、效益和竞争分析。

BME221 Biomedical Engineering Design I (4)

Lecture, 4 credits,4 hours per week. A two-semester design sequence to be taken in the senior year. Elements of the design process, with specific applications to biomedical engineering: concept formulation, systems synthesis, design analysis, optimization, biocompatibility, impact on patient health and comfort, health care costs, regulatory issues, and medical ethics. Selection and execution of a project involving the design of an actual engineering device or system. Introduction to entrepreneurship, biomedical start-ups, and venture capital. Semester I: statistical analysis of detection/classification systems (receiver operation characteristic analysis, logistic regression), development of design prototype, need, approach, benefits and competition analysis.

BME221 生物医学工程设计 II (4)

理论课，4 学分，4 学时/每周。本课程是针对大四年级的学生开设的为时 2 学期的毕业设计课程。课程通过具体的应用讲述了生物医学工程设计过程中的要素：概念组成、系统综合、设计分析、优化以及生物相容性，这些要素关系到患者的健康及舒适度、医疗保健成本、监管问题和医学伦理。课程设置的课题从选题到实施就是一个设计实际的工程设备或系统的过

程。该课程还提倡创业和风险精神。第二学期进一步的开发和测试，迭代和优化初始设计，或者优化标准设计以及商业计划的发展。

BME221 Biomedical Engineering Design II (4)

Lecture, 4 credits, 4 hours per week. A two-semester design sequence to be taken in the senior year. Elements of the design process, with specific applications to biomedical engineering: concept formulation, systems synthesis, design analysis, optimization, biocompatibility, impact on patient health and comfort, health care costs, regulatory issues, and medical ethics. Selection and execution of a project involving the design of an actual engineering device or system. Introduction to entrepreneurship, biomedical start-ups, and venture capital. Semester II: spiral develop process and testing, iteration and refinement of the initial design/prototype and business plan development.

化学系

CH102. 化学原理实验（1）

实验课，1 学分，2 学时/每周。先修课程：化学原理（CH101）。本课程系统讲解化学实验的基本方法、基本操作与常见仪器，涵盖化学实验的原理与应用，面向化学与非化学专业学生。主要内容包括：化学物质的提取/制备、分离/纯化、定性/定量分析，热力学，动力学，色谱法，光谱法，显微镜法，数据处理与误差分析等。

CH102. Laser Fundamentals (1)

Lab, 1 credits, 2 hours per week. Pre-requesite：CH101. This course systematically introduces fundamental methods, necessary skills, and widely-used facilities of experimental chemistry for students who are not necessarily majoring in chemistry, as well as principles and applications of chemical laboratory techniques. Topics include: extraction/preparation, separation/purification, and qualitative/quantitative analysis of chemical materials; thermodynamics; kinetics; chromatography; spectroscopy; microscopy; data processing and error evaluation, *etc.*

CH201. 无机化学（I）

理论课，4 学分，4 学时/每周。先修课程：化学原理（CH101）。本课程从原子轨道和简单成键理论出发，引入分子对称性和群论，讲述分子轨道理论，并用于理解和预测元素及其简单离子或共价化合物的结构、特性和反应性。CH201 是进阶无机化学课程（无机化学（II）和无机化学实验）的基础先修课程。

CH201. Inorganic Chemistry (I)

Lecture, 4 credits, 4 hours per week. Pre-requisites：CH101. This course starts from the atomic

orbitals and fundamental bonding models, introduces molecular symmetry and group theory, and then interprets molecular orbital theory and its applications in understanding and predicting structures, certain properties and reactivities of the elements and of many of their simpler ionic and covalent compounds. CH201 serves as the foundation for the advanced inorganic course, i.e. Inorganic Chemistry II and Inorganic Chemistry Lab.

CH203 有机化学 I

理论课，4 学分，4 学时/每周。先修课程：化学原理（CH101）。该门课程的内容包括有机化合物的命名、结构和性质；烷烃的结构和立体化学；有机化合物的化学反应；立体化学；卤代烷的亲核取代和消除反应；烯烃的结构、合成与反应；炔烃的结构、合成与反应；醇的结构、合成与反应；红外光谱、紫外光谱、质谱、核磁共振光谱；共轭体系和轨道对称性。

CH203 Organic Chemistry I

Lecture，4 credits, 4 hours per week. Pre-requesites：General Chemistry (CH101). The content of the course includes：Nomenclature, structure and properties of organic compounds; structure and stereochemistry of alkanes; study of chemical reactions; stereochemistry; nucleophilic substitution and elimination of alkyl halides; structure, synthesis and reactions of alkenes; structure, synthesis and reactions of alkynes; structure, synthesis and reactions of alcohols; infrared spectroscopy, ultraviolet spectroscopy, mass spectroscopy and nuclear magnetic resonance spectroscopy; conjugated systems and orbital symmetry.

CH205. 分析化学（4）

理论课，4 学分，4 学时/每周。先修课程：高等数学上、下和化学原理。本课程包括经典的定量分析及仪器分析两部分内容，由样品的前处理，分析化学的基础知识及基本操作、化学分析法、电化学分析法、质谱、色谱分析法、光学光谱法等部分构成。通过本课程的学习要

求学生系统地掌握分析化学的基本原理和方法，加深对其它化学课程内容的理解，并具备应用分析化学的基本原理对实际样品进行定性和定量分析，以及解决实际分析问题的能力。

CH205. Analytical Chemistry (4)

Lecture, 4 credits, 4 hours per week. Pre-requisites: courses: Calculus I & II and Principles of Chemical Science. This course including classical quantitative analysis and instrumental analysis consists of sample preparation, chemical analysis, electrochemical methods, chromatography methods, spectrochemical methods, mass spectrometry, etc. This course is intended to provide students with an understanding of basic principles and theories of analytical chemistry that are necessary for chemistry, biology, materials, medical, and engineering students.

CH207. 分析化学实验

实验课，2 学分，4 学时/每周。先修课程：《普通化学原理实验》(CH102)、《分析化学》(CH205)。本课程是与《分析化学》(CH205) 配套而又相对独立的一门实践课程，旨在帮助学生深入理解《分析化学》中的理论、概念，并培养学生正确掌握分析化学相关的基本操作、方法及相关仪器。

CH207.Analytical Chemistry Experiments

Laboratory course，2 credits, 4 hours per week. Pre-requesites：：General principles of Chemistry (CH102), Analytical Chemistry (CH205). It is a relatively independent course while mated with Analytical Chemistry (CH205). The aim of this course is to facilitate the students to understand the concepts and the theories of analytical chemistry intensively. Another aim of this course is to train the students to grasp the basic methods, necessary experimental skills and instruments

operation of analytical chemistry exactly.

CH202. 无机化学 II.(4)

每周 4 小时课程。先修课程：CH201。此课程是讲解无机化学中级原理。使用教材：培生公司 2011 年出版的 Inorganic Chemistry 第四版（编著者：G. L. Miessler 和 D. A. Tarr）。课程内容为两部份：(一)过渡金属配位化学，包括结构与化学键，电子光谱，反应和机理；(二)金属有机，包括导论，反应和催化。其中金属有机采用“问题导向教学法(反转课堂)”(PBL) ，学生会被分成小组讨论学习和报告。

CH202. Inorganic Chemistry II.(4)

Lecture, four hours; Enforced requisites: course CH101. Intermediate inorganic chemistry. Textbook: Inorganic Chemistry 4th Edition (G. L. Miessler and D. A. Tarr, 2011, Pearson). This course is divided into two part, (1) Transition metal coordination chemistry, including Structure and Bonding, Electronic Spectra, Reactions and Mechanisms; (2) Organometallics, including Introduction, Reactions and Mechanisms.In the part of Organometallics, Problem Based Learning (PBL) is adopted and students are divided into small groups for discussion and presentation.

CH204. 无机化学实验.

实验课，2 学分，4 学时/每周。先修课程：《普通化学原理实验》（CH102）、《无机化学Ⅰ》 （CH201）、无机化学Ⅱ（CH202）。本课程是与《无机化学Ⅰ》 （CH201）和《无机化学Ⅱ》（CH202）配套而又相对独立的一门实践课程，旨在帮助学生深入理解《无机化学Ⅰ》和《无机化学Ⅱ》中的概念、理论，并培养学生正确掌握无机化学相关的基本操作，方法及相关仪器。

CH204. Inorganic Chemistry Experiments

Laboratory course，2 credits, 4 hours per week. Pre-requisites：General principles of Chemistry (CH102)，Inorganic Chemistry Ⅰ(CH201), Inorganic Chemistry Ⅱ(CH202). It is a relatively independent course while mated with Inorganic Chemistry Ⅰ and Inorganic Chemistry Ⅱ. The course aims to make the students to have a deeper understanding about the concepts and the theories of inorganic chemistry and master exactly the basic methods, necessary experimental skills, and instrument operations about inorganic chemistry.

CH206. 有机化学 II.

理论课，4 学分，4 学时/每周。先修课程：有机化学 I（CH203）。该门课程的内容包括醚、环氧化物和硫醚；芳香化合物及其反应；酮和醛；胺；羧酸及其衍生物；羰基化合物的缩合反应和 α-取代反应；碳水化合物和核酸；氨基酸、肽和蛋白质；油脂；人工聚合物。

CH206. Organic Chemistry II

Lecture，4 credits, 4 hours per week. Pre-requesites：Organic Chemistry I (CH203). In this course, we will discuss：ethers, epoxides and thioethers; aromatic compounds and their reactions; ketones and aldehydes; amines; carboxylic acids and their derivatives; condensations and alpha substitutions of carbonyl compounds; carbohydrates and nucleic acids; amino acids, peptides and proteins; lipids; synthetic polymers.

CH208. 有机化学实验（2）

实验课，2 学分，4 学时/每周。先修课程：有机化学 I（CH203）、有机化学 II（CH206）。掌握最基本的有机化学实验技能和技巧，同时运用文献检索软件查阅文献（SciFinder）及运用普通的化学画图软件（ChemDraw）等，掌握怎样分析及总结实验结果；为进科研实验室

奠定良好的实验基础

CH208. Organic Chemistry Experiment (2)

Experiment，2 credits, 4 hours per week. Pre-requesites：CH203、CH206. The organic reaction experiments selected for this course are designed to teach students the basic skills and techniques in organic chemistry experiments, the ability to consult literature by using literature retrieval software (SciFinder) and use common chemical drawing software (ChemDraw). Furthermore, students will understand how to analyze and summarize the results of the experiment. These will lay a good foundation for the students before going into the scientific research laboratory.

CH301.物理化学 I.(4)

理论课，4 学分，4 学时/每周。先修课程：高等数学（GE101，102）、大学物理（PHY101，102）、化学原理（CH101）。本课程讨论化学热力学，简单的混合物（包括溶液），相图，化学平衡和电化学平衡（包括先进电池技术），统计热力学等。

CH301. Physical Chemistry I (4)

Lecture, 4 credits, 4 hours per week. Prerequisites: Advanced Mathematics (GE101,102),General Physics (PHY101,102) and General Chemistry (CH101).This course deals with chemical thermodynamics, simple mixtures, phase diagrams, chemical equilibrium, equilibrium electrochemistry (advanced battery technology), statistical thermodynamics, and etc.

CH303 物理化学实验

实验课，2 学分，4 学时/每周。先修课程：物理化学 I（CH301）本实验课程主要涉及热力学、电化学、反应动力学、表面化学和结构化学。 实验内容主要包括：燃烧热的测定、凝固点

降低法测定摩尔质量、双液系的气液平衡相图、纯液体的饱和蒸汽压的测量、原电池电动势的测定、离子迁移数的测定、旋光法测定蔗糖的转化反应速率、最大泡压法测定溶液的表面张力、络合物的磁化率的测定。

CH303 Physical Chemistry Laboratory

Laboratory, 2 credits, 4 hours per week. Pre-requisites: CH301. The experimental courses mainly related to thermodynamics, electrochemistry, reaction kinetics, surface chemistry and structural chemistry. It includes: Heat of combustion; Molar mass from the depression of freezing point; Phase diagram of a binary liquid-vapor system; Saturated vapor pressure of pure liquids; Electromotive force of galvanic cell; Ion transport number; Rate constant for the conversion of sucrose by a polarimetric method; Surface tension of solutions; Magnetic susceptibility of complex compound.

CH305. 仪器分析原理与实践

理论与实验课，4 学分（其中 2 学分为实验学分），6 学时/每周（其中 3 学时为实验学时）。先修课程：分析化学（CH205）、分析化学实验（CH207）。本课程强调分析方法的高级原理和实际应用。从基础理论讲起，使学生对仪器分析方面的知识有一个全方面的了解，使学生更加熟悉仪器的原理和使用、操作技能。为以后科研工作做准备。

CH305. Instrumental Analysis: Principle and Practice

Lecture and experiment, 4 credits (Lecture, two credits; experiment, two credits), 6 hours per week (Lecture, three hours; experiment, three hours per week). Pre-requisites: Analytical chemistry (CH205), Analytical chemistry laboratory (CH207). The course emphasizes the advanced principle and practical application of analytical methods. The course will cover the instrumental analysis which has not been covered by the analytical chemistry course. It starts from

the basic principle. The purpose of the course is to give students a comprehensive understanding of instrumental analysis and to train the students to grasp the methods and skills of instrument operation. This will help their future study and research.

CH302.物理化学 II (4)

主要探讨和解决四个个方面的问题：微观量子效应的起源与应用；物质结构和性能之间的关系问题；化学变化的方向和限度问题；化学反应的速率和机理问题；光谱的产生与应用。

CH302.Physical Chemistry II (4)

The key concepts of this corse: The origins and applications of quantum mechaics. The relationship between molecular structure and its properties. The direction and extent of chemical reactions. The rates and mechanisms of chemical reactions. Spectra and their application.

CH403.化工原理.

专业必修课，3 学分，3 学时/每周。先修课程：高等数学(GE101, GE102)，大学物理(PHY101, PHY102)，有机化学(CH203, CH206)，物理化学(CH301, CH302)。本课程全面系统地讲述流体流动过程、传热过程、传质过程（动量传递、热量传递、质量传递）和化学反应过程的基本原理和方法，并在此基础上阐述主要单元操作的典型设备构造、操作原理、过程计算、设计方法等，介绍化学反应器的设计和选型。本课程的学习能够培养学生从工程、经济观点出发，综合处理化学工程问题的能力。

CH403. Principles of Chemical Engineering

Required course, 3 credits, 3 hours per week. Pre-requesites: advanced mathematics (GE101, GE102), college physics (PHY101, PHY102), organic chemistry (CH203, CH206), physical

chemistry (CH301, CH302). This course develops the basic principles and methods of the fluid flow, heat transfer, mass transfer (momentum transfer, heat transfer, mass transfer) and chemical reaction processes. It then introduces equipments of typical unit operations, including operating principles, process calculations, equipment selection and process/equipment design. Chemical reactor design and selection will be introduced. It develops the students' ability to analyze and solve the chemical engineering problems in terms of engineering and economy.

CH210.化学前沿研究.

专业选修课，2 学分，2 学时/每周。由系各位教授轮流介绍在化学各领域前沿的研究方向、热点和进展。本课程培养学生对化学研究的兴趣，了解化学研究的前沿进展。

CH210. Frontiers of Chemical Science

Elective course, 2 credits, 2 hours per week. Series of seminar topics presented by faculty members, cutting-edge research and progress in all areas of chemistry. To enable the students to grasp the progresses and frontiers of current chemical research, and to develop their interest in chemical research.

CH309. 高等有机化学实验（2）

实验课，2 学分，4 学时/每周。先修课程：有机化学 I（CH203）、有机化学 II（CH206），有机化学实验（CH208）。本课程以操作技术练习和设计为主，尽可能表现出实验室工作的完整性，让学生熟练掌握有机化学实验的操作技能，熟练使用常用检测仪器，熟练地查阅文献，具有独立科研的能力。

CH309. Advanced Organic Chemistry Laboratory (2)

Experiment，2 credits, 4 hours per week. Pre-requesites：CH203，CH206，CH208. The very organic reaction experiments selected for this course are designed to teach the techniques and skills necessary to carry out experimental work in organic chemistry. Furthermore, the students' independent experimental ability in the organic laboratory will be improved through operating some common instruments and consulting literature skillfully.

CH311 现代策略合成 (3)

理论课，3 学分，3 学时/每周。先修课程：有机化学（CH206）、 无机化学（CH202）。进一步加深和掌握化学专业基础课有机化学的有机反应的知识；了解和掌握很多重要基元有机反应中涉及到选择性问题（化学、区域、立体选择性）以及反应机理；同时掌握金属催化剂和有机小分子催化剂参与的有机反应的反应机理和立体选择性控制；了解金属催化剂和有机小分子催化剂在有机合成的应用，初步了解有机合成的策略和设计。

CH311. Modern Strategic Synthesis (3)

Lecture，3 credits, 3 hours per week. Pre-requesites：CH206，CH202. To have a general understanding and working knowledge of important organic reactions including transition metal catalysis and organocatalysis; To learn, appreciate and increase understanding of reaction selectivities (chemo-, regio-, stereo-) and reaction mechanisms; to understand and apply knowledge of organic reactions and synthetic strategy toward wide applications in the context of the synthesis of therapeutic drugs, natural products, and advanced materials.

CH310 化学生物学（3）

理论课，3 学分，3 学时/每周。先修课程：有机化学 I、II。化学生物学是一门研究以化学手段、尤其是以有机小分子为工具研究生物学的一门新兴前沿交叉学科，是新世纪化学及生物专业的重要基础课程之一。本课程的设置旨在使学生掌握化学生物学的基本理论、知识和概念，在知识面上建立起有机化学、生物有机化学、化学生物学和细胞生物学之间的有机联系，消除有机化学和生物学之间的学科隔阂和学习盲区，注重有机化学和生物学知识的融合。本课程将化学生物学最新的权威教材与学科国际前沿进展相结合，着重培养学生的扎实基础、学习兴趣和创新能力，使学生在具备坚实理论基础的同时具备多学科全面发展的潜力和能力。

CH310. Chemical Biology (3)

Lecture，3 credits, 3 hours per week. Pre-requesites：Organic Chemistry I and II. Chemical biology is the study of chemical means, especially in small organic molecules as a tool to study the biology of an emerging interdisciplinary frontier, is an important basic course for the chemical and biological science in the new century. This course aims to enable students to master the basic theory, knowledge and concepts of chemical biology knowledge to establish organic links between chemistry, bio-chemistry, chemical biology and cell biology. This course focus on eliminating the gap between organic and biology. This course combines the latest international chemical biology textbook and the frontier of chemical biology research, with emphasis on cultivating a solid foundation students' interest in learning and innovation, so that students would have a solid theoretical foundation as well as the potential and capacity multidisciplinary and comprehensive development.

GE351.文献检索和科技写作.

每双周 2 小时课程。先修课程：无。此课程是讲解自然科学领域用到的专业文献搜索方法和

科技表达与写作。使用教材：课件和讲义。课程内容包括：专业的科技文献搜索引擎，科技文献阅读，科研论文写作与发表，学位论文写作，科研伦理与道德等。等级制评分。

GE351.Scientific Literature and Writing.

Lecture, two hours biweekly; Enforced requisites: none. Introduction to professional approach for scientific literature and writing/presentation for natural sciences. Textbook: none. Searching engines for scientific literature. Reading of scientific literature. Scientific publications. Thesis writing. Ethics for scientific researches. Letter grading.

CH315.高分子化学.

理论，3 学分，3 学时/周。本课程是由化学系开设的面向化学专业的选修课程。本课程主要介绍高分子科学的理论基础和重要课题。修完本课程，可使学生了解高分子聚合材料的基本概念、结构与性质；聚合反应的分类、机理以及动力学理论，同时理解高分子聚合物材料结构与性能的关系。

CH315. Introduction to Polymer Chemistry.

Lecture, 3 credits, 3 hours/week. This course introduces the field of polymer science, offering a general overview of the concepts, structures and properties of these materials; polymerization reactions and their mechanisms and kinetics. The structure/property relationship is emphasized.

CH317 药物化学

理论课，3 学分，3 学时/周。本课程为化学专业选修课，主要介绍一些与日常生活密切相关的常用各类药物的结构、性质、合成、代谢等；讲解与我们日常生活密切相关的各类药物，比如常用抗生素青霉素，头孢；抗肿瘤药，降血糖药，解热镇痛药，各类维生素等，讲解药

物的结构、性质、合成、代谢等。不仅有趣，更重要的是有用。

CH317 Medicinal Chemistry：

Lecture, 3 credits, 3 hours/week. This course is designed for students in chemistry. We mainly introduce some important drugs which are close to our daily life. We will introduce the structure, property, synthesis and metabolism and so on about these important drugs, such as antibiotics: penicillin, cephalosporin; Anticancer Agents, hypoglycaemic agent, antipyretic analgesics and Vitamins and so on. It is not only interesting, but also important to our life. Besides, students should also guide the safe use of drugs in daily life to ensure their own health.

CH319. 高等无机化学实验

实验课，2 学分，4 学时/每周。先修课程：《普通化学原理实验》（CH102）、《无机化学Ⅰ》（CH201）、《无机化学Ⅱ》（CH202）、《无机化学实验》（CH204）。本课程旨在《无机化学实验》（CH204）的基础上，使学生进一步掌握高等无机化学相关的操作，方法及相关仪器，提高学生的科研能力和创新能力。

CH319. Advanced Inorganic Chemistry Experiments

Laboratory course，2 credits, 4 hours per week. Pre-requisites：General Chemistry Laboratory (CH102)， Inorganic Chemistry ry requistry Experiments3 istry Ⅱ (CH202) and Inorganic Chemistry Experiments (CH204). Building upon the Inorganic Chemistry Experiments (CH204), this course aims to make the students to master the methods, necessary experimental skills, and instrument operations about advanced inorganic chemistry and train the students’ ability of scientific research and innovation.

CH321 高分子化学实验

实验课程，1 学分，2 学时/周。先修课程:有机化学，物理化学，物理化学实验和有机化学实验。通过高分子化学实验的学习，使学生能够深入理解高分子化学理论课中的理论知识，并能灵活运用所学理论知识指导实验；培养学生正确掌握高分子聚合相关的基本操作，方法及相关高分子材料表征仪器。

CH321 Polymer Chemistry Laboratory

Laboratory course, 1 credit, 2 hours per week. Pre-requisites: Organic Chemistry, Physical chemistry, Physical Chemistry Laboratory and Organic Chemistry Laboratory. Training students to have a deeper understanding about the concepts and the theories of Polymer Chemistry, and use the knowledge to guide the experiments. Training students to master the basic methods, necessary skills, and instrument operation of Polymer Chemistry.

CH304.纳米材料合成与技术.(2)

理论课，2 学分，2 学时/每周。先修课程：化学原理（CH101）、物理化学 I（CH301）。本课程主要介绍纳米材料（纳米点、纳米线、碳纳米管和石墨烯、纳米复合材料，纳米孔材料等）的基本概念、结构性能、表征方法、制备技术、最新研究进展、纳米材料在各个领域中的应用情况以及功能纳米材料等内容。

CH304. Nanomaterials Synthesis and Nanotechnology (2)

Lecture, 2 credits, 2 hours per week. Prerequisites: General Chemistry (CH101), Physical Chemistry I (CH301). The course will cover (a) the fundamental principles regarding the synthesis and controlled assembly of nanostructured materials; (b) the types of nanomaterials (zero, one,

two-diemsentional nanomaterials, nanoporous materials, nanocomposites, and etc.); (c) synthesis, measurement and computational tools; (d) new properties at the nanoscale, and (e) existing and emerging applications of nanomaterials.

CH306 微钠合成、技术与应用实验

实验课，2 学分，4 学时/每周。先修课程：纳米材料合成与技术（CH317）本实验课程主要涉及微钠制造技术和纳米材料的合成、表征与应用。实验内容主要包括：PDMS 粘度计的设计、制作与应用；纳米氧化锌的合成、表征与应用；石墨烯的合成与表征；介孔二氧化硅的合成与表征；介孔碳的合成与表征。

CH306 Laboratory for Micro-Nano Synthesis, Technology and Application

Laboratory, 2 credits, 4 hours per week. Pre-requisites: CH317. This course provides and understanding of the theoretical basis, synthetic processes and experimental techniques for nanomaterials and devices, including the PDMS viscometer design, operation and application; the synthesis and characterization of zinc oxide nanoparticles, graphene, mesoporous silicone oxide and mesoporous carbon materials.

CH308. 超分子化学（2）

理论课，2 学分，2 学时/每周。先修课程：有机化学 I 和 II（CH203, CH206）、物理化学 I 和 II（CH301，CH302）。本课程以分子间的弱相互作用出发，讲述超分子化学的基本概念与原理，经典的超分子主体的性能，以及超分子热力学与动力学，并在此基础上超分子化学在材料科学、分析化学、系统化学等方面的应用。

CH308. Supramolecular Chemistry (2)

Lecture，2 credits, 2 hours per week. Pre-requisites：CH203, CH206, CH301，and CH302. This course starts with the introduction of non-covalent interactions, discuss the basic concepts and principles of supramolecular chemistry, the properties of classic supramolecular hosts, and supramolecular thermodynamics and kinetics. On this basis, the application of supramolecular chemistry in materials science, analytical chemistry, and systems chemistry will be discussed.

CH312 有机波谱解析 （3）

理论课，3 学分，3 学时/周。本课程为化学专业选修课，主要介绍有机化合物的结构鉴定等；通过对本课程的学习，学生能掌握有机化合物波谱解析的基本概念、原理和方法，并能应用四大光谱对有机化合物的结构进行解析。掌握紫外、红外、核磁和质谱仪器的操作，进而能够对有机合成或天然产物结构进行解析或信号归属。

CH312 Organic Spectroscopy （3）

Lecture, 3 credits, 3 hours per week. This course mainly introduces the structure identification of organic compounds. Through the study of this course, students can learn how to obtain, analyse and understand the structure of organic compounds by UV, IR, NMR and MS spectrometry.

CH314.不对称合成. (3)

理论课，3 学分，3 学时/每周。先修课程：有机化学（CH206）、 现代策略合成（CH311）。不对称合成是当代有机化学研究的热点和前沿，通过本课程的学习，帮助学生了解和掌握有机化学或药物合成反应中立体化学的基本知识，进一步学习有关不对称合成反应的基本概念、不对称合成的方法学及手性药物合成的策略，并且了解近年来不对称合成的研究成就和

发展前沿，为科学研究打下扎实基础。本课程以基本催化不对称类型-金属催化、有机催化为线索，分别讲解不对称合成单元反应的原理、方法和机制。结合最新文献中对相关反应的研究进展和在药物合成中的应用。可以激发学生从事不对称合成的热情，为我国的新药研发贡献自己的力量。

CH314. Asymmetric Synthesis (3)

Lecture，3 credits, 3 hours per week. Pre-requisites：CH206，CH311. It is an important means by which enantiopure chiral molecules may be obtained and it is a very hot research field in recent years. Several main points will be involved: To gain an appreciation of the types of asymmetric reactions which may be employed in organic synthesis; To understand the origins of the enantioselectivities and the mechanisms of the reactions; To be able to propose asymmetric syntheses of organic molecules of medium complexity; To carry up the most recent development in asymmetric catalysis. Therefore, the students can engage in asymmetric synthesis with great enthusiasm and make a great contribution to new drug research and development.

CH212.高级仪器系统的研发 I.(3)

授课一个学分；实验两个学分。这是一门用“实战练兵”教学法来培育创新人才的实践课，没有考试。将学习 LabVIEW 编程，计算机同仪器的通信，实验数据的自动化采集以及用编写的程序将具有不同功能的器件群整合在一起以便对复杂多变的实验过程进行精准测试和智能控制。成绩由作业，研讨会和从事的科研项目确定。

CH212. Advanced Instrumentation Systems I. (3)

Lecture, one credit; experiment, two credits. Instrumentation is the art and science of measurement and control of process variables. A system is a set of devices that are connected to act as one complete unit. Advanced instrumentation systems use a programming language (LabVIEW in this course) to integrate multiple systems in order to bring information from the

outside world into a computer, make decisions based on the acquired data, and send computed results back into the world to regulate the way an instrument operates. Success in frontier research often requires advanced instrumentation systems that may not be commercially available. In this course, students will learn some instrumentation skills including LabVIEW programming, computer interfacing, data acquisition, and instrument control. This course will be graded on the basis of homework and projects.

CH316. 生物无机化学（2）

理论课，2 学分，2 学时/每周。先修课程： CH101。生物无机化学是一个跨学科的课程, 它涵盖无机化学，有机化学，物理化学和生物化学。本课程是针对高年级化学专业本科生和研究生，提高在生物无机体系的兴趣。本课程将涵盖基本和前沿生物无机化学的概念和知识，如生命的分子机制和固氮。

CH316. Bioinorganic Chemistry (2)

Lecture，2 credits, 2 hours per week. Pre-requisites：CH101. Bioinorganic Chemistry is a cross-discipline course, which covers inorganic chemistry, organic chemistry, physical chemistry and biochemistry. This course is targeted to senior undergraduate and postgraduate students in chemistry who develop a good background in inorganic chemistry and has strong interests in biological inorganic systems. This course will cover basic and frontier concepts/knowledge of bioinorganic chemistry, such as molecular mechanisms of life, nitrogen fixation.

CH318, X-射线单晶结构解析（1）

理论+上机操作课，1 学分，2 学时/每周, 8 周。本课程目的是了解单晶 X-射线晶体结构分析的原理和方法，掌握单晶结构分析程序的基本使用，能够解析对称性较低的简单化合物的晶体结构，学会使用一些晶体绘图软件绘图，明白晶体数据的物理含义，熟悉科技论文写作中

关于晶体数据的格式和要求。

CH318, Single Crystal X-ray structure analysis (1)

Lecture + computer operation，1 credit, 2 hours per week, 8-9 weeks total. The purpose of this course is to understand the basic theory and method of single x-ray structural analysis; learn how to collect and solve the structures for some simple molecules; learn how to draw the figures via XP, X-Seed, Diamond, CrystalMaker, etc. software; understand the physical meanings of the structural parameters; get to be proficient with the nature and format of a structural data necessary for a literature paper.

CH401. 计算化学 (3)

计算化学是以计算机为工具从量子力学、分子力学、统计力学等基础理论出发, 借助于计算软件来解决物质性质等化学相关问题的新学科。我们将学习计算化学的理论基础及 Chemoffice, GaussView, Gaussian 等目前广泛使用的计算软件。在典型算例部分，将利用计算软件获得物质的几何结构，分子轨道，电荷分布，以及反应的电子能，焓变，自由能，反应速率等结果。

CH401. Computational Chemistry (3)

The Computational Chemistry solves the chemical problems by using computer simulation, based on the theories of quantum mechanics, molecular mechanics, and statistical mechanics. Students learn (i) the fundamental theory of quantum chemistry and computational chemistry; (ii) how to simulate the Molecular Geometry, Molecular Orbital, Charge Distribution, as well as the Electronic Energy, Enthalpy Change, Free Energy and Rate of a reaction, by the widely used software, such as Chemoffice, GaussView, and Gaussian.

CH405 高等无机化学 (3)

理论课，每周 3 小时课程。先修课程：CH201 和 CH202。此课程是讲解高等过渡金属配位化学。使用教材：(1) Wiley-VCH 出版第六版的 Advanced Inorganic Chemistry（编著者：F. A. Cotton, G. Wilkinson, C. A. Murillo, M. Bochmann）和 (2)培生公司 2011 年出版的 Inorganic Chemistry 第四版（编著者：G. L. Miessler 和 D. A. Tarr）。课程内容：包括光物理基础，发光配位化学的例子和应用。

CH405 Advanced Inorganic Chemistry (3)

Lecture, three hours; Enforced requisites: course CH201 and CH202. Advanced Coordination Chemistry. Textbook: (1) F. A. Cotton, G. Wilkinson, C. A. Murillo, M. Bochmann, Advanced Inorganic Chemistry, 6th Edition, Wiley-VCH, NY and (2) Inorganic Chemistry 4th Edition (G. L. Miessler and D. A. Tarr, 2011, Pearson). This course focuses on fundamental photophysics, Examples and applications on luminescence transition metal complexes.

CH407 纳米科学与技术选讲 (3)

理论课，2 学分；实验课，1 学分。选讲在钻研文献的基础上，有针对性地引导学生独立设计和搭建可在微、纳米尺度操作的测量装置和自动控制系统，以便克服现有仪器的局限，协助学生调试自行装配的仪器系统和进行实验测量，培养学生捕捉有价值的科学现象，并尝试破解某些前沿科学技术的难题。

CH407 Selected Topics in Nanoscience and Nanotechnology (3)

Lecture, two credits; laboratory, one credit. Students will gain hands-on experience in the design and assembly of computer-controlled equipment in order to overcome the limitations of existing instruments; try to solve some of the most challenging problems at the cutting-edge of science and technology, such as fabrication of nanomaterials; and learn about the manipulation and imaging of living-biological systems at the nanometer scale.

CH409 有机光电材料与器件 (4)

理论课，3 学分；实验课，1 学分。介绍有机半导体的基本概念，有机光电器件器件（包括有机晶体管、有机太阳能电池、有机发光器件）的工作原理。本课学习的重点内容是高性能有机半导体材料的设计以及高性能光电器件的应用。

CH409 Organic Optoelectronic Materials and Devices (4)

Lecture, three credits; laboratory, one credit. To introduce the basic concept of organic semiconductors, working principle of organic electronic devices （including organic transistor、organic photovoltaic cells and organic light-emitting devices）. The emphasis is on design of high performance organic semiconductor and its application for high performance optoelectronic devices.

CH307 高级仪器系统的研发 II (1)

实验课，1 个学分。作为高级仪器系统的研发 I 的延续课程，这是一门用“实战练兵”教学法来培育创新人才的实践课，没有考试。将学习 LabVIEW 编程，计算机同仪器的通信，实

验数据的自动化采集以及用编写的程序将具有不同功能的器件群整合在一起以便对复杂多变的实验过程进行精准测试和智能控制。成绩由作业，研讨会和从事的科研项目确定。

CH307 Advanced Instrumentation Systems II (1)

Experiment, one credit. Instrumentation is the art and science of measurement and control of process variables. A system is a set of devices that are connected to act as one complete unit. Advanced instrumentation systems use a programming language (LabVIEW in this course) to integrate multiple systems in order to bring information from the outside world into a computer, make decisions based on the acquired data, and send computed results back into the world to regulate the way an instrument operates. Success in frontier research often requires advanced instrumentation systems that may not be commercially available. In this course, students will learn some instrumentation skills including LabVIEW programming, computer interfacing, data acquisition, and instrument control. This course will be graded on the basis of homework and projects.

CH101 化学原理

理论课，4 学分。为了使大学一年级学生较早地对整个化学学科理论有较全面的了解，激发学生学习化学的热忱，化学原理 系统介绍了化学学科最基本的原理 (包括微观理论、统计理论和宏观理论)及 其在化学中的应用，融合了无机化学、有机化学、分析化学和物理 化学的内容，并且适当增加了化学发展的前沿动态。

CH101 General Chemistry

Lecture, 4 credits. General Chemistry is designed to give a general but fundamental understanding of chemical principles to undergraduate students majoring in science and engineering. General chemistry also aims to attract more undergraduate students to carry out chemical research at their seniors. The topics of General chemistry include: atoms and elements, molecular and electronic

structures, states of matter, bonding, chemical equilibriums, kinetics and thermodynamics, stoichiometry, aqueous solution chemistry, acids and bases, oxidation and reduction, and so on. As chemistry is an experimental science, a very special point for teaching General chemistry for undergraduate students is to emphasize the experimental aspect of a chemical reaction and create every possible condition for students to practice the reactions in a safe chemical laboratory. Also, the students should be educated that chemistry is practically useful and it helps us to understand the world around us at the molecular level and to create every materials and events in our daily life.

计算机科学与工程系

CS203. 数据结构与算法分析

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机程序设计基础（GE105）。本课程学习计算机科学中的数据组织、存储、处理方面的基本方法，掌握基本数据结构的使用条件和适用情况，学会针对问题或者应用，选择合适的数据结构与算法。

CS203. Data structures and algorithm analysis

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesite：Computer programming fundamentals (GE105). This course will teach students the fudamentals of data organization, storage and processing in computer science. Students will be required to grasp why and how a data structure can be applied according to applications.

CS204. 数字媒体与创意编程

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机程序设计基础（GE105）。本课程注重培养学生的创意编程思维,让学生在创造性的活动中学习电脑程序设计，在解决问题的过程中，培养探索式学习编程的能力。

CS204. Digital Media and Creative programming

Lecture，3 credits, Lab 1 Credit，4 hours per week. Pre-requesite：Computer programming fundamentals(GE105). This course aims to introduce creative thinking in programming via digital media. Students will be required to develop necessary skills of exploitory programming and complete a creative project.

GE105. 计算机编程基础

理论课，3 学分，4 学时/每周。本课程引导学生掌握计算机编程基本技巧。学生能基本掌握一门编程语言并能运用以解决简单的编程问题。

GE105. Computer programming fundamentals

Lecture，3 credits, 4 hours per week. This course introduces the fundamentals of object oriented programming language and programming techniques. In this course, the students will be familiar with a programming language and be able construct software for solving simple programming problems.

GE206. 计算机系统设计

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机程序编程基础（GE105）。本课程将介绍计算机编程高级技巧并能灵活运用。课程要求学生以解决一些实际问题来完成一项软件项目开发。

GE206. Computer system design

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesite：Computer programming fundamentals (GE105). This course aims to teach advanced skills of computer programming and apply them in developing a software project to solve some practical problems.

CS407. 虚拟现实技术

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机程序设计基础（GE105）。本课程介绍虚拟现实技术与系统以及相关实用应用技巧。课程要求学生以解决一些实际问题来完成一项虚拟现系统开发。

CS407.Virtual reality technology

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesite：Computer programming fundamentals(GE105). This course is to provide students with both a deep understanding of the fundamentals of Virtual Reality and to gain practical experience.Students will be required to develop a VR system to solve practical problems.

S303. 人工智能

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：离散数学（CS201）、概率与数理统计（MA212）. 通过对本课程的学习，使学生掌握人工智能技术的基本原理；了解启发式搜索策略、搜索问题、谓词逻辑与归结原理、知识表示、不确定性推理方法、机器学习和知识发现等目前人工智能的主要研究领域的原理、方法和技术。

CS303.Artificial intelligence

Lecture，3 credits, Lab 1 Credit，4 hoursper week. Pre-requesites：Discrete mathematics (CS201), probability and statistics (MA212). This course is a basic introduction to artificial intelligence covering fundamental material in problem solving, heuristic search, knowledge representation, deduction, planning, uncertain reasoning, learning, and natural-language processing.

CS409. 物联网技术

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机网络（CS305），面向对象分析与设计 （CS309）。本课程系统讲授无线网络，无线自组织网络，无线传感器网络，物联网的基本概念和原理，内容包括无线传感器节点，嵌入式软件设计，无线路由算法，数据融合技术，抗干扰和网络安全等。物联网的结构，相关技术和应用等也将包括在课程的

讲授内容中。学生将通过物联网实验平台获得对 Zigbee，WiFi，以及其它无线设备操作的实践能力。

CS409. Internet of things

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites：Computer Network (CS305)，Object Oriented Analysis and Design (CS309) . This course starts with the basic concept of wireless network, wireless ad hoc network, and then wireless sensor network. The essential techniques of wireless sensor nodes, embedded software design, routing algorithms, data fusion, interference, security, etc will be introduced as the foundation of Internet of Things (IoT). IoT architecture, associated techniques, and applications will be included in the module. The Lab sessions will offer opportunities to practice ZigBee, Bluetooth, WiFi and/or other low data rate, low communication range and low power consumption technologies.

CS30. 软件工程

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：：面向对象分析与设计（CS309）. 本课程系统讲授软件工程领域的基础知识、关键技术和典型应用，并通过小型的软件项目训练学生的实践能力。主要教学内容包括：软件生命周期，面向对象理论，软件项目管理，系统测试，系统模型，和软件项目风险管理等。

CS30. Software engineering

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesite：Object Oriented Analysis and Design (CS309). This course starts with the software lifecycle with emphasis on the different phases and methodologies available for development. It will cover the theory of object orientation, which will be demonstrated by use case diagrams, activity diagrams, sequence diagram, class diagrams and state diagrams. It will also introduce the management of software projects, the

testing of systems, alternative modeling techniques and software risk management. The lab session will be a group software project which will last for a whole semester.

CS401. 智能机器人

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：数据结构（CS203）、计算机组成原理（CS202）、计算机编程基础（GE105）。本课程系统讲授智能机器人领域的基础知识、关键技术和典型应用，并通过移动机器人实验平台训练学生的实践能力。主要教学模块包括：机器人世界，机构、形态与系统，机器人运动学，机器人传感器，机器人视觉与听觉，任务规划，运动规划，SLAM 以及服务机器人、特种机器人、智能人机交互等专题。通过编程实现避免碰撞的运动规划、地图构建等移动机器人功能的开发。

CS401. Intelligent Robots

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites: Data Structures (CS203), Computer Organization Principle (CS202), and Computer programming fundamentals (GE105) This course introduces fundamental knowledge, key techniques and typical applications in robotic fields and improves students’ practical abilities by using mobile robot experimental platforms. Main teaching modules include robot world, mechanism, configuration and system, kinetics, robot sensor, robot vision and audition system, task planning, motion planning, SLAM, and special topics on industrial robots, service robots and human robot interaction.

CS302.操作系统

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：嵌入式系统与微机原理（CS301）。本课程介绍计算机系统的进程与资源管理技术，包括计算机系统进程调度、内存管理、文件与设备管理、人机接口以及网络接口技术以及资源调度的基本方法，讨论计算机系统管理编

程方法，针对工程应用来设计合适的计算机操作系统。

CS302. Operating systems

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesite: embedded systems and microcomputer principle (CS301). This course introduces fundamental computer operation and management knowledge on scheduling, memory, file system, I/O peripheral, user interface, networking, as well as resource allocation methods. It will help students to develop programing skills for computer system management, and design proper operating systems for specific applications.

GE101. 计算机导论

理论课，3 学分，4 学时/每周。先修课程：无。本课程系统的介绍计算机科学的各类基础知识和最新进展，集中介绍计算机体系、操作系统与算法、编程语言与软件工程、数据结构与数据库，以及机器学习、移动计算、人工智能等前沿知识，提供一个完整的计算机科学的学课框架。

GE101. Introduction to Computer Science

Lecture，3 credits, 4 hours per week. Pre-requesites：None. This course systematically introduces the fundamentals and up-to-date developments of computer science, focusing on computer architecture, operating systems and algorithms, programming languages and software engineering, data structure and databases, as well as machine learning, mobile computing, and artificial intelligence, outlining a framework of various computer science knowledges.

CS405. 机器学习

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：线性代数（MA103b 、MA104b）概率与数理统计（MA212）。本课程着重介绍基于贝叶斯推理与基于人工神经网络的两种机器学习机制与算法，在监督学习与非监督学习的两种模式下，针对静态与时序数据进行特征提取、建立模型、模式识别、以及行为预测等各种处理。

CS405. Machine learning

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites：linear algebra(MA103b, MA104b), probability and statistics (MA212). This course focuses on introducing Bayesian inference and artificial neural network based machine learning mechanisms and algorithms, either supervised or unsupervised, to perform feature extraction, data modeling, pattern recognition, and behavior prediction, for both static data and sequential data samples.

CS302.操作系统

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：嵌入式系统与微机原理（CS301）。本课程介绍计算机系统的进程与资源管理技术，包括计算机系统进程调度、内存管理、文件与设备管理、人机接口以及网络接口技术以及资源调度的基本方法，讨论计算机系统管理编程方法，针对工程应用来设计合适的计算机操作系统。

CS302. Operating systems

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites: embedded systems and microcomputer principle (CS301). This course introduces fundamental computer operation and management knowledge on scheduling, memory, file system, I/O peripheral, user interface,

networking, as well as resource allocation methods. It will help students to develop programing skills for computer system management, and design proper operating systems for specific applications.

CS301. 嵌入式系统与微机原理

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：数字逻辑（CS207）. 本课程介绍微处理器系统的组织与结构和嵌入式系统编程技术，讨论微处理器系统设计的基本方法，面向单片机、常用外设以及数字逻辑电路的编程方法，以及针对工程应用，来设计合适的嵌入式系统的原理和方法。

CS301. Embedded system and microcomputer principle

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites：Digital Logic (CS207). This course introduces fundamental microprocessor architecture and organization knowledge on number system, digital logic, CPU, memory, I/O peripheral, as well as basic microprocessor system development skills including Assembly/C programming, logic circuit implementation, and embedded system integration, as well as embedded system design methods for specific applications.

CS208. 算法设计与分析

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：无。本课程介绍一些基本的算法，如分类算法，搜索算法，分治算法等，以及与这些算法相关的数据结构。通过本课程的学习，学生需要能理解并掌握这些算法以及实现这些算法的必要知识。

CS208. Algorithm design and analysis

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites：No. This course introduces basic algorithms, including sorting and searching, divide and conquer, etc.，and their related date structures, to undergraduate students with some programming skills. After completing this course, students should have a conceptual understanding of the algorithms and have necessary knowledge on implementing the algorithms.

CS305. 计算机网络

理论课，3 学分，其中实验 1 学分，4 学时/每周。先修课程：计算机组成原理（CS202）本课程介绍了计算机网络中数据通信与网络的基本知识，包括物理层、连接层、网络层、传输层以及应用层的原理与相关协议，以及针对计算机网络的搭建、设置、分析以及编程的各类技术。

CS305. Computer networks

Lecture，3 credits, Lab 1 Credit， 4 hours per week. Pre-requesites：Computer Organization Principle（CS202）. This course introduces fundamental communications and networking knowledge on physical, link, network, transportation, application layers, as well as basic network skills including setup, configuration, analysis and programming.

CS201. 离散数学

理论课，3 学分，3 学时/每周。先修课程：高等数学（MA101b、MA102b），线性代数（MA103b 、MA104b ）。本课程介绍学习计算机科学所需要的对离散对象研究所需要的数学工具，包括：数理逻辑与证明、归纳法、集合、函数、计数、离散概率论、递归、数论与密码学基础、

关系、树与图论。本课程主要以计算机应用为背景，学习解决相关计算机理论问题的解决方法与数学工具。

CS201. Discrete mathematics

Lecture，3 credits, 3 hours per week. Pre-requesites：Calculus I, II (MA101b ,MA102b), Linear Algebra I (MA103b, MA104b) . This course presents basic concepts in discrete mathematics needed for the study of computer science: logic and proofs, induction, set theory, functions, counting techniques, discrete probability, recursion, basic number theory and cryptography, relations, trees and graph theory. The approach of this course is specifically computer science application oriented.

CS315. 信息论与编码

理论课，2 学分，2 学时/每周。先修课程：高等数学（MA101b、MA102b），线性代数（MA101b、MA102b），概率与数理统计（MA212）本课程作为信息论和编码理论的入门课程，将首先介绍信息熵等基本概念，之后主要介绍信息论的两大基本内容：信源编码和信道编码。最后，本课程将介绍一些相关的信道纠错编码技术。

CS315. Information theory and coding

Lecture，2 credits, 2 hours per week. Pre-requesites：Calculus I, II (MA101b 、MA102b), Linear Algebra I (MA101b、MA102b). This course provides an introductory look into the broad areas of information theory and coding theory. As stated in the textbook, “Information theory answers two fundamental questions in communication theory: what is the ultimate data compression (answer: the entropy H) and what is the ultimate transmission rate of communication (answer: the channel capacity C). In later stages of this course, some coding techniques will be discussed.

CS309. 面向对象分析与设计

理论课，3 学分，其中实验 1 学分，3 学时/每周。先修课程：数据结构（CS203）、计算机组成原理（CS202）、计算机程序设计基础（GE105）。本课程在介绍面向对象的基本原理、统一建模语言 UML 的基础上，主要讲述面向对象的需求获取、系统分析、系统设计、设计原则、设计模式、实现方法以及测试，此外还将论述编程范式和软件开发方法学。

CS309. Object Oriented Analysis and Design

Lecture，3 credits, Lab 1 Credit，3 hours per week. Pre-requisites：Data Structures (CS203), Computer Organization Principle (CS202), and Computer programming fundamentals (GE105). This course introduces the fundamental concepts such as object oriented and united modeling language (UML), then mainly explores the requirement elicitation, system analysis, system design, design principles, design pattern, implementation and test. And the programming paradigms and software development methodologies will be discussed.

电子与电气工程系

EE104 电路基础 （2）

理论课，2 学分，2 学时/每周。课堂外课时，四课时。先修课程：高等数学（上）(GE101)。本课程介绍了直流电路的基本概念、基本定律及分析方法，基本运算放大电路，一阶电路，二阶电路，交流电路的基本概念、基本定律及分析方法，正弦稳态电路，交流功率分析，三相交流电路，磁耦合电路，频率响应，傅里叶级数与傅里叶变换。

EE104. Fundamentals of Electric Circuits（2）

Lecture, 2 credits, 2 hours per week. Prerequisites: Calculus I (GE101). This course introduces Basic concepts, laws and analysis methods of DC circuits; Operational amplifiers; First-order circuits; Second-order circuits; Basic concepts, laws and analysis methods of AC circuits; Sinusoidal steady-state analysis; AC power analysis. Three-phase circuits. Magnetically coupled circuits. Frequency response. The Fourier series and Fourier Transform.

EE106 光电子导论 （2）

理论课，2 学分，2 学时/每周。本课程适合本科一年级。通过该课程的学习，激发学生对光电子学科的兴趣。通过该课程，学生将了解：光电子基础知识，激光器，光纤通信，液晶显示技术，LED, 全息技术等知识。

EE106. Introduction to Optoelectronic （2）

Lecture, 2 credits, 2 hours per week. This course is suitable for first-year undergraduates. It is designed to stimulate students’ interest in the subject of photoelectrons. In the class, students will learn: Optoelectronic basics, lasers, optical fiber communications, LCD technology, LED, holography technology, and other knowledge.

EE201 模拟电路 （4）

理论课及实验课，4 学分（含 1 个实验学分），5 学时/每周。课程主要内容包括常用半导体器件、基本放大电路、多级放大电路、集成运算放大电路、放大电路的频率响应、放大电路中的反馈、信号的运算和处理、波形的产生和信号的转换、功率放大电路等。

EE201. Analog Circuits （4）

Lecture and experiment, 4 credits, 5 hours per week. This course covers several topics, including the theory of semiconductors, basic amplifying circuits, multi-stage amplifiers, frequency analysis,

feedback circuits, signal processing circuits, waveform generation circuits, power amplifiers, and so on.

EE202 数字电路 （4）

理论课及实验课，4 学分（含 1 个实验学分），5 学时/每周。先修课程：模拟电路（EE201）。本课程是电子系各专业基础课。本课程主要内容包括数制和码制，逻辑代数基础及逻辑函数，门电路，组合逻辑电路，触发器，时序逻辑电路，半导体存储器，可编程逻辑器件，脉冲波形产生和整形，数/模及模/数转换等。

EE202. Digital Circuits （4）

Lectures and experiment, 4 credits, 5 hours per week. Prerequisites: Analog Circuit (EE201). Foundation course for all majors of EE. Contents: Numeral system and code system, basis of logic algebra and logic function, gate circuits, combinational logic circuits, triggers, sequential logic circuits, semiconductor memory, programmable logic devices, generation and shaping of pulse waveform, and D/A and A/D conversion.

EE203 固态电子学 （3）

理论课，3 学分，3 学时/每周。本课程教学要求学生基本掌握电子材料和电子器件的基础知识， 包括材料科学的基本概念，分子动力学基础，晶体结构及缺陷，电导和热导，量子物理基础，现代物理理论基础，p-n 结的基本原理；发光器件的基本原理和结构。

EE203. Solid - State Electronics (3)

Lecture, 3 credits, 3 hours per week. The course will introduce students to the materials science and engineering behind semiconductor devices, including their applications and processing. Topics for the course include: kinetic molecular theory and thermally activated processes; electrical and thermal conductivity of metals and semiconductors; introductory quantum

mechanics for materials science; band structure; intrinsic and extrinsic semiconductors.

EE204 半导体器件导论 (3)

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。讲授半导体器件的基础物理知识如载流子传输，双极性传输，非平衡过剩载流子，以及各种半导体器件如 PN 二极管，发光二极管，太阳能电池，MOS 电容，场效应晶体管等。

EE204.Introduction to Semiconductor Devices （3）

Lectures and experiment, 3 credits, 4 hours per week. The aim of this course is to introduce the basic physics of semiconductor devices. Carrier transport, ambipolar transport, non-equilibrium excess carrier and various semiconductor devices like PN diodes, light-emitting diodes, solar cells, MOS diodes, MOSFETs and etc.

EE205 信号和系统（3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：高等数学 I、II（GE101、GE102）。本课程是微电子科学与工程、通信工程、材料科学与工程的重要专业类课程之一。本课程的任务是使学生获得研究信号分析和系统分析的基本概念和基本分析方法，掌握卷积、线性时不变系统、信号与系统的时域、变换域分析方法，理解主要变换(傅里叶级数和傅里叶变换)的基本内容、性质与应用，采样原理和基本通信系统。特别要建立信号与系统的频域分析以及系统函数的概念以便为学生进一步学习、研究有关通信理论、控制理论、数字信号处理等打下基础。

EE205. Signals and Systems (3)

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: Calculus I (GE101), Calculus II (GE102). This course introduces convolution, LTI systems, continuous-time Fourier series, the continuous-time Fourier transform, discrete-time Fourier series, the discrete-time Fourier

transform, sampling, introduction to amplitude and angle modulations.

EE206 通信原理 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：高等数学（上）、（下）（GE101，GE102），线性代数 I（GE103b），概率论与数理统计（MA204b），信号和系统（EE205）。本课程介绍基本的模拟与数字通信技术，包括模拟幅度调制、模拟频率调制、模拟相位调制、基带和带通数字信号的传输，基本的信噪比分析等。

EE206. Communications Principles（3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: Calculus I (GE101), Calculus II (GE102), Linear Algebra I (GE103b), Probability Theory and Statistics (MA204b), Signals and Systems (EE205). This course introduces amplitude modulation, phase modulation, frequency modulation, noise in communication systems, digital representation of analog signals, baseband digital transmission, digital band-pass transmission, etc.

EE208 工程电磁场理论 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：高等数学（上）(GE101)，高等数学 （下）(GE102)，线性代数 I (GE103b)，电路基础(EE104)。本课程主要介绍矢量分析，库伦定律和电场强度，电通量密度和高斯定律，能量和电位，导体、电介质和电容，恒定磁场与磁性材料，时变电磁场和麦克斯韦方程，传输线，平面电磁波，导行电磁波。

EE208. Data structures and algorithm analysis （3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: Calculus I (GE101), Calculus II (GE102), Linear Algebra I (GE103b), Fundamentals of electric circuits (EE104). This course introduces vector analysis, coulomb’s law and electric field intensity, electric flux density and Gauss’s law, energy and potential, conductors, dielectrics and capacitance, the steady magnetic field and magnetic materials. time-varying fields and Maxwell’s equations, transmission lines, the uniform plane wave, guided waves.

EE301 现代电子科学与技术前沿讲座 I （1）

理论课，1 学分，1 学时/每周。本课程主要介绍微电子科学与工程、光电子科学与工程、通信工程领域的学科前沿进展，分 9 个专题讲座。主讲教师均由在某一学科领域长期从事科学研究的学科带头人或学术骨干担任。其主要作用是拓宽学生知识面和视野，了解相关学科的最新进展，培育创新精神和启发科研思路，加深理解基础理论的学习在科学研究中的作用，了解科学研究的一般规律，为今后的工作奠定基础。

EE301. Frontier Seminars in Modern Electronic Science and Technology I （1）

Lecture, 1 credit, 1 hour per week. This course consists of nine lectures on frontiers of Microelectronics, Optoelectronics, and Communication Engineering. The lectures are given by leading scientists in the relevant fields. The objective of this course is to introduce the students new developments in the fields of Microelectronics, Optoelectronics, and Communication Engineering, broadening the students’ knowledge and fostering their innovativespirit.

EE302 现代电子科学与技术前沿讲座 II（1）

理论课，1 学分，1 学时/每周。本课程主要介绍微电子科学与工程、光电子科学与工程、通信工程领域的学科前沿进展，分 9 个专题讲座。主讲教师均由在某一学科领域长期从事科学研究的学科带头人或学术骨干担任。其主要作用是拓宽学生知识面和视野，了解相关学科的最新进展，培育创新精神和启发科研思路，加深理解基础理论的学习在科学研究中的作用，了解科学研究的一般规律，为今后的工作奠定基础。

EE302. Frontier Seminars in Modern Electronic Science and Technology II （1）

Lecture, 1 credit, 1 hour per week. This course consists of nine lectures on frontiers in Microelectronics, Optoelectronics, and Communication Engineering. The lectures are given by

leading scientists in the relevant fields. The objective of this course is to introduce the students to new developments in the fields of Microelectronics, Optoelectronics, and Communication Engineering, broadening the students' knowledge and fostering the students' innovative spirit.

EE303 光电子技术基础 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程适合光电子、微电子专业本科三年级，是非常基本并且重要的。通过该课程的学习，学生将了解和掌握光电子学的许多方面：例如，光在介质中的传播，波导光学和光纤，光的偏振和调制，发光二极管、激光、光电二极管和探测器，使得学生对光学领域知识有着系统，全面，和深刻的理解。

EE303. Fundamentals of Optoelectronic Technology （3）

Lecture and experiment, 3 credits, 4 hours per week. This course is suitable for optoelectronic and microelectronic year three undergraduates, as it is very basic yet important. In this class, students will understand and grasp several aspects of photonics: the propagation of light in the medium, optical waveguides and optical fibers, polarization and modulation, light emitting diodes, lasers, photodiodes and detectors, which allows students to systematically comprehend and understand optics domain knowledge.

EE304 集成电路设计 (3)

理论课及实验课，3 学分（含 2 个实验学分），5 学时/每周。先修课程: 数字电路(EE202)，半导体器件导论(EE204)。本课程主要介绍了现代 CMOS 超大规模集成电路设计的基本概念和方法，CMOS 器件与模型，CMOS 工艺过程和设计规则，静态与动态逻辑门，延时和功耗分析，版图设计，用业界标准的 EDA 设计工具进行设计实践。

EE304. Integrated Circuit Design（3）

Lecture and experiment, 3 credits, 5 hours per week. Prerequisites: Digital Circuits (EE202),

Introduction to Semiconductor Devices (EE204). This course introduces basic concepts and methodologies in modern CMOS VLSI design, CMOS devices and modeling, CMOS process and design rules, static and dynamic logic gates, delay and power consumption analysis, layout design, industry standard EDA tools in designing integrated circuits.

EE305 集成电路工艺原理（3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：大学物理（PHY101），半导体器件导论（EE204）。

EE305. Introduction to VLSI Technology （3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: College physics (PHY101), Introduction to Semiconductor Devices (EE204). This course introduces fundamental processing technology in microelectronic fabrication. Topics include semiconductor substrates, thermal processing (oxidation, diffusion, rapid-thermal annealing), ion implantation, lithography, thin film deposition (physical and chemical), etching (wet, dry plasma and ion milling), vacuum systems (principle and design), and process yields. In addition to unit processes, this course discusses process integration for the fabrication of MOSFETs, BJTs, opto-electronic devices, and solar cells. Emphases are placed on the theoretical analysis of the chemical and physical models of the process technologies. Processing simulation is also explored to provide virtual fabrication experience.

EE306 微机电系统基础（3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：大学物理（PHY101），集成电路工艺原理（EE305）。

EE306. Introduction to MEMS （3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: College physics (PHY101), Introduction to VLSI Technology (EE305). This course introduces 1) the operation principles of typical MEMS transducers and sensors, and 2) the design and fabrication of MEMS devices. In addition to theoretical modeling, this course emphasizes the exploration of commercially viable MEMS products for applications in electronics, sensors, communications, and biomedical engineering. Topics covered in this course include various transduction and mechanical sensing mechanisms (capacitive, piezoelectric, piezoresistive, magnetic, and thermal), and MEMS fabrication technologies (silicon bulk and surface micromachining, planar thin-film processing, wafer bonding, etching, and lithography). Computer-aided design of MEMS devices are discussed through MEMS layout and multi-physics simulation software.

EE307 天线与电波传播 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。课程主要介绍了有关天线与电波传播的基本理论。天线部分涵盖了天线基础知识、简单线天线、行波天线、非频变天线、缝隙天线与微带天线、手机天线、测向天线、面天线、新型天线；电波传播部分涵盖了电波传播的基础知识、地面波传播、视距传播、常用的几种电波传播模型和衰落信道模型，以及移动和无线通信信道测量与建模方法。

EE307. Antennas and Radio Propagation （3）

Lecture and experiment, 3 credits, 4 hours per week. This course covers the fundamental topics in antennas and propagation. It is composed of two parts: one part on antennas and another on propagation. The antennas section covers dipole and monopole antennas, microstrip and slot antennas, wideband and frequency-independent antennas. The propagation section coversbasic path loss models, large-scale and small-scale fading, channel measurements and channel modeling.

EE308 光纤通信原理与技术 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程适合光电子、通信专业本科三年级。通过该课程的学习，学生将掌握光纤通信的基本原理和技术，了解光纤通信相关的各种器件。了解从光纤结构、光源、光功率发射与耦合、光检测接收到波分复用、光放大器以及非线性效应等知识。

EE308. Fiber Communication Principles and Techniques （3）

Lecture and experiment, 3 credits, 4 hours per week. This course is suitable for optoelectronics, communications undergraduate year 3 undergraduate. Through this course, students will master the basic principles and techniques of optical fiber communication, understanding the various components related to optical fiber communication. They will learn about fiber structure, light source, optical power transmission and coupling, optical detector receives, WDM, optical amplifiers, and nonlinear effects of such knowledge .

EE309 半导体光学导论（3）

理论课，3 学分，3 学时/每周。先修课程：固态电子学（EE203）。本课程为光电信息科学与工程专业核心课，是光电子技术基础、显示与照明技术课程先修课程；本课程不仅适用于光电专业的学生，也适用于学习物理、材料科学与工程的学生。本课程介绍半导体的光学性质，比如：透射光谱、反射光谱、荧光光谱以及在红外、可见、近紫外波段的复介电函数等，使学生对半导体光学的基本概念和基本物理基础有一个清晰透彻的理解。

E309. Introduction to semiconductor optics （3）

Lecture, 3 credits, 3 hours per week. Prerequisites: Solid-State Electronics（EE203）. This course is one of the core courses for students with a major in Optoelectronic Information Science and Technology. It is a prerequisite for Optoelectronic Technology, Display and Lighting Technology.

This course is also suitable for students of physics and Materials Science. The aim of this course is to introduce the optical properties of semiconductors, e.g., the spectra of transmission, reflection and luminescence, or of the complex dielectric function in the infrared, visible and near-ultraviolet part of the electromagnetic spectrum. We want to evoke in the reader a clear and intuitive understanding of the physical concepts and foundations of semiconductor optics and of some of their numerous applications. To this end, we try to keep the mathematical apparatus as simple and as limited as possible in order to not conceal the physics behind mathematics.

EE310 激光原理与技术 （3）

理论课，3 学分，3 学时/每周。本课程为光电专业必修课，主要阐述激光器的基本原理、理论与应用。学生在完成本课程学习后，应能够掌握：（1）激光原理的基本知识、激光特性，了解激光器的组成；（2）了解光谐振腔模式的波动理论；（3）掌握谱线加宽的机制、速率方程理论的分析方法、以及均匀加宽和非均匀加宽工作物质的增益系数的特性；（4）掌握激光振荡特性；了解弛豫振荡和线宽等概念。

EE310. Principles and Technologies of Lasers （3）

Lecture, 3 credits, 3 hours per week. This course should be taken by everyone in Optoelectronics Science and Technology, as it includes the basic principles of lasers, mechanisms and applications. After the completion of this course, students should know the following items: (1) The basic knowledge, characteristics, and the components of lasers, (2) The ray and wave propagation theory for cavities (3) Line broadening mechanisms, the analysis method of the rate equation, and the characteristics of gain coefficient for various kinds of materials, (4) The oscillation characteristics of a laser, the relaxation oscillation frequency and linewidth of lasers etc.

EE311 光学设计（3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。光电信息科学与工程专业核心课程。先修课程：近代光学（PHY206）。课程主要介绍光学设计概述，LED 芯片与封装光学

设计，自由曲面光学设计算法，自由曲面光学在固态照明领域的应用，LED 照明设计，初级像差理论与像差校正，像质评价，公差分析，目视光学系统设计，照相物镜设计，投影仪光学设计等。

EE311. Optical design (3)

Lecture and experiment, 3 credits, 4 hours per week. Prerequisites: Optics (PHY206). This is a core course for the Major of Optical Information Science and Engineering. This course mainly introduces the introduction of optical design, optical designs for LED chip and package, algorithms of freeform optics, freeform optical design for solid state lighting, LED illumination design, primary aberration theory and aberration correction, image evaluation, tolerance analysis, design for visual optical system, design of photographic lens, and design of projector optical system.

EE313 无线通信 (3)

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程介绍无线通信系统的基本理论、技术问题、设计思路和分析方法，包括无线信道模型、无线信道容量、无线通信中的调制编码技术及分集处理技术、多天线系统、多载波调制、自适应调制与编码、扩频通信、蜂窝系统及无线自组织网络等。

EE313. Wireless communications (3)

Lecture and experiment, 3 credits, 4 hours per week. The purpose of this course is to introduce fundamental principles and technical challenges underlying wireless communications, including wireless channel characteristics, wireless channel capacity, digital modulation/detection and coding over wireless channels, diversity, multiple antennas and space-time communications, multicarrier modulation, adaptive modulation and coding, spread spectrum, cellular systems, Ad Hoc wireless networks, etc.

EE314 通信系统设计 I (2)

实验课，2 学分（含 2 个实验学分），4 学时/每周。本课程介绍通信系统设计的基本理论和知识，重点介绍数字滤波器的基本原理、蜂窝通信系统设计以及低功耗蓝牙网络和 Zigbee 网络的设计、应用和分析。具体知识点包括非递归滤波器（FIR filters）、递归滤波器（IIR filters）、扩频通信、蜂窝通信系统、蓝牙 BLE 网络和 Zigbee 网络等。

EE314. Communications System Design I （2）

Experiment, 2 credits, 4 hours per week. The purpose of this course is to introduce fundamental principles and concepts for the design of communication systems and networks, including digital filters (FIR filters and IIR filters), spread spectrum, cellular communication systems, Bluetooth BLE networks, Zigbee networks, etc.

EE315 数据通信和网络 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：计算机程序设计基础（GE105），通信原理（EE206）。本课程介绍有关物理层、连接层、网络层、传输层、应用层等通信与网络知识。本课程需学习计算机网络开发的基本技能安装、设置、数据分析、以及编程，字母打分。

EE315. Data Communications and Networking （3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisite: Basics of Computer Programming Design（GE105）. This course is an introduction to fundamental communications and networking knowledge on physical, link, network, transportation, and application layers. Basic network skills including setup, configuration, analysis and programming. Letter grading.

EE316 微波工程 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。课程包括微波传输线和微波网络的基本理论介绍，并包括组成通信系统的基本器件，例如谐振器、功分器、耦合器、滤波器、放大器、混频器等。

EE316. Microwave Engineering （3）

Lecture and experiment, 3 credits, 4 hours per week. This course covers the fundamental theory of microwave transmission line and network. It also introduces the basic components in a communication system, including resonator, power divider, directional coupler, filter, amplifier, mixers and so on.

EE317 电子科学创新实验 I （1）

实验课，1 学分（含 1 个实验学分），2 学时/每周。选修此课程的学生需要选择电子系教授作为导师，并在其指导下从事科研工作。本课程希望通过让学生参与教授的科研工作，培养学生的科学素养和创新思维。同时，接触世界前沿的科学知识，了解先进科研仪器，为未来发展打下良好基础。

EE317. Advanced Electronic Science Experiment I （1）

Experiment, 1 credits, 2 hours per week. Students who take this elective course first need to select a professor of from EE department as his/her supervisor, and conduct scientific research under that professor’s supervision. This course aims to improve students’ scientific literacies and innovation abilities by taking part in scientific research, guided by the professors. Meanwhile, through this course, students are expected to lay a good foundation for their future development by learning cutting-edge scientific knowledge and working on advanced scientific instruments.

EE318 电子科学创新实验 II （1）

实验课，1 学分（含 1 个实验学分），2 学时/每周。选修此课程的学生需要选择电子系教授作为导师，并在其指导下从事科研工作。本课程希望通过让学生参与教授的科研工作，培养学生的科学素养和创新思维。同时，接触世界前沿的科学知识，了解先进科研仪器，为未来发展打下良好基础。

EE318. Advanced Electronic Science Experiment II （1）

Experiment, 1 credits, 2 hours per week. Students who take this elective course first need to select a professor of from EE department as his/her supervisor, and conduct scientific research under that professor’s supervision. This course aims to improve students’ scientific literacies and innovation abilities by taking part in scientific research, guided by the professors. Meanwhile, through this course, students are expected to lay a good foundation for their future development by learning cutting-edge scientific knowledge and working on advanced scientific instruments.

EE319 嵌入式系统与微机原理 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。先修课程：计算机程序设计基础（GE105），数字电路（EE202）。本课程介绍有关数字系统、数字逻辑、中央处理器、进出口外设等计算机基本组织与结构知识。本课程需学习计算机系统开发的基本技能：汇编语言、C 语言、以及 HDL 语言编程，逻辑电路实现，以及嵌入式系统集成。字母打分。

EE319. Embedded System and Microcomputer Principle （3）

Lecture and experiment, 3 credits, 4 hours per week. Prerequisite: Basics of Computer Programming Design（GE105）, Digital Circuit（EE202）. This course is an introduction to fundamental computer architecture and organization knowledge of number systems, digital logic,

CPU, memory, and peripheral I/O. Basic computer system development skills include assembly/C/HDL programming, logic circuit implementation, and embedded system integration. Letter grading.

EE320 集成电路工艺实践 (3)

理论课及实验课，3 学分（含 1.5 个实验学分），4.5 学时/每周。本课程介绍硅超大规模集成电路芯片生产制造相关的实际工艺技术，讲解这些工艺技术背后的科学工艺过程的物理图像以及测量方法，包括 CMOS 工艺技术，光刻，刻蚀，薄膜沉积，真空技术，离子注入，化学物理沉积，等离子体技术，薄膜分析等等。

EE320. Silicon VLSI Technology, Fundamentals, Practice and Modeling (3)

Lecture and experiment, 3 credits, 4.5 hours per week. This lecture focuses on the basic features of silicon integrated circuits manufacturing， including their distinctions and common underlying principles, such as: CMOS Technology, lithography, etching, various deposition techniques, vacuum technology, evaporation, ion implantation, epitaxy, chemical vapor deposition, plasma, film analysis.

EE321 光谱技术与应用（3）

理论课，3 学分，3 学时/每周。本课程将系统介绍现代激光光谱学中的基本理论、方法和应用。内容较丰富，涵盖了激光光谱学中众多分支。教学内容主要包括：简介；光的吸收和发散；光谱仪；激光光谱光源；非线性光谱；激光拉曼光谱；光泵谱和双共振技术；时间分辨的激光光谱；相干光谱；碰撞过程中的激光光谱；激光光谱新进展；激光光谱的应用等。

EE321. Spectral Technology and Application（3）

Lecture, 3 credits, 3 hours per week. This course introduces the basic theory, methods and application of spectral technology and covers a wide range of branches in spectral technology. The main areas of the course are: introduction, light absorption and distribution, spectrograph, laser light sources, nonlinear laser spectroscopy, laser Raman spectroscopy, optical pumping and double resonance technology, time-resolved spectra, coherent spectroscopy, laser spectroscopy in collision, new developments in laser spectroscopy, applications of laser spectroscopy, etc.

EE322 光电器件工艺与实践 （2）

理论课及实验课，2 学分（含 1 个实验学分），3 学时/每周。本课程讲授各种光电器件如发光二极管、太阳能电池、薄膜晶体管的工作原理、制造工艺、及测试表征技术。学生需参与到实验中，并亲自制作、表征各种光电器件。

EE322. Optoelectronics Devices Fabrication Laboratory（2）

Lecture and experiment, 2 credits, 3 hours per week. The purpose of this course is to introduce the working mechanisms, fabrication and characterization technologies of various optoelectronics devices like light-emitting diodes, solar cells, thin-film transistors, etc. Laboratory course requiring hands-on work in fabricating LEDs, OPVs and TFTs. Process modules including photolithography, etching, spin-coating, sputtering, evaporation, plasma enhanced chemical-vapor deposition will be covered. Student will also learn to characterize fabricated devices.

EE323 数字信号处理 (3)

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程介绍数字信号处理的基本理论和知识，重点介绍离散时间信号和系统的 z 变换，傅里叶变换及其快速实现，滤波器

设计，功率谱估计方法，具体知识点包括：非递归滤波器（FIR filters）、递归滤波器（IIR filters）、经典功率谱估计， 参数模型功率谱估计 ，维纳滤波器 ，自适应滤波器等。

EE323. Digital Signal Processing (3)

Lecture and experiment, 3 credits, 4 hours per week. The purpose of this course is to introduce fundamental principles and concepts in the area of digital signal processing, including z-transformation, fast Fourier transformation, digital filters (FIR filters and IIR filters), classical and parametric power spectrum estimation, Wiener filtering, adaptive filtering, etc.

EE324 激光微加工 （3）

理论课，3 学分，3 学时/每周。本课程将系统介绍微纳米尺度激光材料加工过程。本课程主要内容包括以下几个部分：激光烧蚀的理论；激光精密微细加工的激光器件和光学系统；激光材料相互作用的基本原理及其在多尺度表面改性中的应用；超快激光制造技术中的时间脉冲剪裁。激光纳米操纵、细胞和组织运输；纳米材料的激光合成；超快激光微纳结构制备；微机械加工与图形化；混合激光加工透明材料；钻孔、切割、焊接、打标等。

EE324. Laser Microfabrication （3）

Lecture, 3 credits, 3 hours per week. This course introduces the process control in laser material processing for the micro and nanometer scale. The main contents include the following parts: the theory of laser ablation; laser devices and optical systems for laser precision microfabrication; fundamentals of laser-material interaction and application to multiscale surface modification; temporal pulse tailoring in ultrafast laser manufacturing technologies; laser nanosurgery, manipulation, and transportation of cells and tissues; laser synthesis of nanomaterials; ultrafast laser micro- and nanostructuring; micromachining and patterning; hybrid laser processing of transparent materials; drilling, cutting, welding, marking and microforming.

EE325 非线性优化技术（3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程介绍非线性优化概念及其在电子及电气方向上的应用。内容包括经典优化算法、无约束/有约束优化、基于梯度/免梯度算法等。本课程还介绍现代建模和优化方法包括基于知识的方法比如替代模型及空间映射算法，全局优化算法如粒子群算法等。本课程的例子和小课题主要集中在电气工程方面。

EE325 Nonlinear Optimization Techniques for Electrical Engineering (3)

Lectures and Labs, 3 credits (including 1 lab credit), 4 hours per week. This course addresses concepts in nonlinear optimization with illustrations and examples in electrical applications. We introduce classical optimization methods. We include topics in unconstrained/constrained and gradient-based/non-gradient optimization approaches. The course also addresses recent advances in modeling and optimization of research relevant to electrical engineering. These include knowledge based methods such as surrogate and Space Mapping (SM) optimization and global optimization approaches such as particle swarm optimization (PSO). The examples and projects mainly focus on applications relevant to electrical engineering.

EE401 现代电子科学与技术前沿讲座 III（1）

理论课，1 学分，1 学时/每周。本课程是专业核心课，主要介绍微电子科学与工程、光电子科学与工程、通信工程领域的学科前沿进展，分 9 个专题讲座。主讲教师均由在某一学科领域长期从事科学研究的学科带头人或学术骨干担任。其主要作用是拓宽学生知识面和视野，了解相关学科的最新进展，培育创新精神和启发科研思路，加深理解基础理论的学习在科学研究中的作用，了解科学研究的一般规律，为今后的工作奠定基础。

EE401. Frontier Seminars in Modern Electronic Science and Technology III（1）

Lecture, 1 credits, 1 hours per week. This course consists of nine lectures on frontiers in Microelectronics, Optoelectronics, and Communication Engineering. The lectures are given by leading scientists in the relevant fields. The objective of this course is to introduce to the students the new developments in the fields of Microelectronics, Optoelectronics, and Communication Engineering, broadening the students' knowledge and fostering the students' innovative spirit.

EE402 现代电子科学与技术前沿讲座 IV（1）

理论课，1 学分，1 学时/每周。本课程为专业选修课，主要介绍微电子科学与工程、光电子科学与工程、通信工程领域的学科前沿进展，分 9 个专题讲座。主讲教师均由在某一学科领域长期从事科学研究的学科带头人或学术骨干担任。其主要作用是拓宽学生知识面和视野，了解相关学科的最新进展，培育创新精神和启发科研思路，加深理解基础理论的学习在科学研究中的作用，了解科学研究的一般规律，为今后的工作奠定基础。

EE402. Frontier Seminars in Modern Electronic Science and Technology IV（1）

Lecture, 1 credits, 1 hours per week. This course consists of nine lectures on frontiers in Microelectronics, Optoelectronics, and Communication Engineering. The lectures are given by leading scientists in the relevant fields. The objective of this course is to introduce the students to new developments in the fields of Microelectronics, Optoelectronics, and Communication Engineering, broadening the students' knowledge and fostering the students' innovative spirit.

EE403 显示与照明技术导论（2）

理论课，2 学分，2 学时/每周。本课程讲授先进显示技术及当前研究前沿，包括显示技术基

础，液晶显示，有机电致发光显示，显示驱动等，以及现代半导体照明技术及当前研究前沿，包括 GaN 外延生长，LED 芯片，LED 封装，LED 应用技术等。

EE403. Introduction to Display and Lighting Technologies （2）

Lecture, 2 credits, 2 hours per week. The purpose of this course is to introduce advanced display technologies including display optics, liquid-crystal displays, organic light-emitting displays, thin-film-transistor driving technologies, etc. Cutting-edge research on display will also be covered. And to introduce current lighting technologies with particular emphasis on LED and OLED lighting technologies, including GaN epitaxial growth, LED chip, LED packaging, LED application technologies, etc.

EE405 电子科学创新实验 III （1）

实验课，1 学分，2 学时/每周。选修此课程的学生需要选择电子系教授作为导师，并在其指导下从事科研工作。本课程希望通过让学生参与教授的科研工作，培养学生的科学素养和创新思维。同时，接触世界前沿的科学知识，了解先进科研仪器，为未来发展打下良好基础。

EE405. Advanced Electronic Science Experiment III （1）

Experiment, 1 credits, 2 hours per week. Students who take this elective course first need to select a professor of from EE department as his/her supervisor, and conduct scientific research under that professor’s supervision. This course aims to improve students’ scientific literacies and innovation abilities by taking part in scientific research, guided by the professors. Meanwhile, through this course, students are expected to lay a good foundation for their future development by learning cutting-edge scientific knowledge and working on advanced scientific instruments.

EE407 能量采集技术 (3)

理论课，3 学分，3 学时/每周。先修课程：大学物理(PHY101)，集成电路工艺原理 (EE305)，微机电系统基础(EE306)。

EE407. Energy Harvesting Technologies （3）

Lecture, 3 credits, 3 hours per week. Prerequisites: College Physics (PHY101), Introduction to VLSI Technology (EE305), Introduction to MEMS (EE306). This course introduces energy harvesting technology for wireless electronics. This course will introduce the energy conversion technologies such as piezoelectric, electrostatic and electromagnetic methods for vibration energy harvesting, thermoelectric materials for energy harvesting from heat flow, thin film solar cells and bio-materials for energy harvesting. In addition, this course will also cover the topics on the application of energy harvesting devices, such as the electronic system, RF ID and embedded sensor nodes with the energy harvesters.

EE409 超快光子学 (3)

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。本课程是光信息科学与技术专业的主干专业课，学生将掌握超快激光脉冲的基本知识，学会并了解超快激光的性质与应用，深入理解物理概念。

EE409. Ultrafast Photonics （3）

Lecture and experiment, 3 credits, 4 hours per week. This course is the core course for students in Optoelectronics Science and Technology. Students will learn the basic principle of ultrafast short pulse, learn and cultivate the ability to analyze and solve the problems in the field of ultrafast photonics, and develop an in-depth understanding of their physical concepts.

EE411 信息论与编码（2）

理论课，2 学分，2 学时/每周。先修课程: 高等数学（上）(GE101),高等数学（下） (GE102), 线性代数 I(GE103b), 概率论与数理统计(MA204b)

EE411. Information Theory and Coding (2)

Lecture, 2 credits, 2 hours per week. Prerequisites: Calculus I (GE101), Calculus II (GE102), Linear Algebra I (GE103b), Probability Theory and Statistics (MA204b). This course introduces probability review, entropy, relative entropy, mutual information, chain rules, inequalities, AEP, The Kraft inequality, optimal codes, Huffman codes, entropy rate, discrete channels, channel coding theorem, Gaussian channels, rate distortion theory, linear block codes, cyclic codes, BCH codes, Hamming codes, convolutional codes, Viterbi decoding algorithm.

EE417 通信系统设计 II （2）

实验课，2 学分，4 学时/每周。课程主要介绍通信系统中前端器件的设计，主要包括天线与天线阵列设计、滤波器理论与设计和微波器件的优化理论。

EE417. Communications System Design II (2)

Experiment, 2 credits, 4 hours per week. This course covers the design techniques of front-end devices in a communication system. It mainly includes antenna and antenna array design, filter theory and optimization techniques for microwave devices.

EE419 生物传感器 （3）

理论课及实验课，3 学分（含 1 个实验学分），4 学时/每周。生物传感器是一种包含物理或化学传感器的生物敏感元件，它用于检测特定生物化合物的存在，对于高等生物科技和生命科学研究起着至关重要的作用。生物传感器在医学研究，临床诊断，食物及环境检测，生物科技应用等方面都有着广泛的应用。通过这门课程的课堂讲义以及实验课程部分，学生们可

以掌握到基础的传感原则和传感元素（化学，生物化学，光学及半导体）。同时，学生也可以学习到与传感原理相结合的多种应用实例。这门课程并不需要学生们有生物方面的基础。生物传感课程会让学生更好的迎接即将到来的生物科技和纳米科技时代。

EE419. Biosensors (3)

Lecture and experiment, 3 credits, 4 hours per week. Biosensors are devices that combine a biologically sensitive element with a physical or chemical transducer to detect the presence of specific biological compounds, and play a key role in advancing biotechnology and life science research. They are applied in medical research and clinical diagnosis, food and environmental testing, and biotechnology applications. Through this course, students will learn the basic sensing principles and sensing elements (chemical, biochemical, optical, semiconductor) through series of lectures and labs. Students will also learn various application examples associated with those sensing principles. This course will better prepare students for the up-and-coming biotechnology and nanotechnology era. No prior knowledge or experience in biology is required.

ESE407 .Introduction to Numerical Simulation Methods (3)

Lecture，3credits, 3hours per week. This course mainly introduces the basic concepts, theory and methods of numerical solutions of common ordinary and partial differential equations used in hydrological and ecological environmental studies, including the existence, uniqueness, convergence and stability of numerical solutions, iterative methods for solving nonlinear ordinary equations, spatial discretization methods for partial differential equations (finite difference method, finite element, and Integrated Finite Difference Method), LU decomposition method and iterative methods for solving large, sparse linear systems. Iterative scheme for solving nonlinear systems of partial differential equations originated from groundwater flow and solute transport problems. The course will emphasize operating and exercises in basic coding.

环境科学与工程学院

ESE201.地球科学概论(3)

理论课，3 学分，3 学时/每周。本课程内容涉及地球的结构、地球各圈层的演化规律及相互关系、构成地球物质（各种元素、矿物、岩石）的基本特性及其分布特点、地质事件，以及地球的历史和生命的演化过程。

ESE201. Introduction to Earth Sciences (3)

Lecture，3 credits, 3 hours per week. The content of the course includes the earth structure, the evolution and the relationship among the earth layers, the basic characteristics and distribution of earth constituent materials (various elements, minerals, and rocks), geological events, and the history of the earth and evolution process of life.

ESE202.环境学导论(2)

理论课，2 学分，2 学时/每周。本课程主要阐述环境问题的发展及其控制，探讨由于人类活动所引起的大气、水体、固体废物、噪声等污染问题产生的原因，带来的危害以及其处理技术方法等。课程还将对后续的主要专业课进行整体概述，使学生便于总体把握专业的主要内容和方向。

ESE202. Introduction to Environmental Sciences (2)

Lecture，2 credits, 2 hours per week. The course introduces the origin, development and control of environmental issue, as well as the causes, hazard and treatment technologies of pollution in the air, water and solid waste introduced in the course. It will also preview the core courses of this program, which help student understand their major better.

ESE204.环境工程原理(2)

理论课，2 学分，2 学时/每周。本课程系统讲解当前环境工程学科领域中的基本理论、污染防治技术与控制工程，以及发展趋势。帮助学生初步掌握污染控制工程防治技术的基本理论和方法。

ESE204. Principles of Environmental Engineering (2)

Lecture，2 credits, 2 hours per week. This course interprets the basic theory, pollution control technology, control engineering and development trend in modern environmental engineering in series and helps students gain the basic theory and method of pollution control engineering.

ESE206.环境化学(2)

理论课，3 学分，3 学时/每周。本课程主要运用化学的理论和方法，鉴定和测量化学污染物在大气圈、水圈、土壤 - 岩石圈和生物圈中的含量，研究它们在环境中存在形态及其迁移、转化和归趋的规律。

ESE206. Environmental Chemistry (2)

Lecture，3 credits, 3 hours per week. This course is targeted for understanding the principles and molecular mechanisms that govern the fate, transport, reactivity, accumulation, sources, and biological effects of contaminants in the environment. Common and emerging techniques to remediate or control environmental pollution based on physical-chemical processes will also be covered.

ESE212.环境监测(2)

理论课，2 学分，2 学时/每周。本课程内容包括：（1）环境污染物的来源、监测的目的；（2）环境监测的一般方法；（3）水、大气、土壤和噪声监测的原理、

方法；（4）环境标准的主要内容与应用。

ESE212. Environment Monitoring (2)

Lecture，2 credits, 2 hours per week. The contents of this course including: (1) the source of environmental pollution and the purpose of environmental monitoring; (2) common methods of environmental monitoring. (3) The mechanism and technology of water, air, soil and noise monitoring. (4) The main content of environmental standards and its applications.

ESE214.环境监测实验(1)

实践课，1 学分，2 学时/每周。本课程主要使学生掌握各环境介质及关键污染物监测的实际操作方法，包括样品采集、预处理及分析等。

ESE214. Environment Monitoring Experiments (1)

Practice，1credits, 2 hours per week. Through learning this course, students can get the skill of environmental monitoring and analysis of key pollutants, including the skill of sample collection, sample pretreatment, and sample analysis etc.

ESE301.环境微生物学(3)

理论课，3 学分，3 学时/每周。先修课程：环境化学（ESE206）或环境学导论（ESE202）. 本课程系统介绍环境污染引起的生物效应和生态效应及其机理；生物对环境污染的适应及抗性机理；利用生物对环境进行监测的原理及方法；以及现代生物技术在环境污染治理中的应用。

ESE301. Environmental Microbiology (3)

Lecture，3 credits, 3 hours per week. Pre-requesites：ESE206，ESE206. This course introduces

biological and ecological effects of environmental pollution and the related mechanisms, adaptation of organisms to environmental pollution, principles and applications of biological monitoring methods, and applications of modern biotechnology for environmental pollution control.

ESE302. 固体废弃物处理处置与资源化(3)

理论课，3 学分，3 学时/每周。本课程在分析固体废物来源、特性、物理化学性质的基础上，介绍固体废物的全过程管理体系以及填埋、堆肥、焚烧和主要资源化利用技术的基本原理。

ESE302. Solid Waste Treatment, Disposal and Recycling (3)

Lecture，3 credits, 3 hours per week. Based on analysis of solid waste sources, characteristics, physical and chemical properties, solid waste management system and the integrated management process are introduced. The basic principles for landfill, composting, incineration and major resource utilization technology are analyzed.

ESE303. 水处理工程(4)

理论课，4 学分，4 学时/每周。本课程主要讲授水和废水物理化学处理技术单元的基本原理和特点、工艺的基本计算方法和应用范围、主要构筑物的构成和运行特点、典型的水与废水处理工艺以及相关技术的国内外最新研究进展。主要包括：混凝、沉淀与澄清、气浮、过滤、消毒、氧化还原、膜分离和软化除盐等。通过本课程的学习，加深学生对水和废水物化处理理论的理解，并提高学生分析和解决问题的能力。

ESE303. Water Treatment Engineering (4)

Lecture，4 credits, 4 hours per week. The main content of this curriculum includes: the principles and characteristics of physicochemical processes for water and wastewater treatment; the basic calculation methods, the applications, the main components and the operational characteristics of these processes; the latest typical water and wastewater treatment processes and technology at home and abroad. The course will mainly cover coagulation, sedimentation and clarification, flotation, filtration, disinfection, oxidation and reduction, membrane separation, softening and desalination, and so on. This course will familiarize students with physicochemical theories for water and wastewater treatment, and enhance their ability to resolve the problems in this field.

ESE304. 大气污染与防治(3)

理论课，3 学分，3 学时/每周。本课程主要讲授大气污染的理论、控制方法原理、工艺技术及设备等，内容包括大气污染物的类型和来源，污染物的迁移扩散模式及浓度估算，颗粒污染控制技术及设备，气态污染物控制技术及设备，及主要污染物如硫氧化物、氮氧化物、挥发性有机物等的污染控制技术。

ESE304. Atmospheric Pollution Prevention and Control (3)

Lecture，3 credits, 3 hours per week. This course is designed to teach students the theory of air pollution, and the technology, equipment and mechanism of air pollution control. The main contents include the type and source of air pollution, the migration mode and density estimation of the pollutants, the technology of particle pollutants and gaseous pollutants remove, and the technology of key pollutants remove, such as SOx, NOx, VOCs and so on.

ESE305. 环境科学与工程实验（一）(1)

实践课，1 学分，2 学时/每周。本课程选取具有代表性的水处理单元或工艺进行模拟实验，要求学生在理解实验目的和基本原理的基础上，完成水处理单元或工艺模拟操作和实验数据分析与讨论。

ESE305. Environmental Science and Engineering Laboratory I (1)

Practice，1 credits, 2 hours per week. The course selects typical water treatment units or processes to demonstrate the simulation experiment. Based on understanding the basic principles and experimental purposes, it requires students to master the operation of simulation water treatment and complete the data analysis and discussion related to the experiments.

ESE306. 土壤与地下水污染(3)

理论课，3 学分，3 学时/每周。本课程主要讲授土壤及地下水中典型污染物的分类、来源、运移转化规律(吸附、氧化还原、水解、挥发、酸碱反应、生物降解等)，以及污染场址评估方法、修复技术及相关的法规、标准等。

ESE306. Soil and Groundwater Pollution (3)

Lecture，3 credits, 3 hours per week. This course focuses on the classification, source, migration and transformation mechanism (adsorption, oxidation, reduction, hydrolysis, volatile, acid-alkali reactions, biological degradation, etc.) of typical pollutants in soil and groundwater, also introduce assessment methods of contaminated site, repair technology and related regulations, standards.

ESE307.水文学原理与应用(3)

理论课，3 学分，3 学时/每周。本课程以水文循环理论为纲，阐述水文循环过程、物理机制和各要素分析计算方法；用系统的观点，分析不同水文系统的水文现象形成及变化规律，探讨水文情势变化引起的环境问题以及环境变化下的水文效应。

ESE307. Hydrology: Principles and Applications (3)

Lecture，3 credits, 3 hours per week. This course introduces processes, mechanisms and quantification approaches of hydrologic cycle. From a system perspective, it analyses the formation and change of different hydrological systems, as well as the environmental impact of the changed.

ESE308.环境经济学(3)

理论课，3 学分，3 学时/每周。本课程内容主要包括：环境经济学基本概念与理论、经济效率与物质平衡分析方法、环境资源价值与费用效益分析方法、环境损益分析方法、环境政策评估标准等。本课程重点培养学生从经济学视角认识和分析环境问题的能力。

ESE308. Environmental Economics (3)

Lecture，3 credits, 3hours per week. The major contents of this course include the basic theory and methodology of environmental economics, method of economic efficiency and mass balance analysis, evaluation of environmental resources and cost-benefit analysis, method of environmental benefit and cost analysis, evaluation criteria of environmental policy. The purpose of this course is to develop student’s ability of understand and analysis environmental problem from the perspective of economics.

ESE310. 环境科学与工程实验（二）(1)

实践课，1 学分，2 学时/每周。本课程使学生重点掌握人工湿地、生物快滤池、异位淋洗修复技术原理及其装置操作方法，开展污水人工湿地和生物快滤池处理过程实验；了解固体废弃物处理、处置与资源化利用技术原理及其装置操作方法，开展固体废弃物处理、处置与资源化利用过程实验；掌握饮用水安全保障技术原理及其装置操作方法，开展饮用水预处理保障技术实验。

ESE308. Environmental Science and Engineering Laboratory II (1)

Practice，1 credits,2 hours per week. The course focuses on the principles and operation methods of constructed wetlands, biological filter, and the ectopic leaching repair technology and carries out experiments on the process of sewage constructed wetland and rapid biological filter; helps the students understand of technical principles and operation methods of solid waste treatment, disposal and resource utilization and conducts experiments on solid waste treatment, disposal and resource utilization; lets the students grasp the principles and operation methods of drinking water security.

ESE312. 流域生态修复(3)

理论课，3 学分，3 学时/每周。本课程内容主要包括：生态系统与人类福祉；流域生态系统的过程和功能、人类活动对流域生态系统的影响；生态修复的价值和原则；流域生态修复的方法、修复模式、案例分析以及生态修复项目的设计、实施等。本课程重点培养学生了解生态系统对人类的重要作用，意识到生态修复的重要性，并初步掌握生态修复的基本知识。

ESE312. Watershed Ecological Restoration (3)

Lecture，3 credits,3hours per week. Ecological restoration has become top ten industries in the

21st century. The main contents of this course include: ecosystems and human well-being; the process and function of watershed ecosystems, impact of human activities on the ecological system; values and principles of restoration; method and case study of watershed ecosystem restoration; design and implementation of restoration projects. The course will show the importance of ecosystems for human beings, help increase awareness of ecological restoration, and demonstrate the basic knowledge of ecological restoration.

ESE313. 生态学概论(3)

理论课，3 学分，3 学时/每周。本课程主要内容包括生态学的基本思想、原理、概念和方法；环境和生态因子类型；生态系统结构和功能；生态因子对生态系统的影响及生态系统的反馈原理。目的是使学生建立系统观念，考虑问题和解决生态与环境问题应从生态角度及系统角度出发。

ESE313. Fundamentals of Ecology (3)

Lecture，3 credits,3hours per week. Main contents of this course include the basic ideas, concepts and methods of ecology, the type of the ecological factors, the structure and function of ecosystem, the influence of ecological factors on the ecological system and the feedback mechanism of ecological system. The purpose of this course is to make students establish the system concepts, to consider and solve ecological and environmental problems from the ecological and system perspective.

ESE314. 环境材料学(3)

理论课，3 学分，3 学时/每周。本课程主要从环境材料理论、环境材料关键技术、环境工程材料、环境友好材料等方面进行介绍，包括了材料对环境的影响因素、材料环境的影响评价方法、资源效率理论、材料生态设计、材料环境友好加工及制备、材料工业生态学、环境治理材料、绿色建筑材料等内容。

ESE314. Environmental Material Sciences (3)

Lecture，3 credits,3 hours per week. This course introduces the concept of environmental materials, environmental materials technologies, environmental engineering materials, environmental friendly materials, including the impact factors on the environment during materials processes, environmental impact assessment, resource efficiency theory, eco-design of materials, environmentally friendly processing, industrial ecology, environmental control materials, green building materials, etc.

ESE317. 地理信息系统(3)

理论课，3 学分，3 学时/每周。本课程主要内容包括：GIS 的基本概念、原理、方法及应用；空间数据采集和处理；社会经济信息的空间可视化。

ESE317. Geographic Information System (3)

Lecture，3 credits, 3hours per week. The main course contents include: the basic concept, principle, method and application of GIS; spatial data collection and processing; spatial visualization of social and economic information.

ESE318. 地下水水文学(3)

理论课，3 学分，3 学时/每周。本课程主要包括：(1)地下水形成、埋藏、交替循环等方面的理论知识；(2)地下水动力学、水井、含水层试验、区域地下水流系统及地下水模拟；(3)地下水的化学成分及地下水污染运移、地下水保护和修复。

ESE318. Groundwater Hydrology (3)

Lecture，3 credits, 3hours per week. The course consists of three basic components: (1) fundamentals of groundwater flow; (2) well hydraulics and evaluation of groundwater as a

resource, and (3) chemical properties of groundwater and groundwater contamination.

ESE319. 全球气候变化(3)

理论课，3 学分，3 学时/每周。本课程介绍了全球气候变化的过程、决定因素及当下和未来的气候变化。着重学习改变人居环境的外在因素（如人类活动、温室气体和地球运行轨道的变化）及环境的反馈作用（如生物地球化学和生物地球物理过程）。

ESE319. Global Climate Change (3)

Lecture，3 credits, 3hours per week. This course provides the rigorous introduction to the process in global climate change. The goal of the course is to provide students with an introductory overview of the broad factors that determine global climate change. Initial focus is on recent and future climate change. Remainder of course will emphasize the study of the forcing (e.g., human activity, greenhouse gases, and orbital changes) and feedbacks (e.g., biogeochemical and bio geophysical process) that produce the environment in which we live.

ESE321. 科技成果表达(2)

理论课，2 学分，2 学时/每周。本课程讲解并培养学生科技论文写作技能，训练并提高其科技成果的文字表达能力；结合学生参与的科研课题，讲解 PPT 编制及演讲技巧，进行演讲训练。教学中力争体现为学生的切实需求服务，提升学生实际能力和人文理念。

ESE321. Scientific Presentation (2)

Lecture，2credits, 2hours per week. This course provides some fundamental introduction and several effective techniques to write papers, make PPT and prepare oral presentation language. The purpose of this course is not only to improve the writing ability, but also to explain and train

PPT preparation and oral presentation about their thesis. The course strives to reflect human philosophy that are the real needs of service for graduates and their practical ability.

ESE322. 环境污染与人体健康(2)

理论课，2 学分，2 学时/每周。本课程介绍环境中常见污染物及污染因素对人体健康的影响。主要内容包括：（1）环境、环境污染的基本概念和污染物的分类；（2）常见的污染物种类、理化特性、来源、毒性作用、对人体健康的危害及污染案例；（3）环境污染物与人体健康的关系，包括空气、水体、土壤、家居环境污染对人体健康的影响。

ESE322. Environmental Pollution and Human Health (2)

Lecture，2credits, 2hours per week. The course introduces typical pollution types and their risk to human health. Main contents including : (1) the basic concept of environment, environmental pollution and the classification of pollutants; (2) the type, properties, source, toxic effect and the impact on the human health of common pollutants;(3)impacts of polluted air, water, soil and household on human health.

ESE403. 环境规划学(2)

理论课，2 学分，2 学时/每周。本课程重点讲授环境规划的基本概念和理论，环境规划的编制程序和主要内容、环境规划的预测和决策方法，重点掌握当前环境规划中比较重要的规划类型，如水、大气、城镇、循环经济和生态工业园区等领域的专项环境规划的有关规划内容和方法。

ESE403. Environmental Planning (2)

Lecture，2credits, 2hours per week. The course introduces basic concept and theory, programming, main content of environmental planning, and the method of forecast and decision-making. The content and method of key planning types, such as water, air, town, circular economy park and eco-industrial park, and so on.

ESE405. 环境影响评价(2)

理论课，2 学分，2 学时/每周。本课程主要介绍环境影响评价的基本概念、基本理论和方法，重点讲解地表水、大气、土壤、噪声等环境要素的评价程序和方法。通过课程学习使学生了解环境影响评价标准、影响预测、评价方法、及环境影响评价报告书的编写等。

ESE405. Environmental Impact Assessment (2)

Lecture，2credits, 2hours per week. This course mainly introduces the basic concepts, theory and methods of environmental impact assessment. Focuses on the assessment procedures and methods of surface water, air, soil, noise and other environmental elements. Through the course study, the students can understand the environmental impact assessment standards, impact prediction, assessment methods, the preparation and writing of the reports, etc.

ESE407. 数值模拟方法基础(3)

理论课，3 学分，3 学时/每周。本课程以水文、生态环境中常见的常微分方程和偏微分方程的初边值问题为背景，介绍常见的数值求解过程的基本概念、理论和方法，包括数值解的存在性、唯一性、收敛性、稳定性，非线性常微分方程的迭代解法，常见的偏微分方程的空间离散方法（有限差分法、有限单元法、积分有限差分法），大型稀疏线性代数方程组的 LU 分解法，常见迭代法。以地下水流

动和溶质运移为背景的非线性偏微分方程组的迭代解法。课程将着重进行实习操作和练习。

金融系

FIN201. 微观经济学

理论课，48 学时，3 学分。授课语言为中文。微观经济学是经济学的一个重要分支，它着重分析各种不同经济主体的行为模式。通过引入一系列基本的经济分析工具，我们探讨经济学如何为理解个人，企业和政府机构的许多行为提供独特视角。通过学习本课程，同学们能够对微观经济学的一系列基本论题有所了解，能够分析和解释经济主体的一些行为特征和政府政策的成因和后果。成绩：课程项目 20%，平时作业 15%，期中考试 30%，期末考试 35%。

FIN201. Microeconomics

Lecture, 48 hours, 3 credits. Teaching language is Chinese. microeconomics, a major field in economics that analyzes the behavioral pattern of various economic agents. Building on basic analytical tools, we investigate how economics can provide insights into many behaviors of individuals, firms and government agencies. After taking this course you should have developed an understanding of the basic topics in microeconomics. You should be able to analyze and explain to others how various behaviors of economic agents and government policies can be explained by economics. Grading: Project 20%, Assignments 15%, Mid-Term Test 30%, Final Exam 35%.

FIN202. 金融与创业前沿论坛 II

理论课，28 学时，1.5 学分。授课语言为中文。先修课程：金融与创业前沿论坛 I。研究中国金融改革与发展关键问题。邀请金融机构高管，金融监管部门，和金融业与高新企业创业

者，通过讲座形式授课。使学生能够在学习基本知识的同时对中国新兴加转轨金融有更好地了解和把握。成绩：出勤 20%，平时作业 20%，期中考试 30%，期末考试 30%。

FIN202. Special Topics in Finance & Entrepreneurship II

Lecture, 1.5 credits, 28 hours. Teaching language is Chinese. Prerequisites: Special Topics in Finance and Entrepreneurship I. This course studies the issues of financial reform and development in china. We invite someone to lecture who are financial institution executives, financial regulators, and the financial industry and high-tech entrepreneur. By this course , we hope that students can learn the basic knowledge of finance and have better understanding of China emerging and transitional finance. Grading: Attendance 20%, Assignments 20%, Mid-Term Test 30%；Final Exam 30%.

FIN203. 财务会计

理论课，56 学时，3 学分；辅导课，4 学时。授课语言是英语为主，辅以中文解释。本课程的目的是帮助学生了解会计信息，使他们能够在实践中恰当的使用它。在完成本课程后，学生应能够：（1）了解会计概念和程序，（2）分析财务报表，（3）衡量一个公司的净收入、现金流量、资产、负债和股东权益。成绩：出勤 5%，课堂表现 5%，平时作业 15%，期末报告 10%，期中考试 30%，期末考试 35%。

FIN203. Financial Accounting

Lecture, 56 hours, 3 credits; Tutorials, 4 hours. Teaching language is English with detailed explanations in Chinese. The goal of this course is to help students understand accounting information so that they can use it appropriately in a practical setting. After completing this course, students should be able to: (1) understand the accounting concepts and procedures, (2) analyze financial statements, (3) measure a company’s net income, cash flow, asset, liability and shareholder’s equity. Grading: Attendance 5%, Class Performance 5%, Assignments 15%, Final

Presentation 10%, Mid-Term Test 30%, Final Exam 35%.

FIN204. 宏观经济学

理论课，48 学时，3 学分；复习、考试（2 周）6 小时。授课语言是英语为主，辅以中文解释。先修课程：微观经济学。此课程的目的是给学生讲授基本的宏观经济学分析工具，并将其运用到实际的真实经济世界中。课程的内容包括：产出的决定、就业、失业、利率、通胀、经济增长理论以及经济周期理论。货币政策、财政政策、公共债务以及国际经济学的相关问题，同样会在课程中与学生讨论。课程将借助于基本的宏观经济模型，分析美国与中国的实际经济问题。成绩：课程项目 10％，平时作业 10％，期中考试 20％，期末考试 30％，小组作业 20％。

FIN204. Macroeconomics

Lecture, 48 hours, 3 credits; Revision & Exam (2 weeks) 6-hours. Teaching language is English with detailed explanations in Chinese. Prerequisites: Microeconomics. This course will teach students the basic tools of macroeconomics and apply them to real world economic policy. This course will provide an overview of macroeconomic issues including the determination of output, employment, unemployment, interest rates, inflation, growth theory and business cycles. Monetary and fiscal policies are discussed, as are public debt and international economic issues. It introduces the basic models of macroeconomics and illustrates principles with the experience of the United States and China. Grading: Projects 10%, Assignments 10%, Mid-Term Test 20%, Final 30%, Club + Self Study 20%.

FIN205. 金融与创业前沿论坛 I

理论课，1.5 学分，16 课时；实验（实习）16 课时。授课语言为中文。研究中国金融改革与发展关键问题。邀请金融机构高管，金融监管部门，和金融业与高新企业创业者，通过讲座形式授课。使学生能够在学习基本知识的同时对中国新兴加转轨金融有更好地了解和把

握。课程内容着重当前金融热点及前沿话题，对相关问题进行深刻剖析，有效引导学生关注金融动态，以培养学生敏锐的洞察力、分析及解决实际问题的能力。

FIN205. Special Topics in Fnance & Entrepreneurship I

Lecture, 1.5 credits, 16 hours. Lab/Practical 16 hours. Teaching language is Chinese. This course studies the issues of financial reform and development in china. We invite someone to lecture who are financial institution executives, financial regulators, and the financial industry and high-tech entrepreneur. By this course, we hope that students can learn the basic knowledge of finance and have better understanding of China emerging and transitional finance. This course focuses on the current financial entrepreneurship topics, analysis of the relevant issues deeply. Our goal is guiding students to focus on financial trends and ability to analyze and solve practical problems.

FIN206. 公司金融

理论课，48 学时，3 学分；辅导课，4 学时。授课语言为中英双语。先修课程：财务会计和微观经济学。完成此课程后，学生将能够解释基本的金融概念，评价企业的资本预算项目，股利政策和资本结构，并讨论专题，如 IPO 和 M&A。成绩：出勤 10%，平时作业 10%，课程项目 20%，期中考试 30%，期末考试 30%。

FIN206. Corporate Finance

Lecture, 48 hours, 3 credits; tutorials, 4 hours. Teaching language is English with some Chinese. Prerequisites: Financial Accounting and Micro Economics. After taking this course, students will be able to explain basic financial concepts, evaluate firms’ capital budgeting projects, dividend policy and capital structure, and discuss special topics, such as IPO and M&A. Grading: Attendance 10%, Assignment 10%, Projects 20%, Mid-Term Test 30%, and Final Exam 30%.

FIN208. 金融数据分析和数据挖掘

理论课，36 学时，3 学分；实验（实习），36 学时；复习、项目和考试，8 学时。授课语言是英语为主，辅以中文解释。此课程的目的是讲授数据分析以及数据挖掘的基本过程、模型和工具，及其在金融中的应用。此课程将培养学生软件包（如 Excel 和 weka 软件）的实用技巧和一些必要扩展的应用来分析和解决金融数据问题。成绩：平时作业 15%，课程项目 35%，期末报告 50%。

FIN208. Financial Data Analysis and Data Mining

Lecture, 36 hours, 3 credits; Lab/Practical, 36 hours; Revision & project & Exam (2 weeks) , 8 hours. Teaching language is English with detailed explanations in Chinese. The course aims to teach students the process, models, and tools for data analytics and data mining in finance. The course will teach students the practical skills to employ software packages (such as Excel and weka) and apply necessary extensions to analytic framework and tackle financial data analysis problems. Grading： Assignment 15%, Projects 35%, Final Presentation50%.

FIN209.创业金融 I

理论课，48 学时，3 学分。授课语言是英语为主，辅以中文解释。无先修课程、其它学习要求。本课程是创业融资与创新的前提条件。本课程将介绍创新的基本逻辑和启动的关键要素。学生将研究目前的企业家模型和创新趋势。通过这门课程，学生将能够分析和价值的一个商业案例启动通过运用他们的知识创新和创业精神。在此课程中，学生也可以准备一个初始业务方案。成绩：课程项目 30%，平时作业 30%，期末报告 40%。

FIN209. Entrepreneurial Finance and Innovation I

Lecture, 48 hours, 3 credits. Teaching language is English with detailed explanations in Chinese. No prerequisites or other academic requirements. This course is a Prerequisite for Entrepreneurial Finance and Innovation II. This course will introduce elementary logic of innovation and key elements of a start-up. Students will study current entrepreneur models and trends in innovation.

By taking this course, students will be able to analyze and value a business case start-up through employing their knowledge of innovation and entrepreneurship. In this class, students can also prepare an initial business proposal of a start-up. Grading：Projects 30%, Case study 30%, Final Presentation 40%.

FIN210. 货币银行学

理论课，36 学时，3 学分；辅导课，8 学时；期中考试、期末考试、课程项目报告，10 学时。授课语言是英语为主，辅以中文解释。本课程旨在系统地阐述货币、银行和金融市场领域的一些主要问题，让学生认识货币在社会经济发展中的重要作用；审视金融市场、商业银行、中央银行制度的运转机制，以及它们在货币运行和货币政策传导过程中所扮演的角色，使学生了解资金融通中的货币在经济活动的各个环节中运转的机理。特别地，本课程将结合中美两国的情况，着重讲述两国在货币政策相关方面的联系与区别，使学生能更好地了解我国的货币政策实施状况。成绩：小测验 10％，平时作业 10％，课程项目 15％，期中考试 30％，期末考试 35％。

FIN210. The Economics of Money and Banking

Lecture, 36 hours, 3 credits; tutorials, 8 hours; Midterm exam & project presentation, 10 hours. Teaching language is English with detailed explanations in Chinese. This course aims to systematically interpret the main contents of money, banking and financial markets, and the important roles of money in our economic developments. The students will be led to examine the operating mechanism of the financial markets, commercial banks and the central banking system, and their respective roles in monetary policy transmissions. In particular, this course will discuss the different situations both in China and in the U.S. and focus on the similarities and differences of them in monetary policy related parts, so that the students can have a better understanding of the implementations of China’s monetary policy. Grading：Quiz 10%, Assignments 10%, Projects 15%, Mid-Term Test 30%, Final Exam 35%.

FIN301. 金融与投资概论

理论课，48 学时，3 学分；辅导课，14 学时；考试（2 周），8 学时。授课语言为英语。先修课程：概率论与数理统计，经济学。课程的目的是让学习者具备理解和解决现实世界中的财务问题的技能。通过课程，学生们将学习金融市场的基本概念和理论、金融市场的机制和功能、投资选择和产品、现金流量的价值，以及财务规划技术。成绩：出勤 15%，小测验 25%，期末考试 30%，期末报告 30%。

FIN301. Financial Investments

Lecture, 48 hours, 3 credits; tutorials, 14 hours; Review and Exam (2 weeks), 8 hours. Teaching language is English. Prerequisites: Micro and Macro Economics, Probability and Statistics. It aims to equip the learners with the skills to understand and solve the real-world finance problems. Through the course the students are expected to learn the basic concepts and theories of finance, mechanism and functions of the financial market, investment choices and products, value of cash flow, and financial planning techniques. The prerequisites for the course are Probability and Statistics and Economics. Grading： Attendance 15%, Quiz 25%, Final Exam 30%.Final Presentation30%.

FIN302.　金融实证分析方法

理论课，54 学时；辅导课，18 学时；小组讨论，8 学时。授课语言为全英文教学。本课程是一个介绍用于财务的实证方法，侧重于选定的主题。该课程将为学生提供横截面和面板数据分析的知识和工具，以便进一步的财务研究和研究。学生将研究金融理论，资产定价理论，统计假设和相关的统计回归技术之间的相互作用等课题。学生将会接触到各种各样的回归性方法，包括经常在金融中运用到的时间序列数据。成绩：课程项目 40%，其他 60%。

FIN302. Empirical Methods in Finance

Lecture, 54 hours, 3 credits; Tutorials, 18 hours; Project discussion 8 hours. Teaching language is

English. This course is an introduction to the empirical methods used for finance with a focus on selected topics. The course will provide students with a toolbox and working knowledge of cross-sectional and panel data analysis to be used for further finance study and research. The interplay between finance theories, asset pricing theories, statistical assumptions and relevant statistical regression techniques will be explored. Students are exposed to a variety of regression methods including AR models for time series data which are commonly employed in finance. Grading: Project 40%, others 60%.

FIN303.计量经济学

理论课，44 学时，3 学分；辅导课，6 学时；课程项目报告，4 学时。授课语言为英文讲义，中文解释。先修课程：概率论与数理统计、微观经济学、宏观经济学。课程包括三个部分：横截面数据的回归分析， 时间序列数据的回归分析，高深专题讨论（例如简单面板数据方法，工具变量估计，联立方程模型）。Eviews 软件需要在该课程中运用。此课程旨在讲授计量经济学的分析方法及其在经济领域中的应用，使学生在掌握计量经济学领域里基础理论内容的同时，学会对真实经济社会中的现象进行计量建模分析。分数:课程项目 30％，期中考试 30％，期末考试 30％，平时作业 10％。

FIN303. Econometrics

Lecture, 44 hours, 3 credits; Tutorials, 6 hours; project presentation, 4 hours . Teaching language is English Slides with Detailed Explanations in Chinese. Prerequisites: Probability and Statistics, Microeconomics, Macroeconomics. This class includes three parts: Regression Analysis with Cross-Sectional data, Regression Analysis with Time Series Data, and Advanced Topics (like Panel Data Modeling, Instrumental Variables, and Simultaneous Equations Models). The software Eviews is used in this class. This course aims to teach students the methodologies of econometrics and their applications in the realm of economy. Besides mastering the basic theories and methods of econometrics, students are particularly expected to be capable of analyzing certain economic problems in the real world with the econometric tools. Grading: Project 30%, Mid-Term Test 30%, Final Exam 30%, and Assignments 10%.

FIN304. 金融时间序列分析

理论课，56 学时，3 学分；期中考试和课程项目报告，4 学时。授课语言是英语为主，辅以中文解释。先修课程：计量经济学。主要内容：一元时间序列的线性模型，一元时间序列的条件异方差模型和风险测度与极值理论。该课程需用 R/SAS 软件。此课程旨在讲授金融时间序列分析领域里的经典模型以及分析方法，使学生在掌握时间序列模型理论内容的同时，学会对真实金融市场上的数据进行建模分析。同时，该课程也会介绍目前该领域里处于研究前沿的相关内容和研究方向。分数：课程项目 20％，期中考试 30％，期末考试 40％，平时作业 10％。

FIN304. Financial Time Series

Lecture, 56 hours, 3 credits; Midterm exam & project presentation, 4 hours. Teaching language is English with detailed explanations in Chinese. Prerequisites: FIN303. Main contents: linear models for univariate (multivariate) time series data, conditional heteroscedastic models for univariate (multivariate) time series data, and risk measures. The software R/SAS is used in this class. This course aims to teach students the classical models and analysis methods in the field of financial time series. Besides mastering the theoretical knowledge of time series models, students are also expected to be capable of modeling the time series data in real financial markets. In addition, this course also introduces some related contents at the forefront of research in this field. Grading: Project 20%, Mid-Term Test 30%, Final Exam 40%, Assignments 10%.

FIN305. 金融衍生品

理论课，40 学时,3 学分；辅导课，18 学时；复习、考试（2 周），6 小时。授课语言是英语为主，辅以中文解释。先修课程：GE1102/GE1203 高等数学上、下和 GE1112/GE1212 线性代数上、下。本课程将系统地讲授金融衍生品(远期、期货、互换和期权等基本衍生工具，以及股票市场和债券市场上的创新产品)。对每种衍生工具将具体讲述其运作机制、价格决

定以及简单投资交易策略这三方面。此外，在讲述这三方面的过程中，本课程也将讲解衍生工具在风险管理方面的作用及金融创新。通过课堂讲授、多媒体教学、案例分析、课堂讨论，还将充分利用我校金融实验室和 Bloomberg 终端让学生获得对衍生工具市场的亲身体验。

FIN305. Options, Futures and Other Financial Derivatives

Lecture, 40 hours, 3 credits; tutorials, 8 hours; Revision & Exam (2 weeks), 6 hours. Teaching language is English with detailed explanations in Chinese. Prerequisites: GE1102/GE1203 Calculus I & II, GE1112/GE1212 Linear Algebra I&II48 hours; Tutorials, 18 hours. This course will systematically cover financial derivatives (futures, forwards, swaps, options and other derivatives, as well as innovative products in stock and bond markets). Each kind of derivatives' operation mechanism, valuation and simple investment and trading strategies will be discussed. Their roles in financial innovation and risk management will also be explained. Through classroom lecturing, multimedia presentation, case analysis, and classroom discussion, students can gain comprehensive knowledge and experience of derivatives market.

FIN306. 固定收益产品

理论课，32 学时。无辅导,中英双语授课。先修课程：金融衍生品。本课程的目的是：定价和确定产量和固定收益证券的波动性，包括企业债券，国债和资产支持证券；衡量和降低投资组合利率风险。课题一般包括收益率曲线，重视息票支付日之间的债券，非票面价格路径和面值的债券，收益率指标，含权债券、资产支持证券、可转换债券，总收益和其他收益指标、风险价值（VAR）、利率互换、波动率和隐含波动率等。成绩:出勤 10%，课堂表现 10%，课程项目 10%，期末考试 70%。

FIN306. Fixed Income Models and Applications

Lecture, 32 hours. no tutorial,Teaching language is English with some Chinese. Prerequisite: Financial Derivatives. The purpose of this course is to teach the analytical skills for: Pricing and

determining the yield and volatility of fixed income securities; Measuring and mitigating portfolio interest rate risk. General topics include the yield curve , valuing bonds between coupon payment dates, price paths of non-par and par bonds, yield metrics , valuation of floaters, bonds with embedded options, asset backed securities , convertible bonds, total return and other return metrics, value-at-risk (VAR), interest rate swaps, volatility and implied volatility, and others.Grading: Attendance 10%,Class Performance 10%, Project 10%, Final Exam 70%.

FIN307.数据库管理系统及金融应用

理论课，36 学时，3 学分；实习，18 学时；复习、项目、考试，8 学时。授课语言是英语为主，辅以中文解释。先修课程：计算机系统设计及应用。通过本课程的学习，学生应该掌握数据库系统理论、设计和应用中的一些基本概念，以及构建数据库管理系统所必须的基本理论和相关技术。成绩：平时作业 10%，课程项目 30%，期末考试 6%。

FIN307. Database Management Systems and Financial Applications

Lecture, 36 hours, 3 credits; Lab/Practical, 18hours; Revision & project & Exam (2 weeks), 8 hours. Teaching language is English with Detailed Explanations in Chinese. Prerequisite: Computer system design and applications. By studying this course, the students should master the basic concepts of database systems theory, design and application, and construct the necessary basic theory and related technologies of database management system. Grading: Assignments10%, Project 30%, Final Exam 60%.

FIN308. 金融经济学

理论课，44 学时，3 学分；辅导课，4 学时。先修课程：数学统计，财务会计，微观经济学，公司金融。该门课程聚焦于金融经济学，特别是其中关于资产定价以及风险现金流价值的内容。在学生学习了消费者在风险条件下决策的内容，学生可以利用这个通用的框架了解证券

的均衡理论和无套利理论，包括资本资产定价模型，消费资本资产定价模型，阿罗-德布鲁模型，鞅测度方法，以及套利定价理论。课程的首要课程教学目标是建立并强化学生的金融直觉以及为之后更深入的课程奠定现代金融理论知识基础。第二个课程教学目标是向学生介绍在资本市场以及公司金融课程当中某些概念的准确模型推演。第三个课程教学目标是严谨而简要地复习金融经济学的重要主题（这些主题在学生之前的课程中都有遇到）。最后，从一个从业者的角度为学生介绍一系列与行为相关的演化的重要前沿理论。

FIN308.Financial Economics

Lecture, 44 hours, 3 credits; tutorials, 4hours. Prerequisite: Higher Mathematics Statistics, Financial Accounting, Microeconomics, Corporate Finance。This course focuses on financial economics, especially on asset pricing and the valuation of risky cash flows. After learning the details of consumer decision-making under uncertainty, it uses that general framework as a basis for understanding both equilibrium and no-arbitrage theories of securities pricing, including the capital asset pricing model (CAPM), the consumption capital asset pricing model (CCAPM),Arrow-Debreu theories, martingale pricing methods, and the arbitrage pricing theory (APT). The course aim to build up and enhance student financial intuition and understand modern financial theory for learning more advanced financial course. Another objective is to introduce students to the precise modelling of many of the concepts discussed in their capital markets and corporate finance classes. The third objective is to review rigorously and concisely the main themes of financial economics (those that students should have encountered in prior courses) and, finally, to introduce a number of frontier ideas of importance for the evolution of the discipline and of relevance from a practitioner ’ s perspective.

FIN309.人工智能和金融应用

32 课时；辅导课，32 学时。先修课程：CS101。课程内容包括：事实和规则，递归结构和列表，智能代理，通过搜索解决问题，传统的搜索方法，知识和逻辑，一阶逻辑，一阶逻辑推理、专家系统、JAVA 专家系统外壳。本课程的目的是为了让学生学习人工智能的应用 。在这个过程中，学生将学习如何利用人工智能工具 PROLOG 和 JESS 开发智能系统。成绩：课

程项目：40%，测试 10%，期末考试 50%。

FIN309. Artificial Intelligence and Financial Applications

32 hours; Tutorial, 32 hours. Prerequisites: CS101. This course will cover: facts and rules, recursion, structures and lists, intelligent agents, solving problems by searching, classical search methods, knowledge and logic, first-order logic, inference in first-order logic, expert systems, JAVA expert system shell. This course aims for students to study foundations and the applications of artificial intelligence. During this course, students will learn how to develop intelligent systems by using artificial intelligence tools PROLOG and JESS. Grading: Three Projects 40%, Exercises 10%, Final Exam 50%.

FIN409.金融建模与定价分析

理论课，48 学时，3 学分；辅导课，16 学时。授课语言为中英双语。先修课程：数学分析，线性代数，概率论。本课程的重点是探讨资产定价理论，这是理解金融现象的关键，并告诉我们如何筹集资金和投资。成绩：出勤 10%，课堂表现 10%，平时作业 20%，期末考试 60%。

FIN409. Financial Modeling and Asset Pricing

Lecture, 48 hours, 3 credits; tutorials, 16 hours. Teaching language is English with some Chinese. Prerequisite: Mathematics Analysis, Linear Algebra, Probability Theory. The focus of the course is to discuss the asset pricing theory, which is key to understand finance phenomena and tell us how to raise funds and invest. Grading: Attendance 10%, Class Performance 10%, Assignments 20%, Final Exam 60%.

FIN411. 国际金融

理论课，32 课时，2 学分；辅导课，8 学时。全英文教学。先修课程：公司金融，宏观经济学，微观经济学。本课程从跨国公司的角度系统阐述了国际金融市场的宏观经济环境以及跨国公司财务经理所面对的国际金融市场主要风险，深入而全面地讨论了汇率制定，汇率风险，跨国公司的外汇交易管理、外汇风险管理、投融资管理等内容。本课程要求学生以金融全球化、企业经营国际化的国际视觉，来审视现代企业国际化经营所面临的各种财务、金融、贸易等问题，同时系统掌握相关理论和技术性解决手段。本课程要求学生在学习后可以对跨国公司金融财务状况进行全面分析，同时可使用基本的金融工具对跨国公司所面临的主要国际金融风险进行规避和对冲。成绩：出勤 5%，平时作业 15%，课程项目 30%，期末考试 50%。

FIN411. International Finance

Lecture, 32 hours, 2 credits; tutorials, 8 hours. Teaching language is English. Prerequisite: Corporate Finance, Macroeconomic, Microeconomics.The course pretends to give the student the needed skills to analyze the international financial environment, not only learning different techniques of the way to hedge the risks involved in the international financial transactions, but also to take profit of them. We must learn how to get profit from the internationalization of the enterprises in all the different aspects, including the financial one. We are also going to learn the Multinational Companies (MNC) structures and the way they behave. Although some of the financial instruments that we are going to analyze are often applied to domestic markets,we are going to consider their international implications. Grading: Attendance 5%, Assignments 15%, Projects 30%, Final Exam 50%.

FIN413. 量化投资分析

理论课，48 学时，3 学分。授课语言是英语为主，辅以中文解释。先修课程：宏观经济学，微观经济学，概率论与数理统计，计量经济学，金融与投资概论。本课程有两个目标：介绍量化投资的基本框架和理论以及相关的数量工具；熟悉金融市场数据并且应用所学理论进行

量化投资。成绩：课堂表现 10%，平时作业 10%，课程项目和期末报告 30%，期末考试 50%。

FIN413. Quantitative Investment Analysis

Lecture, 48 hours, 3 credits. Teaching language is English with Detailed Explanations in Chinese. Prerequisite: Microeconomics, Macroeconomics, Probability and Statistics, Econometrics, Introduction to finance and financial investment. There are two goals for this course: 1. Provide you with an introduction to the fundamental framework and theory of quantitative investment as well as required quantitative tools used in investment analysis. 2. Expose you to real data on financial securities, and learn how to apply the theory to do quantitative investment. Grading: Class Performance 10%, Assignments 10%, Projects and Final Presentation 30%, Final Exam 50%.

FIN417. 公司金融案例分析

理论课，24 学时，3 学分；实习，28 学时。授课语言为中文。先修课程：财务会计，宏观经济学，微观经济学，金融市场与金融机构监管体系，金融与投资概论，公司金融，固定收益产品，金融衍生品，金融经济学，货币银行学，金融实证分析方法，计量经济学，金融数据分析与数据挖掘，金融时间序列分析。该课程旨在通过分析、比较、研究各种各样商业主体成功的和失败的管理经营经验，从中抽象出某些一般性的管理结论或管理原理，让学生通过自己的思考和学习来拓宽视野，从而丰富学生的商业知识与基础管理策略。成绩：出勤 10%，课程项目 60%，期末考试 30%。

FIN417. Corporate Finance Case analysis

Lecture, 24 hours, 3 credits; Lab/Practice, 28 hours. Teaching language is Chinese. Prerequisite:Financial Accounting, Macro-economics, Micro-economics, Financial Market, Institution & Regulation, Introduction to Finance and Investment, Corporate Finance, Fixed Income Securities, Financial Derivatives, Financial Economics, Economics of Money and Finance, Empirical Finance Analysis Method, Econometrics, Financial Data Analysis and Data Mining,

Financial Time Series Analysis. The course aims to summarize general management conclusions and theories from analysing, comparing, and studying the management and operation experiences of various business subjects. And to widen students' vision and enrich students the commercial knowledge and basic managerial strategies through thinking and learning. Grading: Attendance 10%, Projects60%, Final Exam 30%.

FINS301.行为金融学

理论课，14 学时，1 学分；辅导课，2 学时。授课语言是英文为主，中文为辅。先修课程：公司金融。课程旨在培养学生通过分析金融市场主体在市场行为中的偏差和反常，来寻求不同市场主体在不同环境下的经营理念及决策行为特征，使学生有能力建立可以正确反映市场主体实际决策行为和市场运行状况的描述性模型。成绩：出勤 20％，期末报告 80％。

FINS301. Behavioural Finance

Lecture, 14 hours, 1 credits; tutorials, 2 hours. Teaching language is English with Detailed Explanations in Chinese. Prerequisite: Corporate Finance. The course aims to teach students to seek business philosophy and decision-making behaviour characteristics of different market subjects under different environment through analysing the biased and abnormal behaviours of the financial market subjects, and to enable students to establish a descriptive model which can correctly reflect the actual decision-making behaviours of market subjects and the market operating conditions. Grading: Attendance 20%, Final Presentation 80%.

数学系

MA106 C/C++语言程序设计（3）

理论实验课，3 学分，授课 2 学时/周，实践课 2 学时/周。先修课程：程序设计与数据库（MA108）（建议，不是必须）。

MA106 C/C＋＋Programming language (3)

Lecture and experiment, 3 credits, 2 hours’ lectures per week, 2 hours’ experimental courses per week. Pre-requisites: Programming and database(MA108), recommended but not required.

MA110 MATLAB 程序设计（3）

理论课，3 学分，3 学时/周。先修课程：线性代数 I&II（MA103b&MA104b）。本课程系统地讲解 MATLAB 操作流程，矩阵计算，数值方法，计算结果可视化及编程精要；举例阐述 MATLAB 工具箱的功能；剖析 MATLAB 界面编辑器的用法和图形界面(GUI)的制作要求；展现 MATLAB 在数学建模，金融，通信，以及工程中的实际应用。

MA110 MATLAB Programming and Application (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Linear Algebra I&II (MA103b & MA104b). This course systematically introduces MATLAB procedures, matrix calculation, numerical method, visualization of calculation results and the essence of programming. Then it illustrates the function of MATLAB toolbox, and describes the MATLAB interface editor and graphical interface (GUI) production requirements. Finally, it shows practical application of MATLAB in mathematical modelling, finance, communications and engineering.

MA331 并行计算（3）

理论实验课，3 学分，授课 2 学时/周，实验课 2 学时/周。先修课程：数据结构与算法（MA211）。

MA331 Parallel Computing (3)

Lecture and experiment, 3 credits, 2 hours’ lectures per week, 2 hours’ experimental courses per week. Pre-requisites: Data structure and algorithm(MA211).

MAT7002 测度论与积分（3）

理论课，3 学分，3 学时/周。先修课程：实变函数(MA301)。本课将以抽象的测度论开始，再讲抽象可测空间上的积分理论，Lp 空间等，课程的最后部分把学生重新带回 Rn 空间中，学习调和分析的一些最基本的内容，包括傅氏变换的有界性和傅里叶级数的收敛性等。

MAT7002 Measure Theory and Integration （3）

Lecture, 3 credits, 3 hours per week. Pre-requisites: Functions of a Real Variable (MA301). This course starts with abstract measure theory, then integration theory on abstract spaces, such as Lp spaces. The last part of this course returns to Rn space, some basic facts from harmonic analysis, including the bounded property of the Fourier transform and the convergence of the Fourier series, etc.

MA201b 常微分方程 B（4）

理论课，4 学分，授课 3 学时/周，习题课 2 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I（MA103b）。本课程介绍常微分方程中最基本的理论和方法，并将以大量的例子来介绍常微分方程在物理、化学、生物等其他学科中的应用。注重培养学生用常微分方程解决应用问题的意识和能力。理论部分包括：一阶线性方程，分离变量法，方向向量场，欧拉方法，存在和唯一性定理，相线分析，二阶线性方程，常数变易法，解的渐进行为，拉普拉斯变换，一阶线性方程组，一阶非线性自治系统，驻点的线性稳定性和分类，相平面分析，零值线，不变区域等。

MA201b Ordinary Differential Equations B （4）

Lecture, 4 credits, 3 hours’ lecture per week, 2 hours’ discussion per week. Pre-requisites: Calculus I&II (MA101b&MA102b) (or Mathematical Analysis I&II&III(MA101a

&MA102a&MA203a)), and Linear Algebra I（MA103b）. This course introduces the basic theories and methods in ordinary differential equations (ODEs) and lots of examples to illustrate the application of ODEs in physics, chemistry, biology, etc. The course aims to nurture the ability of the student to use ODE to solve problems arising in applications. The theoretical part of the course covers: first order linear equations, separation of variables, direction fields, Euler’s method, existence and uniqueness theorem, phase line analysis, second order linear equations, variation of constants, asymptotic behavior of solutions, Laplace transform, first order linear systems, first order nonlinear autonomous systems, linear stability and types of equilibria, phase plane analysis, nullclines, invariant regions, etc.

MA201a 常微分方程 A（4）

理论课，4 学分，3 学时/每周，习题课 2 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213）），线性代数 I&II（MA103b&MA104b）。本课将理论和应用相互穿插，也将用软件模拟理论结果和帮助解决应用问题，培养用常微分方程解决数学问题和应用问题的意识和能力。理论部分包括：一阶线性方程，分离变量法，方向向量场，欧拉方法，存在和唯一性定理，相线分析，二阶线性方程，常数变易法，解的渐进行为，一阶线性方程组，一阶非线性自治系统，驻点的线性稳定性和分类，局部和整体相平面分析，零值线，不变区域，Lyapuvov 函数，Poincare-Bendixson 定理，极限环，Hopf 分歧。

MA201a Ordinary Differential Equations A（4）

Lecture, 4 credits, 3 hours’ lectures per week, and 2 hours’ tutorial per week. Prerequisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b &MA102b& MA213)), and Linear Algebra I&II (MA103b & MA104b). This course mixes theory with applications, and uses softwares to aid the understanding on theoretical results, and to help to solve application problems. The course aims to nurture the ability of the student to use ODE to solve problems arising in applications and other branches of mathematics. The theoretical part of the course covers: first order linear equations, separation of variables, direction fields, Euler’s method, existence and uniqueness theorem, phase line analysis, second order linear equations, variation of constants, asymptotic behavior of solutions, first order linear

systems, first order nonlinear autonomous systems, linear stability and types of equilibria, local and global phase plane analysis, nullclines, invariant regions, Lyapunov function, Poincare-Bendixson Theorem, limit cycles, Hopf bifurcation theorem.

MA108 程序设计与数据库（3）

理论实验课，3 学分，授课 2 学时/周，实验 2 学时/周。先修课程：无。

MA108 Programming and Database (3)

Lecture and experiment, 3 credits, 2 hours' lectures per week, 2 hours' experimental courses per week. Pre-requisites: None.

MA214 抽象代数（3）

理论课，3 学分，3 学时/周。先修课程：线性代数 I&II（MA103b&MA104b）。代数是数学的主要分支，也是最重要的分支之一。与几乎所有的数学分支都有紧密的联系, 且作为基本工具。代数在数学，自然科学和工程设计等方面有着广泛而重要的应用. 本课程是数学和应用数学等学科的必修课，也推荐给计算机科学，物理，化学等专业的学生学习。内容涵盖群、环、域、和模的理论。包括，子群和商群，群作用，Sylow 定理，也包含矩阵群，置换群，理想，主理想环，惟一析因环，多项式环，域的扩张，Galois (伽罗瓦)理论，有限域，模理论和序列理论等。

MA214 Abstract Algebra (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Linear Algebra I&II (MA103b &MA104b). Algebra is a fundamental mathematics branch, and is foundation to many mathematics courses. It is extensively used in mathematics, natural sciences, and computer science. This course is required by the students who major mathematics, and recommended to the students who are studying natural sciences and computer science. The course covers many topics: groups, rings, fields, and modules, including subgroups, factor groups, Sylow theorems, matrix groups and permutation groups; ideals, principle ideals, polynomial rings; field extensions, Galois theory, finite fields, and

module theory.

MA314 抽样调查（3）

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212））。本课程为有一定数理统计知识基础的本科生介绍有用的抽样方法。该课程涵盖了简单随机抽样、分层抽样、系统抽样和其他相关的抽样方法。

MA314 Sample Survey (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)). This course introduces useful sampling methods to undergraduate students with basic knowledge in mathematical statistics. The course covers simple random sampling, stratified sampling, systematic sampling and other related sampling methods.

MA209 初等数论（3）

理论课，3 学分，3 学时/每周。《初等数论》是数学类学生的一门重要基础理论课程。先修课程：无。该课程主要内容包括：整除理论，不定方程，同余的基本知识，同余方程，指数与原根，连分数，素数分布的初等结果，数论函数等。遵循少而精的原则，精心选材，为便于学生理解，对重点内容多侧面分析，从不同角度进行阐述，为后续课程的学习奠定必要基础，同时培养学生的抽象思维能力和逻辑推理能力。

MA209 Theory of Numbers (3)

Lecture, 3 credits, 3 hours lectures per week, Pre-requisites: None. This is a one semester introduction to basic concepts in Number Theory. Topics including divisibility, primes, fundamental theorem of arithmetic, congruences, number theory from an algebraic viewpoint, quadratic reciprocity, number theoretic functions, diophantine equations. After completing this course, students should understand the basic methods and techniques in elementary number theory. This course also helps students develop their abilities in abstract thinking and logical reasoning. MA209 serves as a prerequisite for many courses, including combinatorics, cryptography and etc.

MA333 大数据导论（3）

理论课，3 学分，3 学时/周。先修课程：高等数学（上、下）（MA101b&MA102b）（或数学分析 I、II（MA101a&MA102a）），线性代数 I（MA103b），概率论（MA215）（或概率论与数理统计（MA212））。这门课主要面向对大数据工业应用和研究有兴趣的高年级本科生。课程将主要给出大数据科学的数学方法的简明介绍，其内容完全独立，包括理论分析和 python 算法实践。主要涵盖：数据预处理、分类模型、回归模型、聚类模型、模型选择和降维等方法，以及自然语言处理、文本分析、社交网络分析、神经网络和深度学习、分布式计算等实用和热门课题，如果时间允许还会涉及推荐系统和在线学习等。

MA333 Introduction to Big Data Science (3)

Lecture, 3 credits, 3 hours per week. Pre-requisite: Advanced Mathematics I&II (MA101b&MA102b) (or Mathematical Analysis I&II, MA101a&MA102a), Linear Algebra I(MA103b), Probability Theory(MA215) (or Probability Theory and Mathematical Statistics(MA212)). This course is intended for high-level undergraduate students who are interested in pursuing industrial work and research in big data science. It provides a concise and self-contained introduction to mathematical aspect of big data science, including theoretical analysis, algorithms and programming with python. Major topics include data preprocessing, classification, regression, clustering, model selection, dimension reduction, and hot topics such as natural language processing (NLP), text analysis, social network analysis, neural network and deep learning, distributed computing, and recommender systems and online learning if time permits.

MA306 代数几何（3）

理论课，3 学分，3 学时/周。先修课程：微分几何（MA327），拓扑学（MA323）。本课程介绍复几何的基本概念，定义和性质,包括复流形，全纯向量丛，Kahler 流形的基本定义，介绍层论在代数几何中的基本应用。

MA306 Algebraic Geometry (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Differential Geometry(MA327), Topology(MA323). This course introduces the basic notions in complex algebraic geometry, including complex manifolds, holomorphic vector bundle, basic Kahler geometry and simple applications of theaf theory in algebraic geometry.

MA401 动力系统（3）

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a），线性代数 I&II（MA103b&MA104b），常微分方程 A 或 B（MA201a 或 MA201b）。动力系统的理论始于 H. Poincaré对数学中微分方程的理论研究，它主要研究微分方程解的性态及其结构。本课程将从简单的平面系统出发，介绍吸引子/排斥子、双曲集、稳定流形/不稳定流形等基本概念与结论，并进一步讨论混沌现象、N 体问题等专题。另外，本课程也将介绍离散动力系统的一些内容，比如符号空间上的转移映射、区间映射以及双曲环面自同胚等。

MA401　Dynamical Systems（3）

Lecture, 3 credits, 3 hours per week. Pre-requisites ： Mathematical Analysis I&II&III(MA101a&MA102a&MA203a), Linear Algebra I&II (MA103b & MA104b), Ordinary Differential Equations A or B (MA201a or MA201b). The theory of dynamical systems began with H. Poincaré’s work of qualitative theory of ODEs. A main objective of this theory is to understand the structure and properties of the solutions of a given ODE system (and hence to see how the system shall evolve). This course will begin with some simple ODE systems on the plane, the basic concepts such as attractor/repeller, hyperbolic set, stable/unstable manifolds, and also some related results shall be introduced. Later on, some selected topics such as chaotic dynamics and the N-body problem shall be studied. Also, this course will present and discuss on some examples of discrete dynamical systems, e.g. the shift map on a shift space, interval maps and Anosov isomorphisms on torus.

MA304 多元统计分析（3）

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&II（MA101a& MA102a & MA203a）（或高等数学上&下（MA101b& MA102b））；线性代数 I&II（MA103b& MA104b）；数理统计（MA204）（或概率论与数理统（MA212））。课程描述：本课程分十章，第一章介绍多元分析中常用的矩阵代数知识，这是全书的基础。第二至第四章介绍的基本是一元统计推广到多元统计的内容，主要阐述了多元分布的基本概念和多元正态分布及其统计推断。第五至十章是多元统计独有的内容，这部分内容具有很强的实用性，特别是介绍了各种降维技术，将原始的多个指标转化为少数几个综合指标，便于对数据进行分析。此外，本课程要用到 SAS 软件进行简单的编程与分析。

MA304 Multivariate Statistical Analysis (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites : Mathematical Analysis I&II&III(MA101a&MA102a&MA203a)(or Calculus I&II (MA101b& MA102b)), Linear Algebra I&II(MA103b& MA104b), Mathematical Statistics(MA204) (or Probability and Statistics(MA212)). Course description: This course is divided into ten chapters. Chapter one introduces the common matrix algebra knowledge of the multivariate analysis, which is the basis of the book. The chapter 2-4 introduce the generalized content of from univariate statistics to multivariate statistics. These chapters states the basic concepts of multivariate distribution, multivariate normal distribution and its statistical inference. Chapter 5-10 are featured chapters in multivariate statistics course with very practical contents. All kind of dimension reduction techniques are introduced in these chapters which transform some original multiple indicators into few integrated indicators. The data after transformation is more easy to analyze because of dimensionality reduction. In addition, programming by SAS software is needed for data analysis in this course.

MAT7003 泛函分析（3）-研究生

理论课，3 学分，3 学时/周。先修课程： 线性代数 I&II（MA103b&MA104b），复变函数（MA202），实变函数（MA301），泛函分析（本科）（MA302）。本课程是本科泛函分析课程的继续与深入，着重介绍有重要应用价值的经典理论，为学生的其他研究生数学课程和相关的科研工作打下基础。课程内容包括：Hahn-Banach 定理，弱收敛及弱*收敛，一般谱理论：谱半径与 Gelfand 定理，谱分解定理，孤立特征值的代数重数及稳定性，紧算子，Riesz-Schauder 理论，Hilbert-Schmidt 定理， Krein-Rutman 定理， Fredholm 算子，Fredholm 指数及局部/紧扰动不变性，有界算子的本质谱，有界对称算子、正则算子、酉算子与无界自共轭算子的谱理论， 强连续半群，Hille-Yosida 定理，半群的指数衰减。

MAT7003 Functional Analysis（3）

Lecture, 3 credits, 3 hours per week Pre-requisites: Linear Algebra I&II (MA103b & MA104b), Complex Analysis(MA202), Functions of a Real Variable(MA301), and Functional Analysis(MA302), This course is a continuation of the undergraduate course “Functional Analysis”. It emphasizes the classical theories that have important applications, laying a foundation for other related graduate courses and research. It covers: Hahn-Banach Theorem, weak and weak * topologies, general spectral theory: spectral radius and Gelfand’s theorem, spectral decomposition/separation theorem, algebraic multiplicities and stability of isolated eigenvalues, compact operators, Riesz-Schauder theory，Hilbert-Schmidt theorem，Krein-Rutman theorem, Fredholm operators, Fredholm index and its constancy under small or compact perturbation, essential spectrum of a bounded operator, spectral theory of bounded symmetric operators, normal operators, unitary operators, and unbounded self-adjoint operators, strongly continuous semigroups, Hille-Yosida theorem, exponential decay of semigroups.

MA302 泛函分析（3）

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）(或高等数学（上&下）及数学分析精讲（MA101b&MA102b& MA213）), 线性代数 I&II（MA103b&MA104b）。 此为本科泛函分析的入门课程，涵盖如线性空间、Banach 空间、Hilbert 空间、对偶空间、Hahn-Banach 定理、一致有界原理、开映射定理及闭图像定理等泛函的基本知识。学生需要理解泛函中的基本概念和重要定理，并能运用已学知识证明泛函的命题。

MA302 Functional Analysis (3)

Lecture, 3 credits, 3 hours lectures per week, Pre-requisites：Mathematical Analysis I and II and III（MA101a& MA102a&MA203a）(or Calculus I and II and Advanced Lecture on Mathematical Analysis（MA101b&MA102b& MA213）), Linear Algebra I and II（MA103b&MA104b）. This is an entry level course of Functional Analysis for undergraduates, covering basic knowledge about Functional Analysis, such as linear spaces, Banach spaces, Hilbert spaces, dual spaces, Hahn-Banach Theorem, uniformly bounded principle, open mapping theorem, closed graph theorem. Students are expected to understand the basic concepts and important theorems in Functional Analysis and use the learned knowledge to prove propositions related to the subject.

MA417 非参数统计（3）

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212））。本课程对经典和现代非参数理论做一个系统全面的介绍。这些内容包含了基于秩的经典非参数统计方法，自助法和经验似然法一类的计算强度高的现代非参数统计方法。

MA417 Nonparametric Statistics (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)). This course provides a comprehensive introduction to classical and modern nonparametric statistical methods. It covers classical rank based nonparametric methods as well as modern computation intensive methods such as the bootstrap and empirical likelihood methods.

MA202 复变函数 (3)

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下（MA101b&MA102b））；线性代数 I（MA103b）。本课程主要讲授复变函数基本理论，内容包括全纯函数、柯西定理及其应用、亚纯函数、级数、留数、对数、整函数、共形映射等。

MA202 Functions of a Complex Variable（3）

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III(MA101a&MA102a&MA203a) (or Calculus I&II (MA101b&MA102b)), Linear Algebra I (MA103b). This course mainly introduces the basic theory of functions of a complex variable. Topics include holomorphic functions, Cauchy’s theorem and its applications, meromorphic functions, series, residues, the logarithm, entire functions, conformal mappings, and so on.

MA215 概率论（4）

理论课，4 学分，3 学时/周，习题课 2 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I & II（MA101a& MA102a）），线性代数 I&II（MA103b&MA104b）。本课程讲解概率论的基本概念，并重点叙述最实用的概率方法及技巧。讲课内容涵盖概率的基本性质；若干重要的离散及连续随机变量及其分布；随机向量的联合分布及边缘分布；独立性；随机变量的函数；随机变量的数字特征包括数学期望、方差、协方差等。并简要介绍大数定律及中心极限定理及其应用。

MA215 Probability Theory (4)

Lecture, 4 credits, 3 hours’ lectures per week, and 2 hours’ tutorial per week. Pre-requisites: Calculus I and II (MA101b&MA102b) (or Mathematical Analysis I and II(MA101a& MA102a)), Linear Algebra I and II (MA103b&MA104b).This course introduces the basic concepts in

probability theory as well as the most useful probability methods and techniques. The lectures cover the important properties of the probability measures; some important discrete and absolutely continuous random variables and their distributions; random vectors; joint and marginal distributions; independence; the functions of random variables; the mathematical expectations, variance, covariance and correlation. The law of large numbers and the central limit theorems are also briefly discussed.

MA212 概率论与数理统计（3）

理论课，3 学分，授课 3 学时/周，习题课 2 学时/周。先修课程： 高等数学上&下（MA101b&MA102b），线性代数 I（ MA103）。本课程主要内容为概率与统计的基本理论、方法与技巧，包括随机事件与概率，随机变量与概率分布，多维随机变量及其联合分布，随机变量的数字特征，极限定理，抽样分布，参数估计，假设检验。

MA212 Probability and Statistics（3）

Lecture, 3 credits, 3 hours’ lecture per week, 2 hours’ tutorials per week. Pre-requisites: Calculus I&II (MA101b &MA102b), Linear Algebra I(MA103). This course introduces the basic concepts in Probability and Statistics，methods and techniques，including probability, random variables, the joint distribution, numerical characteristics of random variable, limit theorems, sample distributions, parametric estimation, and testing hypothesis.

MA101b 高等数学（上）

理论课，4 学分，4 学时/周。先修课程：无。本课程强调单变量微积分的基本概念、性质以及计算微分和积分的基本技巧，培养学生们使用微积分的思想去解决其它科学领域的能力。本课程主要包括：极限与连续性理论、单变量微分及其应用、单变量积分及其应用、常微分方程的简单介绍。

MA101b Calculus I

Lecture, 4 credits, 4 hours per week. Pre-requisites: None. In this course, we emphasize intuitive and conceptual understanding of theory of Calculus, computation skills, and nurture the mentality and the ability to use Calculus to solve problems in other scientific disciplines. The course will cover limits and continuity, derivatives, single variable integrals, and ordinary differential equations.

MA102b 高等数学（下）（4）

理论课，4 学分，4 学时/周。先修课程：高等数学（上）（MA101b）。本课程强调多变量微积分的基本概念、性质以及计算微分和积分的基本技巧，培养学生们使用微积分的思想去解决其它科学领域的能力。本课程主要包括：数列和函数的级数、向量函数的微分、偏微分、向量场的概念，以及在欧式空间上或者在曲线和曲面上的多重积分。

MA102b Calculus II（4）

Lecture, 4 credits, 4 hours per week. Pre-requisites: Calculus I(MA101b). In this course, we emphasize intuitive and conceptual understanding of theory of Calculus, computation skills, and nurture the mentality and the ability to use Calculus to solve problems in other scientific disciplines. The course will cover series, calculus of vector functions, partial derivatives, vector fields, and multiple integrals on regions in Euclidean space and on curves and surfaces.

MA413/MAT7008 高等统计学（研究生）

理论课，3 学分，3 学时/周。先修课程：概率论与数理统计（MA212）（或概率论（MA215）与 数理统计（MA204））。通过此课程的学习，能够让学生掌握高等统计学的基本概念和基本理论，为进入统计领域的研究打基础。教学内容包括：背景；一致最小方差无偏估计量；平均风险最优化；最小最大估计和可允许性估计；渐进最优化；一致最优势检验；小样本理论：最小最大原理；依概率收敛和依律收敛。

MA413/MAT7008 Advanced Statistics

Lecture, 3 credits, 3-hour lectures per week. Prerequisites: Probability and Statistics(MA212) (or Probability(MA215) &Mathematical Statistics(MA204)). This course aims to enable undergraduate and postgraduate students to master some basic concepts and theories in Advanced Statistics and to lay a solid foundation for the research in statistics. The course covers: Background; UMVU estimators; Average risk optimality; Minimaxity and admissibility; Asymptotic optimality; Uniformly most powerful tests; Small- sample theory: the minimax principle; Convergence in probability and in law.

MA403 广义线性模型（3）

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212）），统计线性模型(MA329)。广义线性模型是经典线性模型的自然推广。广义线性模型涵盖了作

为特例线性回归模型、二项响应变量的 logit 模型和 probit 模型。广义线性模型可应用于多种多样的学科领域。在经典线性模型的假设无效时，应考虑使用这一类模型。

MA403 Generalized Linear Models (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)), Statistical Linear Models (MA329). This course introduces generalized linear models which are a natural generalization of classical linear models. They include as special cases linear regression model, logit and probit models for binomial responses and multinomial responses. Generalized linear models are applicable in a wide variety of subject areas, and should be considered whenever the assumptions of the classical linear model are invalid.

FMA301 计量经济学（3）

理论课，3 学分，3 学时/周。先修课程：宏观经济学，微观经济学(FIN201)，数学分析 I&II&III（MA101a&MA102a&MA203a）（或高等数学上&下（MA101b& MA102b）），线性代数 I&II（MA103b& MA104b），数理统计（MA204）（或概率论与数理统计（MA212））。课程描述：对于金融数学专业的学生来说，计量经济学是入门课程。本课程主要是为了让学生把基本的计量经济技术运用到实际工作中去，为他们以后的理论研究做好准备。学好该课程的前提是先学习高等数学和统计学，并达到中等以上水平，除此之外，还要具备计算机编程能力。该课程的主要内容如下：计量经济学简介，简单回归模型，多元回归分析，多元回归模型推断，OLS 的渐近性质，异方差性，工具变量和两阶段最小二乘，面板数据方法的介绍，极大似然方法，有限因变量模型等。为什么金融数学专业的学生会用到计量经济学呢？一个可能的原因是相关系数的想法总是或多或少地出现在像 copula，CAPM，有效前沿模型这样的市场模型中，描述一个资产变量和其他资产变量或正或负的变动相关性。相关系数源自金融分析师和交易员对资产变动关系的比较，而人们则用计量经济学工具把这些定性比较升级为用到数学和统计学的定量分析。

为什么相关系数会被广泛使用呢？它是证券公司中的高频词汇，交易员对存在负相关性的股票进行配对交易，这种交易和时间序列中的协整分析（相关性更进一步的概念）密切关联。计量经济学有助于我们用协整等回归分析方法更好地诠释变量之间的变动相关性。

FMA301 Econometrics (3)

Course description: Lecture, 3 credits, 3 hours per week. Pre-requisites：Macroeconomics, Microeconomics, Mathematical Analysis I&II&III (MA101a & MA102a & MA203a) (or Calculus I&II (MA101b& MA102b)), Linear Algebra I&II (MA103b & MA104b), Mathematical Statistics(MA204) (or Probability and Statistics(MA212)). Course description: Econometrics is an introductory course designed for the Financial Mathematics undergraduate program. The main objectives of the course are to introduce students to basic econometrics techniques and to prepare

them to do their own applied work. Students are encouraged to think of the course as a preparation toward their thesis research project. The prerequisites of the course are Calculus and Statistics at an intermediate level. The knowledge of some computer-programming is welcome. The main contents of this course are listed as follows: Introduction to Econometrics, The Simple Regression Model, Multi-variate Regression Analysis, Inference in the Multi-variate Regression Model, Asymptotic Properties of OLS, Heteroscedasticity, Instrumental Variables and two stage least square, Introduction to Panel Data Methods, Maximum Likelihood, Limited Dependent Variable Models, etc.

Why econometrics can be useful for a student majoring in financial mathematics? One reasonable guess is that the idea of correlation between different assets has become a dominating source of intuition for various market models like copula, CAPM, and the model of efficient frontier, which all get involved with the issue of explaining the change of one asset variable as positively or negatively linked with each of the change of that variable type of all the other assets in the market. This idea of correlation represents a transition from the intuitive sense of traditional financial analysts and traders who will make comparison between price movements to the quantitative depiction of econometric practitioners who will use the toolkit to crystallize such comparison into formulas, which is exactly where mathematics and statistics comes into play.Why is this idea of correlation working? When you step into the office of securities firm one day and “correlation” will probably be the first word that comes into your ears and very often repeated. The trader there may make profit from negatively correlated stocks by using the strategy to buy the one that moves up and sell the one that moves down. This type of pairs trading closely relates to cointegration analysis in time series, a more systematic approach to deal with correlations, and could be an object to start with for research interest in senior years. So, get yourself geared up for studying econometrics and make it the strength in your skill set to modeling!

MA216 计算金融（3）

理论课，3 学分，3 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II（MA101a& MA102a）），线性代数 I&II（MA103b&MA104b）。本课程研究用基于计算机的数值方法及其理论解决金融衍生品定价问题，是金融数学系专业学生所必须所理解和掌握的专业基础知识。介绍计算金融的基本概念，重要的金融分析理论，实践方法及数值实现；主要介绍二叉树期权定价模型和 Black-Scholes 期权定价模型，蒙特卡罗模拟方法，有限差分方法，新型期权，和利率模型等。

MA216 Computational Finance (3)

Lecture, 3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b& MA102b) (or Mathematical Analysis I&II&III (MA101a &MA102a)), Linear Algebra I&II (MA103b & MA104b). This course focuses on modern numerical methods and mathematical theory in the

pricing of financial derivatives. We introduce basic concepts and terminologies of computational finance, mathematical theory of financial analysis, and practical methods and numerical implementation. It includes Binomial Tree Option Pricing Model and Black-Scholes Option Pricing Model, Monte Carlo Simulation Method, Finite Difference Methods, Exotic Option and Interest Rate Model, etc.

MA220 计算数学选讲

理论课，3 学分，授课 3 学时/周。先修课程：偏微分方程（MA303）和数值分析（MA305）。此课程是关于反问题数学理论和数值方法的一门基础课程，主要针对高年级的本科生和研究生。它包含数学反问题中的一些经典理论，比如模型的建立和正则化理论，也包含一些前沿研究课题的简介，比如反散射理论和隐形技术。

MA220 Topics on Computation Mathematics

Lecture, 3 credits, 3 hours per week. Pre-requisites: Partial Differential Equations (MA303) and Numerical Analysis (MA305). This is an introductory course to the mathematical theory and numerical methods for inverse problems. It aims at high-level undergraduate students and research postgraduate students. It will cover both classical topics including model formulation and regularization theory, and state-of-the-art research topics including inverse scattering theory and invisibility cloaking.

MA402 计算统计（R）

理论课，3 学分，3 学时/周。先修课程：MA215 概率论; 概率论与数理统计（MA212）（或概率论（MA215）与 数理统计（MA204）），统计线性模型（MA329）。本课程旨在为统计学学科本科生和研究生提供常用的现代复杂计算方法。它强调计算作为一个基本工具在数据分析、统计推断、统计理论与方法的发展中的中心地位。教学内容包括: 随机变量的产生方法，包括逆方法，格子点方法，抽样/重要性重抽样方法，随机表示方法，条件抽样方法。优化技术包括牛顿方法，EM 算法以及它的变体和 MM 算法。积分包括 Laplace 近似，黎曼模拟，重要性抽样方法以及方差减少技术。MCMC 方法包括数据扩充算法，Gibbs 抽样以及逆贝叶斯公式抽样。自助方法。

MA402 Computational Statistics with R

Lecture, 3 credits, 3-hour lectures per week. Prerequisites: Probability and Statistics(MA212) (or Probability(MA215) &Mathematical Statistics(MA204)), Statistical Linear Models(MA329). This course aims to provide undergraduate and postgraduate students majoring in statistics a background in modern computationally-intensive methods in statistics. It emphasizes the role of computation as a fundamental tool of discovery in data analysis, of statistical inference, and for

development of statistical theory and methods. The course covers: generation of random variables including the inversion method, the grid method, the sampling/importance re-sampling method, the stochastic representation method, and the conditional sampling method; Optimization techniques including Newton’s method, expectation-maximization (EM) algorithm and its variants, and minorization-maximization (MM) algorithm; Integration including Laplace approximations, Riemannian simulation, the importance sampling method and the variance reduction techniques; Markov chain Monte Carlo methods including data augmentation algorithm, Gibbs sampler, and the exact inverse Bayes formulae sampling; Bootstrap methods.

FMA301 金融风险管理

理论课，3 学分，3 学时/周。先修课程：微观经济学(FIN201)，宏观经济学(FIN204),数学分析 I&II&III（MA101a&MA102a&MA203a）（或高等数学上&下（MA101b& MA102b））， 线性代数 I&II（MA103b& MA104b），数理统计（MA204）（或概率论与数理统计（MA212）），时间序列分析(MA309)，计量经济学(FMA301)。课程描述：金融风险管理是金融数专业的一门应用性专业课。是在学习金融数学专业基础课和专业课的基础上，进一步使学生掌握金融风险管理的基本方法、基础知识和基本原理，掌握识别金融风险，计量金融风险，化解金融风险，以及防范金融风险的基本理论和基本措施。

FMA301 Financial risk management

Lecture, 3 credits, 3 hours per week. Pre-requisites ： Mathematical Analysis I&II&III(MA101a&MA102a&MA203a) (or Calculus I&II (MA101b & MA102b)), Linear Algebra I&II (MA103b& MA104b), Mathematical Statistics(MA204) (or Probability and Statistics(MA212)), Macroeconomics(FIN201), Microeconomics (FIN204), Time Series Analysis(MA309), Econometrics(FMA301). Course description: This course will cover the fundamentals of financial risk. Financial risk management is an essential course to study for students who major in finance and insurance, with well-organized topic development on various sources of financial risks classified into market risks, credit risks and transaction risks. As for market risks such as interest rate risks and exchange rate risks etc., the risk hedging instruments will be introduced by dissecting the risk management effects of a wide range of financial derivatives. Integrating modern risk management techniques and conceptual understanding of those techniques such as VaR, special emphasis will be laid upon concepts as well as computational methods, in order to qualitatively and quantitatively equip the course participants with solid comprehension in financial risk management instruments and methods. With respect to credit risks, specific considerations will be drawn to the concepts, characters and identification methods of credit risks. At the same time, transaction risks will also be moderately introduced in this course.

FMA302 金融经济学

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213）），概率论（MA215）（或概率论与数理统计（MA212））。本课程的教学目的是，在简化的静态市场模型框架下，了解金融所涉及的基本经济问题，掌握对这些问题进行分析的理论框架、基本概念、一般原理以及利用相关原理解决各个问题的简单理论模型，为学习现代金融经济学打下基础。

FMA302 Financial Economics

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b& MA102b& MA213)), Probability Theory (MA215) (or Probability and Statistics(MA212)). Under a simplified static market model, the students should learn to understand the basic economic problems arising from the financial area, grasp the theoretical framework of the analysis for these problems, basic concept, general principles and theoretical models based on the related principle to solve problems.

FMA415 金融数学选讲-金融动力学与行为金融

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a &MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213）），线性代数 I&II（MA103b&MA104b），常微分方程 A 或 B（MA201a 或 MA201b），证券投资学（FMA303）。本课程的第一部分介绍离散动力系统的理论基础以及有代表性的离散金融动力学模型的理论研究；第二部分介绍行为金融的基本内容。第一部分以教师讲解为主，第二部分以学生讲演为主。通过本课学习，学生初步掌握金融动力学和行为金融学的基本理论和基本方法，并为今后进行金融数学的学术研究特别是本科毕业论文做准备。

FMA415 Topics of Financial Mathematics-Financial dynamics and behavioural Finance

Lecture, 3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b&MA102b) (or Mathematical Analysis I&II&III(MA101a&MA102a&MA203a)), and Linear Algebra I&II (MA103b & MA104b), Ordinary Differential Equations A or B (MA201a or MA201b), Security Investment(FMA303). The first part of this course is to introduce foundation of discrete dynamical systems and the theoretical studies of some famous discrete financial dynamical models; the second part is to introduce basic contents of behavioural finance. The first part is mainly taught by lecturer, the second part is mainly given by student’s presentations. The course will help them to

prepare their future researches on financial mathematics, especially prepare to write their undergraduate theses.

FMA407 金融数学选讲

3 学分，3 学时/周。先修课程：由授课教师定。本课程主要目的是为学生今后进行金融数学的理论研究或实证研究做准备。本课的任课教师可以是本系教师，也可以是外聘的学术界专家或金融业界的专家（团队）。课程具体内容，教材，评分标准等均理论课，由任课教师确定。为明确学生选课内容，可在本课名称后加一个副标题。

FMA407 Topics of Financial Mathematics

Lecture, 3 credits, 3 hours lectures per week. Pre-requests: prerequisites determined by the instructor. The main purpose is to help students to prepare their future researches on financial mathematics, for either theoretical studies or empirical studies. The lecturer could be teacher of Department of Mathematics or experts invited from financial industry（group）. The pre-requests, contents, textbook, and the type of assessment are determined by lecture(s). The title of the course can be added a subtitle each time.

MA205 离散数学

理论课，3 学分，3 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I（MA103b）。离散数学是数学专业、计算机专业、电子信息和工程专业等众多专业的基础理论课。本课程旨在为计算机科学与技术的研究和应用提供形式化的方法，为实际问题的描述提供数学模型，为问题的求解和机器实现提供数学工具。因此，学习本课程对于提高学生的逻辑思维能力，增强分析问题和解决问题的能力，培养科学的思维方法和数学建模的能力是有重要意义的。本课程包含有五个部分的内容：数理逻辑部分，集合论部分，图论部分，组合数学部分和代数系统部分。其中，数理逻辑部分主要涉及命题公式等值演算、命题逻辑的推理理论、谓词公式的等值演算；集合论部分主要包含集合运算、二元关系、函数与映射；图论部分主要有图的概念与表示、树、欧拉图、哈密顿图等；组合数学部分有基本组合计数公式、递推方程和生成函数；代数系统部分则只是简单介绍几个典型的代数系统。

MA205 Discrete Mathematics

Lecture, 3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b&MA102b) (or Mathematical Analysis I&II&III (MA101a &MA102a &MA203a)), Linear Algebra I (MA103b).

Discrete mathematics is a basic theory course of mathematics, computer science, electronic information and engineering, and so on. This course aims to provide formal methods for the research and application of computer science and technology, to provide a mathematical model for the description of practical problems, and to provide mathematical tools for solving problems and machine tools. Therefore, it is of great significance to study this course to improve students' ability of logical thinking, strengthen the ability of analyzing and solving problems, and develop the ability of scientific thinking method and mathematical modeling. This course consists of five parts: mathematical logic, set theory, graph theory, combinatorial mathematics and algebra system. At first, we cover in propositional formula equivalent calculation, inference theory of propositional logic and predicate formulas equivalent calculation. We also study set operations, binary relation, function and mapping. Out of graph theory some contents are dealt with such as concepts of graphs, trees, Euler graph, and Hamilton graph a. As to combinatorial mathematics, counting formula, recursive equations and generating function are involved. At last, several typical algebraic systems are given.

MA328 流体力学数学导引

理论课，3 学分，3 学时/周。先修课程：高等数学（上、下）（MA101b&MA102b）（或数学分析 I、II，MA101a&MA102a），线性代数 I（MA103b），常微分方程 A（或 B）（MA201a（MA201b）），偏微分方程（MA303）。这门课面向高年级本科生和低年级研究生，尤其是对工业应用以及应用数学和流体力学的学术研究感兴趣的学生。课程将主要给出关于流体力学数学理论的简明介绍，其内容完全独立，包括流体力学中主要方程的推导和特殊解。主要涵盖：守恒律，欧拉方程，Navier-Stokes 方程，流函数-涡流形式，有势流，边界层，不可压缩流的一些例子，如果时间允许还会涉及一些气体动力学。

MA328 Mathematical Intro to Fluid Mechanics

Lecture, 3 credits, 3 hours per week. Pre-requisite: Advanced Mathematics I&II(MA101b&MA102b) (or Mathematical Analysis I&II(MA101a&MA102a)), Linear Algebra I(MA103b), Ordinary Differential Equations A (or B)(MA201a or MA201b), Partial Differential Equations(MA303). This course is intended for high-level undergraduate students and low-level graduate students who are interested in pursuing industrial work and research in applied mathematics and fluid mechanics. It provides a concise and self-contained introduction to mathematical aspect of fluid mechanics, especially in the derivation of governing equations in fluid mechanics, and typical solutions in particular cases. Major topics include the conservation laws, Euler equations, Navier-Stokes equations, streamfunction-vorticity formulation, potential flows, boundary layer, examples of incompressible flows, and gas dynamics if time permits.

MA325 偏微分方程数值解

理论课，3 学分，3 学时/周。先修课程：高等数学（上、下）（MA101b&MA102b）（或数

学分析 I、II（MA101a&MA102a））, 线性代数 I（MA103b）, 常微分方程 A（或 B）（MA201a (MA201b)）, 偏微分方程（MA303）。这门课面向高年级本科生和低年级研究生，尤其是对工业应用以及计算数学和工程的学术研究感兴趣的学生。课程将主要给出关于偏微分方程数值解法的简明介绍，其内容完全独立，包括理论分析和程序设计。主要涵盖：有限差分方法，椭圆、双曲和抛物方程的显隐式数值格式，截断误差分析，相容性、收敛性和稳定性分析，数值线性解法器，迭代方法，如果时间允许还会涉及一些深度课题。

MA325 Numerical Solutions to Partial Differential Equations

Lecture, 3 credits, 3 hours per week. Pre-requisite: Advanced Mathematics I&II (MA101b&MA102b)(or Mathematical Analysis I&II (MA101a&MA102a)), Linear Algebra I(MA103b), Ordinary Differential Equations A (or B), (MA201a or MA201b), Partial Differential Equations, MA303. This course is intended for high-level undergraduate students and low-level graduate students who are interested in pursuing industrial work and research in computational mathematics and engineering. It provides a concise and self-contained introduction to numerical solutions to partial differential equations, including the theoretical analysis and programming aspects. Major topics include finite difference methods, explicit and implicit schemes for parabolic, hyperbolic and elliptic equations, truncation error, consistency, convergence, stability, iterative methods, numerical linear solvers, and some further topics if time permits.

MA303 偏微分方程

理论课，3 学分，3 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a））, 线性代数 I（MA103b）常微分方程 A 或 B（MA201a 或 MA201b）。本课程主要讲述了一阶偏微分方程（如输运方程）和三类二阶偏微分方程（椭圆型、抛物型和双曲型）的背景、概念、解法及其应用。

MA303 Partial Differential Equation

Lecture, 3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b& MA102b) (or Mathematical Analysis I&II&III (MA101a&MA102a &MA203a)), and Linear Algebra I (MA103b), Ordinary Differential Equations A or B (MA201a or MA201b). This course focuses on the first order partial differential equation (such as transport equation) and three kinds of second order partial differential equations (elliptic, parabolic and hyperbolic) in the backgrounds, concepts, methods and their application.

MA405 生存分析

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212）），统计线性模型(MA329)。本课程涉及了单个群组或者多个群组的生存时间分析。我们将要讨论描绘生存时间特征的方法以及如何估计和比较这些方法（参数和非参数的方法）。我们也会讨论一些回归模型，这些模型可以被用于解释生存时间对其他诸如药物治疗和个体内在特征（包括性别、临床试验中病人的体重）变量的依赖性。

MA405 Survival Analysis

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)), Statistical Linear Models (MA329). This course is concerned with the analysis of survival times of a group or groups of individuals. We will discuss ways of characterizing survival times and how to estimate and compare them (parametrically and non-parametrically). We will also discuss regression models that may be used to explain the dependence of survival times on other variables such as drug treatments and intrinsic characteristics of subjects such as sex, bodyweight of patients in a clinical trial.

MA310 生物数学

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II（MA101a&MA102a）（或者高等数学上&下(MA101b&MA102b)，线性代数 I（MA103b），常微分方程 A 或者 B（MA201a 或 MA201b）。生物数学是生物学与数学之间的边缘学科。它以数学方法研究和解决生物学问题，并对与生物学相关的数学方法进行理论研究。本课程将向学生介绍生物数学中的几类经典模型，学生通过课程学习将深刻理解这些模型所涉及的生物问题的基本原理，了解基于这些原理的建模方法和思路，并掌握分析这些模型所用的数学方法。

MA310 Mathematical Biology

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematics Analysis I & II (MA101a&MA102a) (or Calculus I & II (MA101b&MA102b)), Linear Algebra I (MA103b), Ordinary Differential Equation A or B (MA201a or MA201b). Mathematical Biology is a frontier subject between biology and mathematics. It studies and solves biological problems with mathematical methods, and conducts the theoretical study on the mathematical methods related to biology. This course will introduce students some of the classic models of biology. The students will understand the basic principles of biology involved in these models, and how to model biological problems based on these principles. They will also master a wide range of mathematical techniques used in analyzing these models.

MA309 时间序列分析

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&II（MA101a& MA102a& MA203a）（或高等数学上&下（MA101b & MA102b））；线性代数 I&II（MA103b & MA104b）；数理统计（MA204）（或概率论与数理统计（MA212））。 课程描述： 本课程讲述时间序列里一系列重要的概念，比如随机过程的平稳性，自回归-求和-滑动平均模型，参数估计与预测，模型诊断，异方差性及建模，以及其他选定的协整和因果关系等时间序列方面的主题等。本课程是时间序列方法论与实践的结合。理论方面聚焦在平稳性特征，时间序列平稳模型及其相应的分析。实践方面关注 R 语言在时间序列里的应用，尤其是金融时间序列。本课程完成后，你将能够对一些时间序列数据进行建模，分析和预测并能阅读一些这方面的文献，同时具备开始做时间序列方面有关论文的能力。更一般地，你会懂得依赖性在统计建模中的重要性。

MA309 Time series analysis

Lecture, 3 credits, 3 hours per week. Pre-requisites ： Mathematical Analysis I&II&III(MA101a&MA102a&MA203a) (or Calculus I&II (MA101b& MA102b)), Linear Algebra I&II (MA103b& MA104b), Mathematical Statistics(MA204) (or Probability and Statistics(MA212)). Course description: The aim of the course is to present important concepts of time series analysis (Stationarity of stochastic processes, ARIMA models, parametric estimation forecasting, model diagnostic, heteroscedasticity, and other selected topics such as Co-integration and Causality, etc.). The course is a mixture of theory and practical applications of time series methods. The theoretical part focuses upon properties of stationary time series and their analysis in the time domain. The practical part focuses upon the application of R language in time series. Having completed this course, you will be able to model and forecast a time series as well as read papers from the literature and start to do thesis research in time series analysis. More generally, you will acquire an appreciation for the role of dependence in statistical modeling.

MA301 实变函数论

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a& MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213））。本课程主要目的是介绍勒贝格测度与勒贝格积分理论，进一步锻炼学生抽象分析的能力，为学生学习后续数学课程奠定基础。

MA301 Theory of functions of a real variable

Lecture，3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b&MA102b& MA213)). This course aims to introduce Lebesgue measures and Lebesgue integrals. It will provide a foundation stone for future course e.g. functional analysis, stochastic processes, stochastic analysis, and mathematical finance.

MA418 试验设计

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212）），统计线性模型（MA329）。实验设计研究的是实验的因素与实验的输出结果之间的关系。有许多经典的实验设计在工业领域得到了广泛的应用。本课程着重于讨论这些重要的设计。

MA418 Design of Experiments

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)), Statistical Linear Models (MA329). Design of Experiments studies the relationship between factors of an experiment and the output of the experiment. There are a number of classical designs which have wide applications in the industry. This course focuses on these important designs.

FMA322 寿险精算

理论课，3 学分，3 学时/周。先修课程： 高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I（MA103b）， 概率论与数理统计（MA203b ）(或概率论（MA215））。本课程主要内容为寿险精算的基本原理、方法与技巧，包括利息理论基础，生命函数，人寿保险的精算现值，生存年金的精算现值，净保费与费用负荷保费，责任准备金理论，简单多生命函数。

FMA322　Life Insurance Actuarial Science

Lecture,3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b& MA102b) (or Mathematical Analysis I&II&III(MA101a&MA102a&MA203a)), and Linear Algebra I&II (MA103b), Probability and Statistics(MA212) (or Probability Theory (MA215)). This course introduces the basic concepts in actuarial mathematics, methods and techniques, including interest theory, life functions, the actuarial present value of life insurance, the actuarial present value of life annuity, net premiums and fee load premiums, reserve theory and simple Joint-life function.

MA211 数据结构及算法分析

理论实验课，3 学分，授课 2 学时/每周，实验课 2 学时/每周。先修课程：程序设计与数据库（MA108）（或 C/C＋＋程序设计语言（MA106））

MA211 Data structure and algorithms

Lecture and experiment, 3 credits, 2 hours’ lectures per week, 2 hours’ experimental courses per week. Pre-requisites: Programming and database(MA108) (or C/C++ programming languages(MA106)).

MA204 数理统计

理论课，4 学分，授课 3 学时/每周，习题课 2 学时/周。先修课程：数学分析 I&II（MA101a&MA102a）（或高等数学上&下（MA101b&MA102b））线性代数 I&II（MA103b&MA104b），概率论（MA215）（或概率论与数理统计（MA212）。本课程是在概率论（MA215）的基础上研究统计概念和统计方法的，它将着重讲述统计推断的两大主题----估计和假设检验。通过学习本课程，学生将具备定性分析，定量分析统计数据的能力。本课程包括：随机变量的函数的分布和密度函数，次序统计量，中心极限定理；极大似然估计（MLE），矩估计，贝叶斯估计，估计量的性质，MLE 的极限性质，正态均值，两个正态均值之差，正态方差，两个正态方差之比的置信区间，以及大样本情况下的参数的置信区间；势函数，Neyman-Pearson 引理，似然比检验，拟合优度检验，线性回归，最小二乘估计，正态回归分析，正态相关分析，多重线性回归；符号检验，Wilcoxon 符号秩检验，秩和检验。

MA204 Mathematical Statistics

Lecture, 4 credits, 3 hours’ lectures per week, 2 hours’ tutorials per week. Prerequisites: Mathematical Analysis I&II(MA101a&MA102a) (or Calculus I&II (MA101b& MA102b)), and Linear Algebra I&II (MA103b & MA104b), Probability Theory (MA215) (or Probability and Statistics(MA212)). This course is on the basis of “Probability(MA215)”. It will study the concepts and methods of statistics. The course will lay emphasis on the estimation and hypothesis testing, the two major areas of statistical inference. Through the study of this course, students will be equipped with both quantitative skills and qualitative perceptions essential for making rigorous statistical analysis of data. The course covers: distribution and density of function of random variables, order statistics, central limit theorem; Maximum likelihood estimator (MLE), moment estimator, Bayesian estimator, properties of estimators, limiting properties of MLE; Confidence interval estimations for normal mean, the difference of two normal means, normal variance, the ratio of two normal variances, and large-sample confidence intervals; Power function,

Neyman-Pearson Lemma, likelihood ratio test, and goodness of fit test; Linear regression, least squares estimator, normal regression analysis, normal correlation analysis, and multiple linear regression; The sign test, the Wilcoxon signed-rank test, the rank-sum test.

MA101a 数学分析 I

理论课，5 学分，4 学时/周，习题课 2 学时/每周。先修课程：无。本课程为主修数学的学生奠定坚实的分析理论基础，培养严谨的逻辑推理和数学思维能力。用 epsilon-delta 语言定义微积分里的基本概念，内容涵盖基本的实数理论、极限、函数的连续性、函数的导数和不定积分等。学生需要通过 epsilon-delta 语言理解极限、连续等基本概念，并能运用 epsilon-delta 语言证明简单的命题，熟练掌握微积分的运算技巧。

MA101a Mathematical Analysis I

Lecture, 5 credits, 4 hours lectures per week, and 2 hours tutorial per week. Pre-requisites：None. This course aims at providing math majored students with solid foundation in the theory of analysis, cultivating their ability of rigorous logical reasoning and mathematical thinking. It uses epsilon-delta language to define basic concepts in Calculus and covers elementary theory of real numbers, limits, continuity of functions, derivatives and indefinite integrals. Students are expected to understand the basic concepts, such as limit and continuity, through epsilon-delta language, and use epsilon-delta language to prove simple propositions. They are also supposed to master calculation skills in Calculus.

MA102a 数学分析 II

理论课，5 学分，4 学时/周，习题课 2 学时/每周。先修课程：数学分析 I（MA101a）。本课程为主修数学的学生奠定坚实的分析理论基础，培养严谨的逻辑推理和数学思维能力。内容涵盖定积分、多变量函数的连续性和多元微积分等。学生应掌握定积分、欧式空间拓扑、多元微积分的重要概念，及相关主题的运算和证明技巧。

MA102a Mathematical Analysis II

Lecture, 5 credits, 4 hours lectures per week, and 2 hours tutorial per week. Pre-requisites：Mathematical Analysis I（MA101a）. This course aims at providing math majored students with solid foundation in the theory of analysis, cultivating their ability of rigorous logical reasoning and mathematical thinking. It covers definite integrals, the continuity of functions of several variables and multi-variable calculus. Students are expected to understand the important concepts in definite integral, topology of Euclidean spaces and multivariable calculus, and master the calculation and

proof techniques of the related subjects.

MA203a 数学分析 III

理论课，5 学分，4 学时/周，习题课 2 学时/每周。先修课程：数学分析 I&II（MA101a& MA102a）。本课程为主修数学的学生奠定坚实的分析理论基础，培养严谨的逻辑推理和数学思维能力。内容涵盖场的数学、数项级数、函数列与函数项级数、反常积分、傅立叶积分和含参变量积分。学生应理解函数序列和级数的几种收敛性，并能运用恰当的判别法确定序列、级数和含参数的积分的收敛，以及熟练掌握相关内容的运算和证明技巧。

MA203a Mathematical Analysis III

Lecture, 5 credits, 4 hours lectures per week and 2 hours tutorial per week. Pre-requisites：Mathematical Analysis I&II（MA101a& MA102a）. This course aims at providing math majored students with solid foundation in the theory of analysis, cultivating their ability of rigorous logical reasoning and mathematical thinking. It covers vector fields, numerical series, sequences and series of functions, improper integrals, Fourier analysis and integrals with parameters. Students are expected to understand several kinds of convergences of sequences and series of functions, and use proper criteria to determine the convergence of sequences, series and integrals with parameters. They should also master the calculation and proof techniques of the related subjects.

MA213 数学分析精讲

理论课，5 学分，授课 4 学时/周，习题课 2 学时/周。先修课程：高等数学 上&下（MA101b&MA102b）。此课程为衔接高等数学与后期数学课程（如复变函数、实变函数、泛函分析和概率论等）的桥梁。内容涵盖基本的实数理论和拓扑概念，用 ε - δ 语言描述极限、连续、微分、积分和级数收敛等概念并严格推导相关的性质和证明定理。

MA213 Advanced Lecture on Mathematical Analysis

Lecture, 5 credits, 4 hours lectures per week and 2 hours tutorial per week. Pre-requisites：Calculus I&II（MA101b&MA102b）. This course bridges Calculus and advanced math courses (such as Complex Analysis, Real Analysis, Functional Analysis and Probability). It covers basic theory of real numbers and concepts of Topology, using $\varepsilon - \delta$ language to describe concepts in Calculus, such as limit, continuity, differentiation, integration, convergence of series etc and to rigorously derive related properties and prove theorems.

MA206 数学建模

理论课，3 学分，3 学时/周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II（MA101a& MA102a）），线性代数 I&II（MA103b&MA104b）。本课程是高强度介绍数学建模，主要使用图形、数值、符号计算和数学写作技巧描述和探究实际数据和现象。重点在运用微积分，高等代数的知识来研究和分析应用型的模型和问题，特别是物理、生态、环境、医学、管理、经济、信息技术等领域的一些典型实例，在传授知识的同时，通过典型建模实例的分析和参加建模实践活动，培养和增强学生自学能力、创新素质。

MA206 Mathematical Modelling

Lecture, 3 credits, 3 hours per week. Pre-requisites: Calculus I&II (MA101b& MA102b) (or Mathematical Analysis I&II&III (MA101a &MA102a)), Linear Algebra I&II (MA103b & MA104b). This course is an intensive introduction to mathematical modeling using graphical, numerical, symbolic, and verbal techniques to describe and explore real-world data and phenomena. Emphasis is on the use of calculus and linear algebra to investigate and analyze prototype model problems and interesting questions in science, physics, technology, medicine, economics and information science.

MA324 数学前沿论坛

理论课，3 学分，3 学时/周。先修课程由授课者定。本课在短时间内，快速地把学生引导到一个活跃的、有发展前途的研究领域的前沿。教学内容将是授课教师自己的科研成果及其他人的有关结论，使得整个课程在特定的学期里有一个主旋律。因而内容随授课人的变化而变化，不同学期讲授的内容也会不同。

MA324 Frontiers of Mathematics

Lecture, 3 credits，3 hours per week. Prerequisites are determined by the instructor. In a short period of time, the course will lead the student to the research front of an active and promising research field. The course will be centered on the research results in the instructor’s own research field, so that the whole course in a fixed semester has a certain theme/focus. Thus the content of the course will vary from instructor to instructor, and time to time.

MA207 数学实验

理论实验课，3 学分，授课 2 学时/周，实验 2 学时/周。先修课程：数学分析 I&II （MA101a& MA102a）(或高等数学上&下（MA101b&MA102b）)、线性代数 I（MA103b）。《数学实验》是理工类学生的一门重要基础课程。该课程以一些经典的、有趣的、具有启发性的问题为出发点，引导学生发现现象，总结规律，培养学生的创造力。本课程主要介绍多个数学实验，包括：微积分基础、怎样计算π、最佳分数近似值，数列与级数、素数，概率，几何变换、物理现象的数学模拟、迭代、初等几何定理的机器证明等。

MA207 Mathematical Experiment

Lecture and experiment, 3 credits, 2 hours’ lectures per week, 2 hours’ experimental courses per week. Pre-requisites: Mathematical Analysis I&II (MA101a& MA102a), Calculus I and II (MA101b&MA102b), Linear Algebra I (MA103). This one semester course will focus on solving classical, interesting, and provocative mathematical problems. It leads students to explore phenomena, find laws, and help them develop creative ability in solving challenge problems. The course will cover the following experiments: Calculus, Computing Pi, Sequences and Series, Primes, Probability, Geometrical Transformations, The Mathematical Models of Physical Phenomena, Iteration etc.

MA320 数学之英文写作

理论课，3 学分，3 学时/周。先修课程：学术英语 I&II&III&Ⅳ，高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I&II（MA103b&MA104b）。本课程旨在提高高年级本科生的科技英语尤其是数学英语的写作讲解和使用能力。主要内容包含英文数学文章的结构及常用句型和词语，英文数学文章的投稿和修改。本课程也将讨论怎样给英文讲座，怎样用英文写科研计划和经费申请，并对常用英文数学写作软件 LaTeX 做一个基本介绍。

MA320 Mathematical Writing in English

Lecture, 3 credits, 3 hours per week. Pre-requisites: English for Academic Purposes I&II&III&Ⅳ, Calculus I&II (MA101b&MA102b) (or Mathematical Analysis I&II&III(MA101a&MA102a&MA203a)), and Linear Algebra I&II (MA103b & MA104b). This course is designed for senior undergraduate students who need advanced training in English writing and communication skills. Topics include structures of English mathematical research papers, commonly used sentence structures and phrases, and tips on how to submit and revise papers in English. The course also covers how to give presentations in English and how to write research or grant proposals in English. It also introduces LaTeX, an open-source software for high-quality typesetting widely used for mathematical papers.

GGC5001 数学英文写作

理论课，2 学分，2 学时/周。先修课程：学术英语 I&II&III&Ⅳ，高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I&II（MA103b&MA104b）。本课程旨在提高研究生和科研人员的科技英语尤其是数学英语的写作讲解和使用能力。主要内容包含英文数学文章的结构及常用句型和词语，英文数学文章的投稿和修改。本课程也将讨论怎样给英文讲座，怎样用英文写科研计划和经费申请，并对常用英文数学写作软件 LaTeX 做一个基本介绍。

GGC5001 Mathematical Writing in English

Lecture, 2 credits, 2 hours per week. Pre-requisites: English for Academic Purposes I&II&III&Ⅳ, Calculus I&II (MA101b&MA102b) (or Mathematical Analysis I&II&III(MA101a&MA102a&MA203a)), and Linear Algebra I&II (MA103b & MA104b). This course is designed for mathematics graduate students and researchers who need advanced training in English writing and communication skills. Topics include structures of English mathematical research papers, commonly used sentence structures and phrases, and tips on how to submit and revise papers in English. The course also covers how to give presentations in English and how to write research or grant proposals in English. It also introduces LaTeX, an open-source software for high-quality typesetting widely used for mathematical papers.

MA305 数值分析

理论课，3 学分，3 学时/每周。先修课程：高等数学上&下（MA101b&MA102b）（或数学分析 I&II&III（MA101a& MA102a&MA203a）），线性代数 I（MA103a）。本课程讲述数值分析的基本概念和理论，包括插值、数值逼近和曲线拟合、求解线性方程组的直接法和间接法、数值积分和矩阵特征值的求解方法。

MA305 Numerical Analysis

Lecture, 3 credits, 3 hours’ lectures per week, Pre-requisites: Calculus I&II (MA101b& MA102b) (or Mathematical Analysis I&II&III (MA101a&MA102a& MA203a)), Linear Algebra I (MA103b). In this course, we introduce the basic concepts in Numerical Analysis including interpolations, approximation theory, direct and indirect methods for solving systems of linear equations, numerical integrations and numerical methods for computing the eigenvalues.

MA313 随机分析

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213））。这门课程主要介绍布朗运动、随机过程、鞅与随机积分等基本概念，能应用伊藤公式解决问题。 该课程是现代概率论的基础课程，不但有利于学生深入掌握金融数学理论，也有利于将来从事概率论和金融数学的研究。

MA313 Stochastic Analysis

Lecture，3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b&MA102b& MA213)). Theory of function of a real variable or measure theory. This course aims to introduce basic concepts e.g. Brownian motion, stochastic processes, martingales, stochastic integrals, and Ito formula.

MA308 统计计算与软件

理论实验课，3.5 学分，授课 2 学时/周，实验课 1 学时/周。先修课程：概率论与数理统计（MA212）（或概率论（MA215）与 数理统计（MA204））。本课程通过实际案例引导学生利用统计软件 R 来解决实际问题，使学生加深对常用分布函数的理解，提高对统计的应用能力，达到利用统计方法，结合统计软件，解决实际问题的目的。课程内容包括：常用分布函数、分位数算法与程序， 常用随机变量产生算法与程序， 概率中的随机模拟实验,，假设检验,，回归分析，方差分析,，聚类分析， 判别分析， 主成分分析，因子分析，典型相关分析，时间序列分析。

MA308 Statistical Calculation and Software

Lecture and experiment, 3.5 credits, 2 hours’ lectures per week, 1 hour’s experimental courses per week. Pre-requisites: Probability and Statistics(MA212) (or Probability(MA215) & Mathematical Statistics(MA204)). This course aims to guide undergraduate students majored in statistics to solve the practical problems by utilizing the statistical software such as R via some case studies. It emphasizes the understanding of students on the commonly used distribution functions, enhances the application abilities of statistics, reaches the goal of solving the practical problems by combining the statistical methods with statistical software. The course covers: algorithms and R codes for commonly used distributions and quantiles; algorithms and R codes for generating commonly used random variables; some stochastic simulation experiments in probability including central limit theorem; testing hypotheses, regression analysis, ANOVA,

cluster analysis, discriminant analysis, principal components analysis, factor analysis, canonical correlation analysis, and time series analysis.

MA409 统计数据分析(SAS)

理论实验课，3.5 学分，授课 2 学时/周，实验 1 学时/周。先修课程：概率论与数理统计（MA212）（或概率论（MA215）与 数理统计（MA204）），统计线性模型（MA329）。在已经学过的统计方法和统计建模的基础上，本课程将会使这些学生更深入的理解数据分析的整个过程 。它旨在发展学生的模型选择技术，使得手中的实际问题能够被合适地转化为假设检验问题。最重要的是当用第一个模型拟合数据发现不合适时，怎样选择出适合的模型。学生将会学习怎样探索数据，如何建立可靠的模型以及如何清楚阐释统计分析的结果。课程内容：描述性统计量，数据陈述与可视化，用参数统计方法进行单样本和双样本情况下的简单统计分析，用非参数统计方法进行单样本和双样本情况下的简单统计分析；回归分析，模型拟合，变量选择和模型诊断；单因子、双因子、多因子方差分析；协方差分析 logistic 回归和 Poisson 回归。用 SAS 软件进行实例数据建模与分析使学生能够获得第一手经验。

MA409 Statistical Data Analysis with SAS

Lecture and experiment, 3.5 credits, 2 hours’ lectures per week, 1 hour’s experimental courses per week. Pre-requisites: Probability and Statistics(MA212) (or Probability(MA215) & Mathematical Statistics(MA204)), Statistical Linear Models(MA329). Building on prior coursework in statistical methods and modeling, students will obtain a deeper understanding of the entire process of data analysis. The course aims to develop skills of model selection so that practical questions at hand can be properly formulated as statistical null and alternative hypotheses. An important step is how to select a reasonable model, when one's first attempt does not adequately fit the data. Students will learn how to explore the data, to build reliable models, and to communicate the results of data analysis to a variety of audiences. The course covers: descriptive statistics, presentation and visualization of data; Simple statistical analyses for the one-sample and two-sample case using parametric and nonparametric methods; Regression analyses: model fitting; variable selection and model diagnostic checking; Analysis of Variance (ANOVA): 1-way, two-way and higher-way ANOVA; Covariance analysis; Categorical and count data: binary logistic regression, Poisson regression. Real data sets will be presented for modeling and analysis using statistical software for gaining hands-on experience.

MA329 统计线性模型

理论课，3 学分，3 学时/周。先修课程：数理统计（MA204）（或概率论与数理统计（MA212））。本课程为有一定数理统计知识基础的本科生介绍统计线性模型。该课程涵盖了一元线性回归模型、多元线性回归模型以及其他相关的问题，而且还介绍如何运用 R 语言进行统计计算。

MA329 Statistical Linear Models

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Statistics (MA204) (or Probability and Statistics (MA212)). This course introduces statistical linear models to undergraduate students with basic knowledge in mathematical statistics. The course covers simple linear regression model, multiple linear regression models and other related topics, and it involves the R language for statistical computing.

MA412 统计研究论题（研究生）

理论课，3 学分，3 学时/周。先修课程：概率论与数理统计（MA212）（或概率论（MA215）与 数理统计（MA204）），统计线性模型（MA329）。本课程引进了某些统计概念和统计方法，这些概念和方法对研究生在准备研究论文时是非常有用的。该课程着重介绍最新的统计技术在实际中的应用以及它们的基本理论。教学内容可从以下列表中选择：(1)基本的渐进方法：收敛性；随机序；大数定律；中心极限定理；delta 方法；Edgeworth 展开；鞍点近似。(2)参数和非参数似然方法：高阶近似；profile 似然及它的变体；符号似然比统计量；经验似然. (3)非参数统计推断：符号检验和秩检验；Kolmogorov-Smirnov 检验；非参数回归；密度估计；核方法。(4)复杂计算方法：交叉验证；自助方法；排列方法。(5)稳健方法：稳健性度量；M 估计量 ；L 估计量；R 估计量；估计函数. (6)序贯分析：序贯概率比检验；序贯估计。(7)用信息准则进行模型选择。(8)由授课老师确定的其他内容。

MA412 Selected Research Topics in Statistics

Lecture, 3 credits, 3 lectures/per week. Prerequisites: Probability and Statistics(MA212) (or Probability(MA215) &Mathematical Statistics(MA204)), Statistical Linear Models(MA329). This course introduces some statistical concepts and methods, which are potentially useful for graduate students in preparing their research papers in statistics. Focus is on applications of state-of-the-art statistical techniques and their underlying theory. Contents of this course may be selected from: (1) Basic asymptotic methods: convergence; stochastic orders; laws of large numbers; central limit theorems; delta method; Edgeworth expansions; saddle-point approximations. (2) Parametric and nonparametric likelihood methods: high-order approximations; profile likelihood and its variants; signed likelihood ratio statistics; empirical likelihood. (3) Nonparametric statistical inference: sign and rank tests; Kolmogorov-Smirnov test; nonparametric regression; density estimation; kernel methods. (4) Computationally-intensive methods: cross-validation; bootstrap; permutation methods. (5) Robust methods: measures of robustness; M-estimator; L-estimator; R-estimator; estimating functions. (6) Sequential analysis: sequential probability ratio test; sequential estimation. (7) Model selection using information criteria. (8) Other topics as determined by the instructor.

MA323 拓扑学

理论课，3 学分，3 学时/周。先修课程：抽象代数（MA214）。本课程介绍点集拓扑和代数拓扑的一般概念和具体例子。为后续的分析，几何（代数几何和微分几何）和更高的拓扑学课程奠定基础。

MA323 Topology

Lecture, 3 credits, 3 hours per week. Pre-requisites: Abstract Algebra(MA214). This course introduces the basic definitions, notions and examples in point-set topology and algebraic topology. The knowledge of topology will be the basics for the study of algebraic geometry, differential geometry and higher level topology and analysis courses.

MA327 微分几何

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下和数学分析精讲（MA101b&MA102b& MA213）），线性代数 I（MA103b），常微分方程 A 或 B（MA201a or MA201b）。本课程介绍空间中曲线和曲面的基本理论，包括曲率，第一和第二基本型，并介绍微分流形的基本定义。

MA327 Differential Geometry

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematics Analysis I & II &III(MA101a& MA102a&MA203a)(or Calculus I & II and Real Analysis (MA101b&MA102b&MA213)), Linear Algebra I (MA103b), Ordinary Differential Equations A or B （MA201a or MA201b. This course introduces the basic theory of curves and surfaces in 3d Euclidean spaces, including curvature, first and second fundamental forms. The basics of manifold will be introduced.

MA104b 线性代数 II

理论课，4 学分，4 学时/周。先修课程：线性代数 I（MA103b）。线性代数 II 是线性代数的第二部分，是一门重要的数学基础课，是许多数学分支的基础。其内容包括：多项式，二次型、欧氏空间等基本概念、基本理论及基本计算方法。在计算机科学，自然科学和工程设计等方面有着广泛而重要的应用。本课程是数学和应用数学等学科的必修课，也高度推荐给其他理工科，尤其是计算机科学与技术、信息科学技术，物理等专业的学生学习。

MA104b Linear Algebra II

Lecture, 4 credits, 4 hours per week. Pre-requisites: Linear Algebra I (MA103b). Linear algebra II is a fundamental mathematics course, and is foundation to many mathematics courses. It covers many topics: polynomials, quadratic forms, and many topics in Euclidean spaces. It is widely used in computer science, natural science and engineering. This course is required by many mathematics courses, and strongly recommended to students who are studying natural sciences, computer science and technology, information science, physics, and engineering.

MA103 线性代数 I

理论课，4 学分，4 学时/周，先修课程：无。《线性代数》是理工类学生必修的一门重要基础理论课程。该课程主要内容包括：行列式、矩阵、线性方程组、二次型、线性空间与线性变换等。通过本课程的学习，使学生对线性代数的基本概念、理论和方法有较深入的理解，为后续课程的学习奠定必要基础，同时培养学生的抽象思维能力和逻辑推理能力。

MA103 Linear Algebra I

Lecture, 4 credits, 4 hours lectures per week, Pre-requisites: None. This is a one semester introduction to basic concepts in linear algebra including determinants, matrices, systems of linear equations, vector spaces, linear transformations, eigenvalues and eigenvectors, and quadratic forms. Linear algebra (I) is suitable for all students majoring in science or mathematics, or any other courses of study requiring linear algebra. After completing this course, students should understand the basic methods and techniques in linear algebra. This course also helps students develop their abilities in abstract thinking and logical reasoning. This course serves as a prerequisite for many courses, including numerical analysis, ordinary differential equations, partial differential equations, regression analysis, financial mathematics and financial engineering and etc.

FMA307 衍生证券模型与定价

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213）），概率论（MA215）（或概率论与数理统计（MA212））；最好修过偏微分方程（MA303）以及应用随机过程（MA208）。本课程将介绍各类金融衍生产品定价的数学模型，基本原理和基本方法。

FMA307 Models and Pricing of Financial Derivatives

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b& MA102b& MA213)), Probability Theory (MA215) (or Probability and Statistics(MA212)), Partial Differential Equations (MA303) and Applied Stochastic Processes (MA208) will be helpful. This is an introductory course on mathematical models, theories and methods of financial derivatives pricing.

MA317 应用金融统计

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III（MA101a&MA102a & MA203a）（或高等数学上&下（MA101b& MA102b）），线性代数 I&II（MA103b& MA104b），数理统计（MA204）（或概率论与数理统计（MA212），时间序列分析(MA309)，计量经济学(FMA301)。课程描述：应用金融统计侧重于介绍金融中的统计方法的应用介绍。该课程涉及金融变量分布建模，金融资产收益率的建模以及金融风险的建模，另外还涉及资产收益和风险之间的关系以及投资组合选择优化问题。通过本课程的学习，使学生掌握常见的金融数据分析的统计方法，提高进行实际数据分析处理的能力。

MA317 Applied financial statistics

Lecture, 3 credits, 3 hours per week. Pre-requisites ： Mathematical Analysis I&II&III(MA101a&MA102a&MA203a) (or Calculus I&II (MA101b& MA102b)), Linear Algebra I&II (MA103b& MA104b), Mathematical Statistics(MA204) (or Probability and Statistics(MA212)), Time series analysis (MA309), Econometrics (FMA301). Course description: Applied financial statistics is a course highlighting the introduction to applications of statistical methods to several important areas of finance. A list of fields of applications covered in this course will include distribution modeling of such financial variables as rate of return of financial assets, financial risk modeling of correlations between asset risk and return as well as optimization problem solving of investment portfolio selection issue. After the course, students should be able to conduct standard statistical treatment of financial data analysis with strengthened capability in handling data analysis in practice.

MA406 应用数学选讲

理论课，3 学分，授课 3 学时/周。先修课程：数学分析 I&II（MA101a& MA102a）（或高等数学（上&下）（MA101b&MA102b）），线性代数 I&II（MA103b&MA104b）。数据科学所产生的许多问题的数学形式是一个大规模的凸优化。本课程以一个统一框架介绍凸优化

的一阶分裂收缩算法。框架的特点是简单，需要的知识基础是大学高等数学和线性代数。通过学习，学生能够了解和掌握压缩感知、机器学习、图像和视频处理等应用领域的一些基本算法。课程学习也对构造优化算法提供有益的启示。

MA406 Topics on Applied Mathematics

Lecture, 3 credits, 3 hours lectures per week. Pre-requisites: Mathematical Analysis I&II (MA101a& MA102a) (or Calculus I and II (MA101b&MA102b)), and Linear Algebra I&II (MA103b & MA104b). The mathematical form of many problems arising from Data Science can be posed in large scale convex optimization. This course will introduce a class of splitting and contraction methods for convex optimization under a uniform framework, which is relative simple because the only background required of the students is a good knowledge of advanced calculus and linear algebra. Through the study, students will be able to understand and grasp some basic algorithms in the applications, such as compressed sensing, machine learning, image and video processing. The study also provides beneficial enlightenment for constructing optimization algorithms.

MA208 应用随机过程

理论课，4 学分，3 学时/周，习题课 2 学时/周。先修课程：数学分析 I&II&III（MA101a& MA102a&MA203a）（或高等数学上&下及数学分析精讲（MA101b&MA102b& MA213）），线性代数 I&II（MA103b&MA104b），概率论（MA215）（或概率论与数理统计（MA212））。本课程讲解随机过程的基本概念，并重点叙述几种最重要的随机过程及其应用。本过程首先详细解释在随机过程理论中有重要应用的条件期望及条件概率方法。然后重点讲解离散参数马尔科夫链、普阿松过程及布朗运动。对连续参数马尔科夫链也将简要陈述。

MA208 Applied Stochastic Processes

Lecture, 4 credits, 3 hours’ lectures per week, and 2 hours’ tutorial per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a& MA102a&MA203a) (Calculus I&II and Real Analysis (MA101b&MA102b& MA213)), Linear Algebra I&II (MA103b & MA104b), Probability Theory (MA215) (or Probability and Statistics(MA212)). This course covers the basic concepts regarding stochastic processes and the emphasis will be put on some classes of stochastic processes which have important applications. After introducing the most important and powerful method of conditional expectations, the course discusses the discrete-time Markov chains, Poisson processes and the Wiener processes. The continuous-time Markov chains are also briefly discussed.

MA321 有限群表示论

理论课，3学分，3学时/周。先修课程：线性代数I&II（MA103b&MA104b），抽象代数（MA214）。群表示论是现代代数的一个重要分支，是很多现代数学学科的基础。为研究群的结构和作用提供重要方法。在物理学，化学，密码学等学科中有着重要的应用。本课程是数学系三年级、四年级课程，也适合研究生。也推荐为物理学四年级或研究生课程。本课程包括群表示论的很多重要内容，如： 群表示论的基本概念，与模的关系，群环，矩阵代数，可约性，Maschke’s 定理，Schur’s 引理及其应用，正规子群和 Clifford’ s 定理，张量积，特征标理论及其应用。

MA321 Representations of finite groups

Lecture, 3 credits, 3 hours per week. Pre-requisites: Linear Algebra I&II (MA103b & MA104b), Abstract Algebra(MA214). Group Representations is an important mathematics course, and is foundation to many other mathematics courses. It provides fundamental tools for studying group actions and group structures. It has important applications in mathematics, physics, chemistry, and many others. This course is for year 3-4 students and postgraduate students, and also recommended to the year 4 students or postgraduate students from physics department. The course covers many topics: basic concepts of representations, and modules; Group rings, matrix algebras; Reducibility, and Maschke’s theorem; Schur’s Lemma and applications; Normal subgroups, and Clifford theorem; Tensor product; Character theory and its applications.

MA210 运筹学

理论课，3 学分，授课 3 学时/周。先修课程：数学分析 I&II（MA101a& MA102a）（或高等数学（上&下）（MA101b&MA102b））。运筹学主要向学生系统地讲授规划论、网络分析与网络计划、存储论、排队论、决策论、对策论等运筹学方法模型，包括模型条件、结构特点、基本方法步骤及应用范围等；使学生认识运筹学在生产与技术管理和经营管理决策中的作用，领会其基本思想和分析、解决问题的思路。

MA210 Operations Research

Lecture, 3 credits, 3 hours lectures per week. Pre-requisites：Mathematical Analysis I&II (MA101a& MA102a) (or Calculus I and II (MA101b&MA102b)).

FMA303 证券投资学

理论课，3 学分，3 学时/周。先修课程：数学分析 I&II&III （MA101a& MA102a&MA203a）（或高等数学上&下以及数学分析精讲（MA101b&MA102b& MA213）），线性代数 I&II（MA103b&MA104b），概率论（MA215）（或概率论与数理统计（MA212））。本课程主要介绍金融投资理论方面的基本概念。主要内容包括：资产组合理论，资本市场均衡，固定收益证券，证券分析以及应用组合。

FMA303 Security Investments

Lecture, 3 credits, 3 hours per week. Pre-requisites: Mathematical Analysis I&II&III (MA101a&MA102a&MA203a)(Calculus I&II and Real Analysis (MA101b& MA102b& MA213)), Linear Algebra I&II(MA103b & MA104b), Probability Theory (MA215) (or Probability and Statistics(MA212)). The focus of this course is to developing key concepts in investment theory. It covers Portfolio Theory, Equilibrium in Capital Markets, Fixed-Income Securities, Security Analysis, and Applied Portfolio Management.

MA319 组合数学与图论

理论课，3 学分，3 学时/每周。 先修课程：线性代数 I&II（MA103b&MA104b），抽象代数（MA214）（或有限群表示论（MA321））。组合数学是现代数学的一个重要分支，是很多数学学科的基础，特别是在数论，代数等数学学科有重要应用；是计算机科学，编码理论和密码学的基础。组合数学是一个庞大的学科。本课程将选取组合数学里的最重要的分支，比如：组合计数，组合设计，有限几何，编码理论，Ramsey 理论， 结构图论，对称图理论，拓扑图论，代数图论。本课程是数学系三年级、四年级及研究生课程。也是适合计算机科学四年级或研究生课程。

MA319 Combinatorics and Graph Theory

Lecture, 3 credits, 3 hours per week. Pre-requisites: Linear Algebra I&II (MA103b & MA104b), Abstract Algebra(MA214) (or Group Representations(MA321)). Combinatorics is an important mathematics branch, and is foundation to many other mathematics courses, especially to number theory and algebra; it is also important in computer science, codes and ciphers. It contains extensive contents. This course will select important topics, such as: enumeration combinatorics, block designs, finite geometries, coding theory, Ramsey theory; structural graph theory, symmetrical graph theory, topological graph theory, and algebraic graph theory. This course is for year 3-4 students and postgraduate students who major mathematics, and also recommended to the year 4 students or postgraduate students from computer science.

力学系

MAE203. 理论力学 I

理论课，3学分，3学时/每周。先修课程：GE101、GE102（B级），PHY101、PHY102（A级）。理论力学课程是力学类本科生主干基础课。它在培养学生系统掌握力学的科学概念、分析方法，构筑完整的力学知识体系方面占据基础性地位。理论力学教学要强调清晰的物理概念；强调与工程实际的密切结合。理论力学I的基本内容包括静力学、运动学、质点动力学、质点系动力学的基本定理。

MAE203. Theoretical Mechanics I

Lecture，3 credits, 3 hours per week. Pre-requests：GE101、GE102(B)，PHY101、PHY102(A). Theoretical Mechanics is the backbone of undergraduate courses in mechanics. This course teaches students with scientific concepts and analysis methods of mechanics, thus occupy the fundamental position in building a complete knowledge of mechanics. Theoretical mechanics I emphasize clear physical concept, as well as practical applications in engineering. The main content of Theoretical Mechanics I include the fundamental theorem of statics, kinematics, particle dynamics and particle system dynamics.

MAE204. 理论力学 II

理论课，3 学分，3 学时/每周。先修课程：MAE203。主要是介绍分析动力学初步，微振动理论和刚体三维运动的动力学。分析动力学的理论和方法在现代物理与工程实际中有重要的应用，也是力学专业后期课程的基础。微振动理论在现代工程实际中有重要的应用。而刚体的三维运动学与动力学是航空航天飞行器的理论基础。

MAE204. Theoretical Mechanics II

Lecture，3 credits, 3 hours per week. Pre-requests：MAE203. Theoretical Mechanics II mainly teaches students analytical dynamics, micro-vibration theory and 3D dynamics of rigid body. Theories and methods of analytical dynamics have important applications in modern physics and engineering practice, which are also the basis of other courses in mechanics. Micro-vibration theory has important applications in modern engineering practice. The three-dimensional kinematics and dynamics of rigid body is the theoretical basis of aerospace vehicles.

MAE202. 材料力学

理论课，3 学分，3 学时/每周。先修课程：MAE203。介绍材料力学的基本概念，拉伸和压缩，扭转，复杂应力状态，弯曲应力，弯曲变形，薄壁杆件的弯曲和扭转，压杆稳定性，弹性杆系的能量原理，材料的非弹性性质。通过材料力学的学习建立 和了解固体力学和连续介质力学的一些基本的概念和研究方法。

MAE202. Mechanics of Materials

Lecture，3 credits, 3 hours per week. Pre-requests：MAE203. This course teaches concepts of stress, strain, deformation, internal equilibrium, and basic properties of engineering materials. In this course, students also learn how to analyze axial loads, torsion, bending, shear and combined loading. Students also study stress transformation and principle stresses, column analysis and energy principles.

MAE303. 流体力学

理论课，4 学分，4 学时/每周。先修课程：MAE204。本课程系统介绍流体的力学性质、流体力学的基本概念和观点、基础理论和常用分析方法、有关的工程应用知识等；培养学生具有

对简单流体力学问题的分析和求解能力，掌握一定的实验技能，为今后学习专业课程，从事相关的工程技术和科学研究工作打下坚实基础。

MAE303. Fluid Mechanics

Lecture，4 credits, 4 hours per week. Pre-requests：MAE204. This course will provide the student with a fundamental background in the statics and dynamics of fluids. In this course, we will analyze basic conservation laws of mass, momentum and energy in control volume and differential form. The students will learn how to use the right formulation for different flow problems. The student will also learn how to simplify problems with different frames of reference. We will also introduce real life applications of these fundamental concepts with an emphasis on critical analysis of the limitations of the model used in solving the problem. Interpretation of results from experiments and numerical simulation of fluid flows will also be emphasized.

MAE305. 工程热力学

理论课，3 学分，3 学时/每周。先修课程：PHY101。工程热力学是研究热能以及热能与其他能量（尤其是机械能）之间相互转换规律的一门学科。通过本课程的学习，可以使学生了解并掌握一种新的理论方法体系，科学地认识能量转换规律及能量有效利用的基本理论，树立合理用能思想，掌握工程热力学分析问题的方法与手段，并能应用这些理论对工程中涉及的热力过程及热力循环进行正确的分析与计算，为学生之后的专业课程学习及工作奠定必要的理论基础。

MAE305. Engineering Thermodynamics

Lecture，3 credits, 3 hours per week. Pre-requests：PHY101. Engineering thermodynamics is a discipline, studying the heat transfer and conversion law between heat and other energy (especially mechanical energy). Through this course, the students can understand and master a

new theoretical method system. Through the study, students can understand the scientific laws of energy conversion and energy effective utilization, establish the rational ideas of using energy, master the methods and means of analyzing problems about engineering thermodynamics, can apply these theories to the thermodynamic processes and thermodynamic cycles for proper analysis and calculation. Through careful study of the course, ultimately the theoretical foundation for the professional courses and work can be laid.

MAE302. 流体力学实验

实验课，3 学分，6 学时/每周。先修课程：MAE303。流体力学实验对于力学专业学生，尤其是流体力学专业的学生是不可或缺的，通过该课程可以提高学生分析问题及解决问题的能力，使学生对典型流体物理现象能深刻理解。

MAE302. Fluid Mechanics Lab

Lab，3 credits, 6 hours per week. Pre-requests：MAE303. Fluid Mechanics Lab is essential for students of Mechanics major, especially for students of fluid mechanics. Through this course, students can improve the ability to analyze and solve problems, so that students can have a deep understanding of classical fluid flow.

MAE304. 弹性力学

理论课，4 学分，4 学时/每周。先修课程：MAE204。介绍弹性力学的理论基础，向量与张量，应变分析，应力分析，本构关系，弹性力学的边值问题的提法，弹性力学的基本原理；Saint-Venant 问题，弹性力学平面问题的直角坐标解法，弹性力学平面问题的极坐标解法，弹性力学平面问题的复变函数解法，弹性力学的空间问题。

MAE304. Elasticity

Lecture，3 credits, 3 hours per week. Pre-requests：MAE204. This course provides an introduction to the elasticity theory and its application to material structures. The basic theory includes the definition of stress, strain and elastic energy; equilibrium and compatibility conditions; and the formulation of boundary value problems. We will discuss two major methods for solving elasticity equations: the stress function method for 2D problems and the Green’s function approach for 3D problems. The theory and solution methods are then applied to microscopic defects in solids, their stress fields and interaction with each other. Analytic and numerical tools will be developed to solve elasticity problems.

MAE401. 固体力学实验

实验课，3 学分，6 学时/每周。先修课程：MAE304。掌握固体实验力学的基本知识，训练力学实验的基本技能，通过实验设计、实验过程和实验结果分析等环节提高创造能力和实践能力。

MAE401. Solid Mechanics Lab

Lab，3 credits, 6 hours per week. Pre-requests：MAE304. Solid Mechanics Lab teaches students the basic knowledge and basic skills of experimental solid mechanics. Through the design of experiments, the carry-out of experiments and analysis of experimental results, students can improve their creativity and practical ability.

MAE201. 力学概论

理论课，3 学分，3 学时/每周。先修课程：无。本课程针对大一和大二学生作为一门选修课开设；课程主要介绍力学的最基本知识，通过多媒体和课堂讲座、报告让学生对力学学科有

一定了解。

MAE201. Introduction to Mechanics

Lecture，3 credits, 3 hours per week. Pre-requests：NA. This course is designed as a freshman and sophomore elective course. Multimedia and classroom lectures and presentations will be used to introduce basic knowledge of mechanics, with the aim for students to have a certain understanding of the mechanics discipline.

MAE309. 输运现象原理

理论课，3 学分，3 学时/每周。先修课程：无。本课程的第一个目标是为学生讲授工程中遇到的三个传输过程（动量，热量和质量传输）的基本原理。第二个目标是让学生通过使用分析方法来解决工程领域中的输运现象，从而培养学生的批判性思考能力和解决问题的能力。

MAE309. Principle of Transport Phenomena

Lecture，3 credits, 3 hours per week. Pre-requests：NA. The first objective of this course is to provide students with basic principles of the three transfers encountered in engineering, momentum, heat and mass transfers. A second objective is for students to develop critical thinking skills by solving transport phenomena problems taken from the fields of engineering, using analytical methods.

MAE306. 粘性流体

理论课，3 学分，3 学时/每周。先修课程：无。在本课程中，学生学习 Navier-Stokes 方程，斯托克斯问题，蠕变流动，内部和外部流动，边界层流动，流动的稳定性和转捩等。本课程的目的是介绍粘性流动理论方法和技术，给高年级本科生介绍研究方法，并加强解决问题的

能力.

MAE306. Viscous Flow

Lecture，3 credits, 3 hours per week. Pre-requests：NA. In this course, students study the Navier-Stokes equations; Stokes' problems; creeping flows; internal and external flows; similarity and integral methods in boundary layer flows, stability and transition to turbulence. The object of this course is to introduce methods and techniques in viscous flows theory; to develop both the mathematical and physical concepts necessary to interpret viscous flow phenomena; to introduce research methods to advanced undergraduate students, and to reinforce skills in problem solving.

MAE308. 传热学

理论课，3 学分，3 学时/每周。先修课程：无。本课程主要内容包括：研究热量传递的规律，学习热传导、热对流和热辐射三种基本传热方式、综合传热过程与换热器的基本理论及计算和实验过程。通过课堂教学结合教学实验和课程项目的设计和实施，培养学生运用热量传递的基本理论和研究方法去分析、解决实际工程和科学问题的能力，为学习一系列后续专业课程和有关的科学技术打好基础、为以后的科研工作提供坚实的保障。

MAE308. Heat Transfer

Lecture，3 credits, 3 hours per week. Pre-requests：NA. The course covers the followings contents: (1) the law of heat transfer; (2) three basic styles of heat transfer, i.e., thermal conduction, thermal convection and thermal radiation; (3) the basic theory and design method of heat exchanger; (4) experiment method of heat transfer. The course is structured to provide students with a basic ability to analyzing and treating with an actual engineering problem by using the basic theory and research method of heat and mass transfer, at the same time, a basis will be built for following relative courses.

MAE310. 计算固体力学

理论课，3 学分，3 学时/每周。先修课程：MAE304。讲授有限元法的基本概念，基本原理，计算公式的导出与应用。介绍各种常用的单元特性。系统讲述平面桁架、刚架的有限元 解法，平面问题的有限元解法、轴对称问题及三维问题的有限元解法，弹性薄板弯曲问题的有限元解法， 讲授面积坐标，等参元，高次单元，协调元与非协调元等。讲授收敛性准则及线性插值三角形单元的收敛性分析。并配有上机实习。

MAE310. Computational Solid Mechanics

Lecture，3 credits, 3 hours per week. Pre-requests：MAE304. This course teaches numerical methods and techniques for solving initial boundary value problems in continuum mechanics. Course content includes finite difference methods, direct methods, variational methods, finite elements in small strains and at finite deformation for applications in structural mechanics and solid mechanics. Computational aspects and development and use of finite element code will be introduced.

MAE312. 航空飞行器动力学

理论课，3 学分，3 学时/每周。先修课程：无。本课程介绍描述和预测飞机运动的理论和方法。课程将向学生介绍一系列飞行器的性能，稳定性和控制。课程重视分析、模拟和评价飞行质量的数学模型和技术，同时对制导，导航和控制等问题进行简要讨论。讲授内容包括运动方程，空气动力学，线性系统的分析和纵向/横向/定向运动等。

MAE312. Aircraft Flight Dynamics

Lecture，3 credits, 3 hours per week. Pre-requests：NA. This course presents theory and methods

for describing and predicting the motions of aircraft. The course introduces students to the performance, stability, and control of a wide range of airborne vehicles. Attention is given to mathematical models and techniques for analysis, simulation, and evaluation of flying qualities, with brief discussion of guidance, navigation, and control issues. Topics include equations of motion, configuration aerodynamics, analysis of linear systems, and longitudinal/lateral/directional motions.

MAE403. 计算流体力学

理论课，3 学分，3 学时/每周。先修课程：MAE303。计算流体力学以计算机为重要工具，研究求解各类流体力学问题的数值方法的一门新兴学科。本课程目的在于结合具有典型性的流体力学问题，向学生介绍一些主要的数值方法及相关的基础理论知识，由于数值方法及其基础理论的相通性，故其应用并不仅仅局限于流体力学领域，学生在学 习和掌握了本课程的主要内容后就为其将来应用和研究数值方法求解各类物理问题打下了良好的基础。

MAE403. Computational Fluid Dynamics

Lecture，3 credits, 3 hours per week. Pre-requests：MAE303. Computational fluid dynamics is an important tool to investigate fluid flow problems in industry and academia. This course can be taken without prior background in computational techniques. A background of fundamental fluid dynamics, partial differential equations, linear algebra and a programming language is desirable. The primary focus of this course is to gain a solid foundation of numerical methods for convection-diffusion problems. The emphasis is on the physical meaning underlying the required mathematics.

MAE405. 空气动力学

理论课，3 学分，3 学时/每周。先修课程：无。本课程的内容主要包括了空气动力学的基本

概念、低速流动的基本原理、 绕翼型和机翼的不可压缩流动的薄翼理论和有限翼理论、粘性流动和边界层，可压缩流体动力学基本方程，激波等。本课程的目的和任务是使学生掌握空气动力学的基本概念、基本理论，以及解决空气 动力学问题的基本方法和分析手段。

MAE405. Aerodynamics

Lecture，3 credits, 3 hours per week. Pre-requests：NA. This course covers the following topics: fundamentals concepts of aerodynamics, principles of invisicid incompressible flows, invisicid, incompressible flows over airfoils and finite wings, fundamental equations governing compressible fluid flow, quasi-one-dimensional isentropic flow and normal shock, etc. By learning this course, students can rapidly apply fundamental principles of physics, formulate and apply appropriate aerodynamic models, and assess the applicability of various aerodynamic models, thus making the basis for their future research work on aerodynamics and aircraft design.

MAE407. 喷气推进

理论课，3 学分，3 学时/每周。先修课程：无。本课程的目的是介绍吸气式推进系统。课程主要给学生讲授燃烧一个基本背景，一维可压缩内部流动，和布雷顿循环发动机热力学。另外，学生还将学习空气引擎中的主要部件，比如进气口、压缩机、燃烧器，涡轮机，和喷嘴等。

MAE407. Jet and Propulsion

Lecture，3 credits, 3 hours per week. Pre-requests：NA. The course is intended to serve as an introduction to air breathing propulsion systems. Students are given a basic background in combustion, one-dimensional compressible internal flows, and the thermodynamics of Brayton-cycle engines. In addition, the students are provided with more detailed discussion of the major components in an air breathing engines ranging from inlets and compressors to combustors,

turbines, and nozzles.

MAE409. 微纳力学

理论课，3 学分，3 学时/每周。先修课程：无。本课程着重于介绍微纳米力学在计算和实验上的最新的科学发现和进展。课程学习微纳米尺度材料和结构的力学性能。在这个层面上，材料和结构的机械性能和化学，物理和量子力学密切相关。

MAE409. Micro and Nano Mechanics

Lecture，3 credits, 3 hours per week. Pre-requests：NA. This course focuses on the latest scientific developments and discoveries in the field of both computational and experimental micro and nano mechanics, and the study of mechanical properties of materials and structures with size down to nano meter scale. At this level, mechanical properties are intimately related to chemistry, physics and quantum mechanics.

MAE402. 非牛顿流体

理论课，2 学分，2 学时/每周。先修课程：无。在工程和工业应用的许多流体是复杂的混合物。因此，它们常表现出非牛顿特性。特别是，它们的粘度可依赖于时间，或者应力。这些流变性质是通过在压力下，这些流体的复杂微结构变化引起的，并且可以对宏观流动特性产生深远的影响。该课程的目的是要说明其中的一些影响，展示在剪切下的微观结构变化和宏观流变特性之间的关系，并引入一些在实践中所使用的模型和分析工具。

MAE402. Non-Newtonian Fluids

Lecture，2 credits, 2 hours per week. Pre-requests：NA. Many fluids in engineering and industrial applications are complex mixtures. Hence, they often demonstrate a non-Newtonian behavior in

the sense that the stress endured by a macroscopic fluid element is not a linear function of the shear rate. In particular, their viscosity can depend on time, or on stress. These rheological properties are induced by changes in the complex microstructure of these fluids under stress and can have a profound impact on the macroscopic flow characteristics. The objective of the course is to illustrate some of these effects, to demonstrate the relation between the microstructure changes under shear and the macroscopic rheological properties, and to introduce some of the models and analysis tools used in practice.

机械与能源工程系

ME101. 机械工程导论（1）

理论课，1 学分，1 学时/每周。先修课程：无。本课程是针对大一学生的入门课，主要介绍什么是机械工程以及和制造工业的关系，帮助学生了解机械工程领域的内容特点、重要性以及工程专业人员的社会责任。

ME101. Introduction to Mechanical Engineering (1)

Lecture，1 credit, 1hour per week. Pre-requisites: None. This course is for freshman. It mainly introduces what is mechanical engineering and the relationship with manufacturing industries, which helps students to understand what to learn in mechanical engineering, and the social responsibility of the engineering professionals.

ME102. CAD 与工程制图（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：无。本课程主要学习工程绘图与计算机辅助设计（CAD）建模技术。学习解决空间几何问题的理论和方法。通过本课程的学习，学生能掌握用基本的工程表达手段和标准，为学习后续课程以及完成课程设计和毕业作业打下一定的基础。

ME102. CAD and Engineering Drawing (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: None. This course is mainly to learn understanding and creating engineering drawings, and to represent a mechanical design with geometric modeling with Computer-aided Design (CAD) tools. It is about learning the theory and methods to solve the problems of spatial geometry. After learning this course, students should be

familiar with engineering representation method, skill, and standards. It is a foundation of learning other engineering principles in following courses and practice projects.

ME103. 制造工程认知实践（3）

实践课，3 学分，6 学时/每周。先修课程：无。本课程是一门关于制造工程的认知实践课程。通过学习机械制造的基本原理，操作典型的制造设备，如数控加工机床，质量检测工具，增材制造（3D 打印）设备等，了解和掌握基本的制造方法与工艺过程，以及加工质量的概念，为进一步学习相关的工程专业打下必要的基础。

ME103. Awareness Practice of Manufacturing Engineering (3)

Laboratory, 3 lab credits, 6 hours per week. Pre-requisites: None. This is an awareness practice course to gain some basic knowledge of fundamental manufacturing principle and methods through learning and operating typical manufacturing equipment, such as Numerical Controlled (NC) machine tools, measurement devices, additive manufacturing (3D printing) machines, etc. Students are expected to establish an understanding of basic manufacturing methods and operations as well as the concept of quality. It is a foundation for further learning in related engineering disciplines.

MES300. 机械工程专业认知实习（1）

实践课，1 学分，8 学时/每周。先修课程：无。认知实习为学生提供一个了解工程专业人员在实际工作中辨识与解决技术问题的思路与方法。拓展学生视野，学习一些机械工程的专业知识，培养沟通实践能力、锻炼团队合作精神等。

MES300. Awareness Practice of Mechanical Engineering (1)

Laboratory, 1 lab credit, 8 hours per week. Pre-requisites: None. Awareness practice is to provide an opportunity for students to understand how an engineering professional identify and solve a problem in real world. Students may gain some insides of Mechanical Engineering, such as knowledge learning, communication skills and teamwork capability.

ME301. 动力学与机械振动（2）

2 学分，其中实验学分 0.5 学分，2.5 学时/每周。先修课程：常微分方程 B、理论力学Ⅰ。本课程主要讨论机械系统动力学与机械振动的基本理论、建模方法与分析计算方法。旨在培养学生分析、解决一般机械系统动力学和工程结构振动的能力。通过本课程的学习，要求学生掌握机械动力学与机械振动的基本概念，基础理论，并能应用基本理论分析和解决机械系统动力学与工程振动的建模、分析等问题。

ME301. Dynamics and Vibration (2)

2 credits, 0.5 lab credit, 2.5 hours per week. Pre-requisites: Ordinary Differential Equation B，Theoretical Mechanics Ⅰ. This course focuses on the basic theory, the modeling method and analysis calculation method of dynamics and mechanical structure vibration. It aims at cultivating students' ability of analyzing, solving the general problem of dynamics and mechanical structure vibration. After learning this course, students should master the theory of dynamics and vibration, and should analyze and solve the problem of dynamics modeling, mechanical structure vibration etc.

ME302. 机械制造基础（3）

理论课，3 学分，3 学时/每周。先修课程：CAD 与工程制图、制造工程认知实践、材料力学、机械设计基础。本课程以现代制造工程中主要制造技术和制造工程设计的基本原理为主线。通过学习为学生进一步深入学习机械制造领域打下坚实的基础。

ME302. Fundamentals of Manufacturing (3)

Lecture，3 credits, 3 hours per week. Pre-requisites: CAD and Engineering Drawing，Awareness Practice of Manufacturing Engineering, Mechanics of Materials, Fundamentals of Machine Design. This course mainly conveys the basic principle of manufacturing technology and manufacturing engineering design. This will lay a good foundation for students to learning mechanical manufacturing in the future.

ME303. 机械设计基础（3）

理论课，3 学分，3 学时/每周。先修课程：理论力学Ⅰ、CAD 与工程制图、材料力学。机械设计是一门通过设计新产品或者改进老产品，满足人类需求的应用技术科学。它涉及工程技术的各个领域，主要研究产品的尺寸、形状和详细结构的基本思路，还要研究产品在制造、销售和使用等方面的问题。本课程主要介绍机械系统方案设计的过程、设计思想、设计理论与方法。

ME303. Fundamentals of Machine Design (3)

Lecture，3 credits, 3 hours per week. Pre-requisites: Theoretical Mechanics Ⅰ, CAD and Engineering Drawing, Mechanics of Materials. Machine design is the application of science and technology to devise new or improved products for the purpose of satisfying human needs. It is a vast field of engineering technology which not only concerns itself with the original conception of the product in terms of size, shape, and construction details, but also considers the various factors involved in the manufacture, marketing and use of the product. This course mainly introduces the process，idea, theory and method of Machine Design.

ME304. 能源工程基础（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：材料科学基础、流体力学、工程热力学或传热学。本课程为能源工程基础课程。

ME304. Fundamentals of Energy Engineering (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Materials Science and Technology, Fluid Mechanics, Engineering Thermodynamics or Heat Transfer. This is a basic course of energy engineering.

ME305. 创新设计实践（2）

实践课，2 学分，4 学时/每周。先修课程：机械设计基础。本课程依托机械设计基础，通过设计过程向学生介绍解决机械工程问题的方法和技术。

ME305. Innovative Design Practice (2)

Laboratory, 2 lab credits, 4 hours per week. Pre-requisites: Fundamentals of Machine Design. This course utilizes a design process to introduce students to the methods and techniques for solving mechanical engineering problems.

ME306. 机器人基础（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：理论力学Ⅰ、机械设计基础、控制工程基础。本课程主要讲授机器人基础理论和技术，包括机器人的历史与发展，基本概念和分类，结构组成及其功能等等。

ME306. Fundamentals of Robotics (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Theoretical Mechanics Ⅰ, Fundamentals of Machine Design, Fundamentals of Control Engineering. This course introduces the theory and technology of robotics, including the history and development of robots, the concept and the principle, the structure and function etc.

ME307. 控制工程基础（2）

2 学分，其中实验学分 0.5 学分，2.5 学时/每周。先修课程：电路基础。本课程是一门控制工程的基础课程。通过学习，学生能了解控制工程的基本概念和技术，并且熟悉控制工程。

ME307. Fundamentals of Control Engineering (2)

2 credits, 0.5 lab credit, 2.5 hours per week. Pre-requisites: Fundamentals of Electric Circuits, Ordinary Differential Equation B. This is a basic course of control engineering. This introductory course in control engineering will give students an understanding of the basic concepts and techniques. After this course, students should be familiar with control engineering.

ME308. 先进制造实践（2）

实践课，2 学分，4 学时/每周。先修课程：机械制造基础。本课程以机械制造为基础展开实践，解决制造工程问题。

ME308. Advanced Manufacturing Practice (2)

Laboratory, 2 lab credits, 4 hours per week. Pre-requisites: Fundamentals of Manufacturing. This course is based on Fundamentals of Manufacturing. It aims at solving the problem of manufacturing engineering.

ME310. 测试与检测技术基础（3）

理论课，3 学分，3 学时/每周。先修课程：控制工程基础，信号与系统。主要讲授测试技术的基本原理、方法与应用，包括信号与信号处理理论、测试系统特性分析、信号获取的原理与方法，传感器的作用原理、关联电路及应用、信号的调整与转换；显示记录技术与仪器；

典型物理量的测试技术及应用。

ME310. Fundamentals of Measurement Technology (3)

Lecture，3 credits, 3 hours per week. Pre-requisites: Fundamentals of Control Engineering, Signals and Systems. The course is intended to provide the students with adequate knowledge on principles and methods of measurement technology, including signal theories and signal processing, characteristic analysis of measurement system, principles for various sensors and transducers and their applications, signal conversion and conditioning, principles and applications of common instruments for data presentation and storage, and measuring techniques for various physical quantities and their applications.

ME401. 信号分析（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：控制工程基础。

ME401. Signal Analysis (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Control Engineering.

ME403. 智能机器人技术（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：机器人基础。

ME403. Intelligent Robot Technology (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Robotics.

ME405. 创新设计理论与实践（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：机械设计基础、创新设计实践。

ME405. Innovative Design Theory and Practice (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Machine Design, Innovative Design Practice.

ME407. 精密加工技术（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：机械制造基础。本课程介绍精密制造工程技术的基本原理和方法。

ME407. Precision Machining Technology (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Manufacturing. This course focuses on the basic theory and technology of precision machining.

ME409. 化学燃料电池技术（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：能源工程基础。

ME409. Chemical Fuel Cell Technology (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Energy Engineering.

ME411. 新能源技术（3）

3 学分，其中实验学分 1 学分，4 学时/每周。先修课程：能源工程基础。

ME411. New Energy Technology (3)

3 credits, 1 lab credit, 4 hours per week. Pre-requisites: Fundamentals of Energy Engineering.

ME460. 社会实践（2）

实践课，2 学分，16 学时/每周。先修课程：无。

ME460. Social Practice (2)

2 lab credits, 16 hours per week. Pre-requisites: None.

ME470. 创新创业（3）

实践课，3 学分，6 学时/每周。先修课程：无。

ME470. Projects of Innovation and Entrepreneurship (3)

3 lab credits, 6 hours per week. Pre-requisites: None.

ME480. 工业实习（3-6）

实践课，3-6 学分，24-48 学时/每周。先修课程：无。

ME480. Industrial Practice (3-6)

3-6 lab credits, 24-48 hours per week. Pre-requisites: None.

ME490. 毕业设计（8）

实践课，8 学分，16 学时/每周。先修课程：无。

ME490. Graduation Project (8)

8 lab credits, 16 hours per week. Pre-requisites: None.

材料科学和工程系

EE419. 生物传感（3）

3 学分，含 1 分实验， 4 学时/周。

先修课程：无要求。

生物传感器是一些集成生物敏感元件与物理或化学换能器于一体的用以检测特定生化物质存在的器件或设备。生物传感器已经在推进生物技术和生命科学研究中起到关键作用。它们被应用于广泛地应用于医学研究、临床诊断、食品和环境测试、以及生物技术等领域。在本课程学习中，学生将通过一系列的讲座和实验操作学习到传感器的基本的检测原理和包括化学，生物化学，光学，及半导体的传感元器件。学生也将学习到与这些感应原理相关的各种应用实例。本课程将更好地帮助学生为未来的生物技术和纳米技术时代做准备。本课程无对学生是否掌握生物学的知识或经验的要求。

EE419. Biosensors (3)

2 credits Lecture, 2 hours per week; Lab, 2 hours per week.

Pre-requests：none

Biosensors are devices that combine a biologically sensitive element with a physical or chemical transducer to detect the presence of specific biological compounds, and play a key role in advancing biotechnology and life science research. They are applied in medical research and clinical diagnosis, food and environmental testing, and biotechnology applications. Through this course, students will learn the basic sensing principles and sensing elements (chemical, biochemical, optical, semiconductor) through series of lectures and labs. Students will also learn various application examples associated with those sensing principles. This course will better prepare students in the up and coming biotechnology and nanotechnology era. No prior knowledge or experience in biology required.

MSE102. 材料科学进展（1）.

理论课，1 学时/周。

先修课程：

此课程为材料专业为低年级学生开设的基础讲座课程，邀请校内外材料领域知名专家学者为学生做讲座，介绍材料的不同领域的最新知识和制作工艺。期末时学生提交相关报告进行评

估。

MSE102. Frontier Seminars in Materials Science and Engineering (1)

Lecture,1 hours per week.

Pre-requesites：

This course delivers students state-of art knowledge and technologies in different research fields among all kinds of materials. Sixteen topics will be introduced to the students by lecture inside and outside the class. After one hour of presentation, a half an hour discussion between the speaker and students will be carried out. The students need to submit one relative report in paper for evaluation in this course.

MSE201. 材料科学基础（4）.

4 学分（含 1 学分实验），5 学时/周。

先修课程：大学物理（PHY101/102）、化学原理（CH101）。

授课语言：英文

课堂教学内容包括：序言、原子结构与化学键、金属，陶瓷与高分子结构基础、缺陷、扩散、机械性质、变形与增强机理、材料失效、相图、电学性质、材料的种类与应用。实验课内容包括：晶体中的原子排列、高分子黏均分子量的测定、相图、金属与合金的腐蚀、金属与高分子的机械性能。

MSE201. Fundamentals of Materials Science and Engineering (4)

4 credits. Lecture, 3 hours per week; Lab, 2 hours per week.

Pre-requisites：PHY101/102, CH101.

Lectures: atomic structure and interatomic bondings; structure of metals, ceramics, and polymers; defects in solids; diffusion; mechanical properties; deformation and strengthening mechanisms; failure; phase diagram; electrical properties; types and applications of materials. labs: ball model of atom arrangement in crystals; determination of viscosity average molecular weight of polymers;

binary phase diagram; passivation and corrosion behavior of metals and alloys; mechanical properties of metals and polymers.

MSE202. 物理化学（3）.

理论课，3 学时/周。

先修课程：高等数学 I/II（GE101/102），化学原理（CH101）。

该课程是通过物理的概念和方法来研究和理解化学体系的行为。本课程讨论化学热力学，简单的混合物，相变，化学和电化学平衡，统计热力学和化学动力学等。通过本课程的学习，要求学生系统地掌握物理化学的基本原理和方法，加深对其它化学课程内容的理解，并具备应用物理化学的基本原理分析关于平衡态化学和电化学体系(包括能源转换与存储)，简单化学反应速率等基本问题和解决一些实际问题的能力。

MSE202. Physical Chemistry (3)

Lecture, 3 hours per week.

Pre-requesites：GE101/102, CH101

This course is the study of macroscopic, atomic, subatomic and particulate phenomena in chemical systems in terms of the laws and concepts of physics. This course subject deals with chemical thermodynamic, simple mixtures, phase diagrams, chemical equilibrium, equilibrium electrochemistry, statistical thermodynamics, chemical kinetics, etc. This course is intended to provide students with an understanding of basic principles, laws and theories of physical chemistry that are necessary for chemistry, biology, materials, pre-med, general science and engineering students.

MSE203. 晶体学（2）.

理论课，2 学时/周。

先修课程：材料科学基础（MSE201）。

此门课程是材料系的最重要的基础课程之一，同时也是物理、化学、生物、电子等诸多学科研究材料结构的基础。本课程是固体物理、现代材料表征测试技术、材料物理等课程的必要前置课程。课程内容包括晶体的概念、晶体的对称性、晶体的性质以及一些具体的表征技术介绍。

MSE203. Crystallography (2)

Lecture, 2 hours per week.

Pre-requesites：MSE201.

The course is an important basic course in MSE, Physics, Chemistry and Biology. This course provides undergraduate level students basic theories and knowledge of crystallography. The purpose of this course is to provide fundamental knowledge for further learning in courses such as Solid Physics, Modern Material Characterization and Analyzing Techniques, Materials Physics, etc. Fundamental topics such as the concept of crystal, the symmetry of crystal, the properties of crystal, and some crystal characterization technologies will be introduced.

MSE204. 物理化学实验（1）

实验课，2 学时/周。

先修课程：大学物理 I/II（PHY101/102），化学原理（CH101），基础物理实验（PHY104），化学原理实验（CH104），材料科学基础（MSE201）。

此课程南方科技大学材料系设置的基础实验课，与材料专业课相互配合。学生在教师指导下独立完成实验，得到预期的实验结果，并结合理论知识，对实验结果进行分析、归纳。材料物化实验的主要目的是使学生初步了解物理化学的实验研究思路，掌握材料物化的基本实验技术和技能，学会一些重要物理化学性能的测定方法，体验材料物化实验的完整过程------现象的观察和记录、条件的判断和选择、数据的测量和处理、结果的分析和归纳等，加深对材料物化基本理论的理解，增强应用物理化学实验技能解决实际材料问题的能力。整个实验过程要求学生分工与合作，充分发挥主管能动性，锻炼学生的综合能力。

MSE204. Physical Chemistry Experiments (1)

Laboratory, 2 hours per week.

Pre-requesites： PHY101/102, CH101, PHY104, CH104, MSE201

The course is one of the basic experiment courses in MSE. The students can complete the experiment independently and get the expected results under the guidance of the teachers. They can analyze and discuss the experimental results based on the theoretical knowledge. The

objective of this class is to make the students understand the basic research method, master the basic experimental techniques and skills, and learn some measurement methods of important physical chemistry properties. The whole experiment process can bring the students' subjective initiative into play and improve students' comprehensive ability.

MSE. 基础有机化学（4）.

4 学分（含 1 学分实验），5 学时/周。

先修课程： 化学原理

此课程是面向材料系本科生开设的一门理论性和实践性很强的重要基础课程。 有机高分子材料、生物材料、及有机/无机杂化材料是材料科学的重要分支， 是当今材料科学的前沿研究领域。本课程的开设将有利于材料系本科生提高有机化学基础知识，为今后有机材料相关课程的学习和有机材料相关研究课题的开展打下良好的基础。本课程主要讲授有机化学的基本原理，系统介绍有机化合物的基本结构、反应、及合成方法。介绍有机化合物结构表征的各种光谱技术，注重有机化学在现代材料科学中的应用。在实验课程上，使学生了解和掌握有机化合物的基本使用规范和有机化学实验的安全常识， 掌握基本的有机化学实验技能，使学生初步具有合成、分离、提纯及鉴定简单有机化合物的基本技能，培养学生的动手能力。

MSE. General Organic Chemistry (4)

4 credits. Lecture, 3 hours per week; Lab, 2 hours per week.

Pre-requesites：General Cehsmitry

This course is scheduled for undergraduate students majoring in materials science and engineering (MSE). The class trains MSE students both theoretically and practically in organic chemistry field. Organic and polymeric materials, biological materials and organic/inorganic hybrid materials are important research fields and they play significant roles in modern materials research. Studying General Organic Chemistry will greatly improve the student's fundamental knowledge of organic chemistry and build solid foundation for their organic materials studies and research projects.

The course covers the fundamentals of organic chemistry, including the basic structures of organic compounds, important organic reactions, and typical synthetic methods. The class will focus on the application of organic chemistry in materials science. Various spectroscopies for chemical

structure identification of organic compounds will be elaborated. In addition to the classroom study, the students are required to take organic lab as part of this course. Basic hand-on experimental techniques including organic synthesis, chemical separation and purification, and structure characterization will be the major contents in the lab.

MSE301. 材料力学（3）.

理论课，3 学时/周。

先修课程：大学物理 I/II（PHY101/102），化学原理（CH101），基础物理实验（PHY104），化学原理实验（CH104），材料科学基础（MSE201），高分子材料（MSE313）

主要内容：该课程涉及内容包括有关材料科学、结构、合成、表征、性质和应用的基本原理和基础知识。在巩固化学基本原理基础上，重点是如何利用化学知识和手段制备各种材料(包括无机、有机、高分子、金属、陶瓷，生物以及先进纳米材料等)，并调制相关材料的性质等。专业基础课。

MSE301. Materials Chemistry (3)

Lecture, 3 hours per week.

Pre-requesites： PHY101/102, CH101, PHY104, CH104, MSE201, MSE313

The course covers the basic principles, structures, synthesis, characterization, properties, and applications in materials science. Emphasizing a solid grasp of the fundamentals of chemistry, we shall focus on the use of learned chemical knowledge to synthesize various materials (such as inorganic, organic, polymeric, metallic, ceramics, biological and nanomaterials) and manipulate their properties. Foundation course.

MSE302. 现代材料科学与技术前沿讲座 II（1）.

理论课，1 学时/周。

先修课程：材料科学基础（MSE201），

此课程为讲座课，是 MSE309《现代材料科学与技术前沿讲座 I》的进阶课程。由我系教授与国内外知名专家学者为学生介绍各种先进材料、材料测试与加工、材料制备等材料领域的知识和最新的科学概念等。

MSE302. Seminars on Frontiers of Modern Materials Science and Technology II (1)

Lecture, 1 hours per week.

Pre-requesites： MSE201

This course is in the form of seminars to provide cutting-edge knowledge and the latest scientific concepts and technological developments in the synthesis, processing, characterization, testing, mechanics, modeling and applications of a broad range of advanced materials.

MSE304. 材料学综合实验 II（4）

实验课，8 学时/周。

先修课程：材料学综合实验 I（MSE307）

此课程与《半导体材料与器件》、《光伏光热技术导论》、《材料腐蚀与防护》、《材料物理》等课程有密切的联系，是理论教学的深化与补充。材料综合实验 II 的主要内容如下：一、半导体材料基本参数的测试原理、测试方法以及半导体器件制造过程中与材料有关的特性和参数的测试原理、测试方法；二、各种材料的物理特性如电声光磁等特性的测试；三、各种材料的腐蚀与防护；四、环境测试；五、3D 打印技术等。 通过该课程教学,可使学生掌握材料的各种特性，使学生了解这些特性在实际应用中的原理方法，培养学生动手实践能力，增强独立思考、分析问题、解决问题的能力,同时促进知识创新和拓展的能力。

MSE304. Comprehensive Experiments of Material II (4)

Laboratory, 8 hours per week.

Pre-requesites： MSE307

This course is closely linked with the following four courses: Semiconductor Materials and Devices, Introduction of Photovoltaic and Photothermal Technique, Corrosion and Protection of Materials, and Materials Processing Technology. It is the supplement of these theoretical courses. In this course, students will conduct: 1) tests of the parameters about semiconductor materials and

devices, 2) experiments about the electric, optical, magnetic properties of different materials, 3) experiments about the corrosion and protection of materials, d) environmental testing, 4) 3D printing techniques. After finishing this course, students can better master the knowledge about the various properties of materials and understand how to use these properties in the daily life. Meanwhile, their abilities to think independently, problem solve and innovate will greatly improve.

MSE305. 材料力学（2）

理论课，2 学时/周。

先修课程：材料科学基础（MSE201）。

主要内容: 本课程将介绍材料力学的基本概念及其在工程中的应用， 主要包括形变，压力，轴向力,扭矩,弯曲,剪切,压力转换,柱体屈服等内容。本课程提供材料力学相关应用的完整理论框架，及对材料力学行为的更深入认识。课程相关实验放置于材料科学综合实验 I 内

MSE305. Mechanics of Materials (2)

Lecture, 2 hours per week.

Pre-requesites： MSE201

This course will introduce the basic concepts of mechanics in materials science and their engineering’s applications, including strain, stress, tensile, bending, torsion, shear, etc. The objectives of this course is to provide a complete framework of mechanics in materials science applications as well as a deep understanding of the mechanical behavior of materials. The corresponding experiments of the coursed is integrated in Materials Science Intergated LAB I.

MSE306. 材料测试分析技术（3）

理论课，3 学时/周。

先修课程：材料科学基础（MSE201）

此课程对常用的材料测试分析手段，如 SEM， TEM， XRD，AFM 等。 相关的实验部分整合入课程综合材料实验 II 中。

MSE306. Material Characterization Techniques (3)

Lecture, 3 hours per week.

Pre-requesites： MSE201

This course is an introduction to commonly used materials characterization techniques', including SEM, TEM, XRD, AFM, etc. Related integrated labs: Integrated Materials Science Lab II.

MSE307. 材料学综合实验 I（4）

实验课，8 学时/周。

先修课程：高分子材料（MSE201），晶体学（MSE203），材料化学（MSE301），材料力学（MSE305）

此课程与《材料化学》、《高分子材料》、《材料制备与加工技术》、《晶体学》、《材料力学》等课程有密切的联系，是理论教学的深化与补充。材料综合实验的主要目的是训练学生掌握材料合成，材料制备与加工、材料性能测试和材料组织结构表征的基本技能，并通过这一系列综合实验了解各种材料的合成制备、加工技术和过程与材料组织性能间的相互关系，掌握材料实验研究的基本思路和方法，体验材料研究的完整过程，即 “合成制备-加工-结构表征-性能测试”，为学生以后在工作研究中解决材料方面的相关问题打下良好科学基础。

MSE307. Comprehensive Experiments of Material I (4)

Laboratory, 8 hours per week.

Pre-requesites： MSE201, MSE203, MSE301, MSE305

This course is closed linked with the following five courses: Introduction to Polymer Material, Crystallography, Materials Chemistry, Materials Processing Technology, and Mechanics of Materials. It is the supplement of these theoretical courses. The main purpose of this course is to train students to master the basic skills of materials synthesis, processing and characterization. Through doing a series of comprehensive experiments, students can better understand the relationship between materials and the structures, and can grasp the basic idea of material research. This course will give students a chance to experience the whole process of material research, namely, the "synthesis-characterization-performance test".

MSE308. 材料物理（3）

理论课，3 学时/周。

先修课程：大学物理 I/II（PHY101/102），高等数学 I/II（GE101/102），材料科学基础（MSE201），晶体学（MSE203）

此课程是材料科学与工程专业的一门主要专业基础课。本课程教授了解材料性能所必需的物理基础理论，包括电子论和能带论，材料的电，磁，光，热等性能，这些性能的评价方法，及其与材料结构的关系；同时介绍基于这些性能的器件、应用，以及未来的发展前景。

MSE308. Physics of Materials (3)

Lecture, 3 hours per week.

Pre-requesites： PHY101/102, GE101/102, MSE201, MSE203

The Physics of Materials is an important fundamental course and is required for all the students with major in Materials Science and Engineering. This course covers the basic theory for understanding the properties of materials, including electron theory and band theory in solids. It also introduces the electrical, magnetic, optical, and thermal properties of materials, the characterization of these properties, and their relationship with the structures of materials. The state-of-art devices, applications, and future based on materials properties will also be introduced.

MSE309. 现代材料科学与技术前沿讲座 I（1）

理论课，1 学时/周。

先修课程：材料科学基础（MSE201），

此课程为讲座课，由我系教授与国内外知名专家学者为学生介绍各种先进材料、材料测试与加工、材料制备等材料领域的知识和最新的科学概念等。

MSE309. Seminars on Frontiers of Modern Materials Science and Technology I (1)

Lecture, 1 hours per week.

Pre-requesites： MSE201

This course is in the form of seminars to provide up-to-date knowledge and the latest scientific concepts and technological developments in the synthesis, processing, characterization, testing, mechanics, modeling and applications of a broad range of advanced materials.

MSE310. 半导体材料与器件（3）

理论课，3 学时/周。

先修课程：

主要教学内容介绍：本课程目的是使学生了解包括半导体材料，器件和加工技术等物理学原理。学生将学习到半导体材料的基本的电子和光学特性，典型半导体材料器件如二极管、双极晶体管和 MOS 器件的运行原理，以及用于现代 VLSI 技术的处理加工技术。学生将获得对半导体产业的了解，理解半导体器件和微电子加工技术的关键概念。学生还可以通过数学建模来优化设备操作及优化处理技术。

MSE310. Semiconducting Materials, Devices and Technology (3)

Lecture, 3 hours per week.

Pre-requesites：

Course Contents：The goal of this course is to establish a basic understanding of the physical principles involved in semiconductor materials, as well as an understanding of devices and processing technology. The knowledge acquired in this course will allow students to understand the fundamental electronic and optical properties of semiconducting materials, the principals involved in the operation of typical semiconductor devices such as diodes, bipolar transistors, and MOS devices, and the processing techniques used in modern day VLSI technology. Upon

completion of this course, students will acquire a general understanding of the semiconductor industry and understand the key concepts related to semiconductor devices and microelectronic processing technology. Students will also be able to describe device operation and optimize processing technology through mathematical modeling.

MSE311. 材料热力学（3）

理论课，3 学时/周。

先修课程：高等数学 I/II（GE101/102），大学物理 I/II（PHY101/102），化学原理（CH101），材料科学基础（MSE201），

本课程主要讲述热力学的基本定律以及应用热力学原理来解决各种材料科学的问题。课程内容包括热力学三大定律，相图，气相与气相反应，固体中的缺陷，电化学，动力循环和热机，以及冷却循环等。

MSE311. Thermodynamics of Materials (3)

Lecture, 3 hours per week.

Pre-requesites： GE101/102, PHY101/102, CH101, MSE201

This course will focus on the basic laws of thermodynamics and application of thermodynamic principles to various materials problems. It will cover the first, second, and third laws of thermodynamics, including phase diagrams, gas phase and gas/condensed phase reactions, defects in solids, electrochemistry, power cycles and heat engines, and refrigeration cycles.

MSE313. 高分子材料（3）

理论课，3 学时/周。

先修课程：材料科学基础（MSE201）

授课语言：英文

课堂教学内容包括：序言、高分子合成、高分子溶液、高分子固态性质、共混高分子与高分子复合材料、粘弹性、高分子的分解与断裂、热塑高分子、热固高分子、弹性体、粘合剂、纤维、高分子加工、高分子液晶、涂层、膜、生物高分子。

MSE313. Polymer Materials (3)

Lecture, 3 hours per week.

Pre-requisites： MSE201

Course overview: synthesis of polymers; polymer solutions; solid state properties of polymers; polymer blends and composites; viscoelasticity; degradation and failure of polymers; thermoplastics, thermosets, elastomers, adhesives; polymer fibers; polymer processing; polymer liquid crystals; coatings; membranes; biopolymers.

MSE315. 金属材料（3）

3 学分（含 1 学分实验），4 学时/周。

先修课程：材料科学基础（MSE201）

本课程主要讲述金属学的基础理论，让学生了解金属材料热力学，扩散，金属的表面和晶界结构，金属的凝固过程，金属中的扩散性相变和非扩散性相变。课程中会向学生介绍工业上目前使用的主要金属材料，如碳素钢，不锈钢，铝合金，铜合金以及钛合金的基础知识。

MSE315. Physical Metallurgy (3)

3 credits. Lecture, 2 hours per week; Lab, 2 hours per week.

Pre-requesites： MSE201

This course gives an introduction to the fundamental theories of physical metallurgy. Students will learn thermodynamics of metallic materials, diffusion, surface and grain boundary structures of metals, solidification, diffusional and diffusionless transformation in metals. They will learn about metallic materials commonly used in industry, such as carbon steels, stainless steels, Al alloys, Cu alloys, Ti alloys, etc.

MSE316. 生物材料（4）

4 学分（含 2 学分实验），6 学时/周。

先修课程：材料科学基础（MSE201）。

生物材料是一门讲授用于诊断，修复和增强人体组织和器官功能的材料的课程。该课程主要介绍了多种常见生物材料的结构，性质，制备，应用以及生物材料研究的最新进展等。

MSE316. Biomaterials (4)

4 credits Lecture, 2 hours per week; Lab, 4 hours per week.

Pre-requests：MSE201

The course of biomaterials is a class of high technology material for diagnosis, repairing and enhancement of the human tissues and organs. It mainly introduces the structures, properties, preparation, application of various common biomaterials, as well as the latest development of biomaterials research.

MSE317. 陶瓷材料（3）

理论课，3 学时/周。

先修课程：材料科学基础（MSE201）

陶瓷材料（含结构陶瓷和功能陶瓷）的微观结构-加工工艺-性能-实际工程应用之间的关系，掌握晶体/玻璃的结构、相图、以及表面、界面、晶界的基本知识，熟悉陶瓷材料的加工制备方法和烧结原理，掌握陶瓷材料力学、光学、热学、电学、磁学以及生物学性能以及在工程实际中的具体应用，培养学生设计和开发新型陶瓷材料的能力。

MSE317. Ceramic Materials (3)

Lecture, 2 hours per week.

Pre-requesites： MSE201

This course is an introduction to the basic principles of crystal structure, phase diagram, processing, mechanical, thermal, electrical, magnetic and biological properties and applications of both structural and functional ceramics.

MSE317/MSE328/MSE401/MSE490 材料科学创新实验+毕业论文（毕业设计）

1 学分+1 学分+1 学分+10 学分

先修课程：材料科学基础（MSE201）。

上课方式：科研导师指导，双语交流。

从大三上学期开始，每一位材料系本科生都将有一位相关教授指导其独立的科研课题，直到毕业设计。学生通过材料学创新实验的训练将会对研究领域有一定深入的了解，并学到基本的相关实验技术与表征方法，最终完成高质量的研究课题与毕业论文。

MSE317/MSE328/MSE401/MSE490 Advanced Materials Research+ Thesis (Graduation Project)

1 credit+ 1 credit +1 credit +8 credits

Pre-requisites： MSE201

Each MSE student will be assigned a research supervisor from the related faculty member starting from the third year. The students will conduct independent research in their supervisors' lab until the final thesis. The students who have been through two years' research under this course will have a relatively deep understanding of their own research fields, have basic skills of the experimental methods and advanced instruments in the related research areas, and finish their high-quality research projects and the final thesis for graduation.

MSE318. 能源材料学（3）

3 学分（含 1 学分实验），4 学时/周。

先修课程：大学物理 I/II（PHY101/102），化学原理（CH101），基础物理实验（PHY104），化学原理实验（CH104），材料科学基础（MSE201）。

本课程主要讲述能源材料的基本原理、基本特征和基本类型，能源材料的基本性质，能源材料的一些常规制备方法，以及能源材料的应用领域；同时介绍新能源材料国内外的研究和发展现状，新能源材料的主要任务及面临的关键课题，新能源材料研究未来发展前景。第一部分的主要内容包括各种化学电源材料，如一次碱锰电池，可充铅酸电池、镍镉电池、镍氢电池、锂离子电池，新型锂空气电池，热电材料，以及智能储能材料。第二部分主要包括相变储能材料、核能材料、太阳能材料、生物质能材料以及氢能材料等。

MSE318. Introduction to Energy Materials (3)

3 credits. Lecture, 2 hours per week; Lab, 2 hours per week.

Pre-requesites： PHY101/102, CH101, PHY104, CH104, MSE201

This course covers a wide range of topics including the fundamentals, basic characteristics, and classification of energy materials as well as the basic properties, general preparation and manufacturing methods, and significant applications of energy materials. This course will also introduce the state-of-art research and development on new energy materials, the major challenges and critical issues facing energy materials, and even some perspectives of development related to new energy materials. The first part of this course will introduce the materials and the corresponding energy storage mechanism in chemical power sources including primary alkaline manganese batteries, rechargeable lead-acid batteries, Ni-Cd and nickel metal hydride batteries, lithium ion batteries, next-generation Li-air batteries, thermoelectric materials, smart energy storage materials; The second part will mainly deal with the phase-transition energy storage materials, nuclear materials, solar energy conversion and storage materials, biomass materials and hydrogen energy materials.

MSE320. 光伏光热技术导论（3）

理论课，3 学时/周。

先修课程：大学物理 I/II（PHY101/102），化学原理（CH101），模拟电路（EE201）， 半导体器件导论（EE204）

本课程主要讲解太阳能的利用技术现状和前景，光伏和光热。光伏技术部分将系统的讲解单晶硅和多晶硅电池技术及工艺、硅基薄膜电池技术及工艺、CdTe 薄膜电池技术及工艺、CIGS 薄膜电池技术及工艺、有机电池技术、染料敏化电池技术、新型电池技术、逆变器和并网技术等。光热技术将介绍集热技术及工艺、集热及光热转换材料及构造等。本课程还将结合以上内容讲授工业制程控制基本概念，如 Cpk、6Ω等技术指标。

MSE320. Introduction to Photovoltaics and Photo-thermal (3)

Lecture, 3 hours per week.

Pre-requesites： PHY101/102, CH101, EE201, EE204

This course will deliver the students the current technologies of using solar energy and the its potentials, including photovoltaic and solar-thermal. In the photovoltaic part, this course mainly includes technology and processes of single crystalline silicon solar cell, silicon-based thin film solar cells, CdTe solar cells, CIGS solar cells, organic solar cells, DSSC, novel compound quantum dots solar cells, inverter and grid, etc. In the solar-thermal part, this course introduces the heat collecting and converting technique from solar light, the key materials and devices structures involved. In addition, basic concepts on process control are also presented in this course, such as Cpk, 6Ω.

MSE322. 复合材料学（3）

理论课，3 学时/周。

先修课程：材料科学基础（MSE201）， 材料力学（MSE305）

本课程是学生在完成了材料科学基础，材料力学等专业基础课后，进一步扩宽专业知识和材料设计思路，以及增强学生对材料科学与这门学科的兴趣。它包括基本概念和理论；不同母相和拓扑结构的复合材料及制备合成方法学；复合材料的物理、化学及力学性能及它们与组成材料及界面之间的关系等三大部分内容。通过课堂教学，课程项目或论文等方式使学生能够掌握复合材料的基本概念和理论，系统地了解各类复合材料的性能、制备成型工艺、界面

特征，以达到可以针对不同应用来选择或初步设计所需的复合材料。同时，使学生能够通过自身的理解来把握复合材料在未来材料学及工程领域中的角色和发展趋势。

MSE322. Composite Materials (3)

Lecture, 3 hours per week.

Pre-requesites： MSE201，MSE305

Introduction to characteristics of reinforcements and matrices, mechanics and failure mechanism, processing techniques, properties and applications of composites containing polymer , metal and ceramic matrices.

MSE330. 金属材料粉末冶金及其 3D 打印（3）

理论课，3 学时/周。

先修课程：材料科学基础（MSE201），金属材料（MSE315.）

本课程将使学生在以下方面得以提高：(a) 掌握粉末冶金原理；(b) 了解粉末冶金技术；(c) 掌握金属材料 3D 打印原理；(d) 了解金属材料 3D 打印；(e) 了解金属材料粉末冶金、3D 打印行业动态。

MSE330. Powder metallurgy and 3D printing of metallic materials (3)

Lecture, 3 hours per week.

Pre-requisites：MSE201. MSE315.

Learning outcomes are expected as follows: (a) To grasp the fundamentals of powder metallurgy; (b) To get familiar with various techniques based on principals of powder metallurgy; (c) To grasp the fundamentals of the 3D printing of metallic materials; (d) To get familiar with the development of the 3D printing of metallic materials; and (e) To get familiar with the progress of the powder metallurgy and 3D printing as well as the latest development of the related industries.

MSE332. 电化学基础（3）

理论课，3 学时/周。

先修课程： 化学原理（CH101），物理化学（MSE202）

此课程本课程是介绍电化学及电化学工程的基本原理。本课程旨在让学生掌握电化学和电化学工程的基础理论知识，掌握电化学分析手段，了解电化学理论如何应用于电化学能量储存与转换等新能源领域，从而培养学生在新能源领域的创新能力。

MSE332. Fundamentals of Electrochemisty (3)

Lecture, 3 hours per week.

Pre-requisites：CH101， MSE202

This course will introduce the basic principles of electrochemistry and electrochemical engineering。 The course will equip the students with the knowledge of the working mechanisms and characteristics of electrochemical systems and the skill of electrochemical analysis. The course will also introduce the application of electrochemistry and electrochemical engineering in clean and renewable energy areas.

MSE403. 先进材料表征技术（3）

3 学分（含 1.5 学分实验），4.5 学时/周。

先修课程：材料科学基础（MSE201）， 材料测试分析技术（MSE306）

提供多种材料表征的技术，如电子显微镜、拉曼、原子力显微镜、光谱仪器等的进阶理论知识和实际的操作经验。本门课将使得学生掌握材料的测试设备的结构、工作原理以及测试的方法与结果分析。

MSE403. Advanced Materials Characterization Techniques (3)

3 credits. Lecture, 1.5 hours per week; Lab, 3 hours per week.

Pre-requesites： MSE201, MSE306
This course is to provide advanced knowledge and practical operations of scanning electron microscopy, transmission electron microscopy, Raman and atomic force microscopy and a variety of other characterization of material properties of the science and technology. The main purpose is to enable students to master the test methods of material analysis, to understand the basic structure, working principle of a variety of analytical instruments, and applications of analytical instruments on the material characterization. This is useful for materials science research.

MSE403. 先进材料表征技术（3）

3 学分（含 1.5 学分实验），4.5 学时/周。

先修课程：材料科学基础（MSE201）， 材料测试分析技术（MSE306）

提供多种材料表征的技术，如电子显微镜、拉曼、原子力显微镜、光谱仪器等的进阶理论知识和实际的操作经验。本门课将使得学生掌握材料的测试设备的结构、工作原理以及测试的方法与结果分析。

MSE403. Advanced Materials Characterization Techniques (3)

3 credits. Lecture, 1.5 hours per week; Lab, 3 hours per week.

Pre-requesites： MSE201, MSE306
This course is to provide advanced knowledge and practical operations of scanning electron microscopy, transmission electron microscopy, Raman and atomic force microscopy and a variety of other characterization of material properties of the science and technology. The main purpose is to enable students to master the test methods of material analysis, to understand the basic structure, working principle of a variety of analytical instruments, and applications of analytical instruments on the material characterization. This is useful for materials science research.

MSE413. 3D 打印及激光先进制造（3）

理论课，3 学时/周。

先修课程：高等数学 I/II（GE101/102），固体物理（PHY311）

本课程目的是通过约 48 课时的授课让本科生掌握 3D 打印技术的最新进展、软件/硬件、及应用范畴。激光科学及激光器的发展对 3D 打印机的发展有重要影响，故本课程亦将教授激光器的工作原理、种类，以及激光在材料连接、材料分离/切割、材料微制造、材料表面改性、以及新材料制备这五个方面的重要应用。

MSE413. 3D Printing and Lase-based Additive Manufacturing (3)

Lecture, 3 hours per week.

Pre-requisites： GE101/102, PHY311

The objective of this course is to teach undergraduate students about cutting-edge knowledge about 3D printing, its current status, and software & hardware, using about 48 credit hours. Since the development of science and technology of laser and laser system is key to the advancement of 3D printing, this course will also teach students working principles and types of lasers and laser systems, as well as the applications and fundamentals of laser systems in five important areas, namely materials joining, material cutting/separating, micro-fabrication, surface engineering and fabrication of new materials.

MSE450. 材料科学创新创客名家讲座（1）

理论课，1 学时/周。

先修课程：

本课程通过创业名家和学术大家的现身讲座，旨在为学生拓宽材料科学与工程技术在产业中应用的视野，激发学生对科研和技术开发的创新动力，和学生创业热情，培养学生创新创业

精神。

MSE450. Distinguish Lectures for Innovation and Entrepreneurship in Materials Science and Engineering （1）

Lecture, 1 hours per week.

Pre-requisites：

Through a series of lectures delivered by some famous entrepreneurial and academic masters, this course aims to broaden students’ insights of materials science and engineering applications into industry, to motivate students' innovation of research and technological development, their entrepreneurial enthusiasm, and their spirits of innovation and entrepreneurship.

MSE460. 走进材料系（1）

1 学分（含 0.5 学分实验），1.5 学时/周。

先修课程：

系统介绍材料学科组成，各学科方向的相关基本概念和基本理论，前沿研究等概念知识，通过讲课、实验、课堂讨论和项目设计等各个教学环节，对材料科学与工程领域的主要内容进行全面介绍，为学生后继专业课程、从事材料科学研究和工程技术工作奠定一定理论基础。

MSE460. Orientation Program of Dept. of Materials Science and Engineering **(1)**

1 credits. Lecture, 0.5 hours per week; Lab, 1 hours per week.

Pre-requests：

The objectives of this course is to systematically introduce the basic concepts, basic theories and cut-edge research related to materials science and engineering. The main content of materials science and engineering major will be introduced to the students through lectures, experiments, discussion and projects. The course will be helpful in students’ further MSE related courses studies, and will provide certain background knowledge to materials science research and

technologies.

MSE470. 工业实习（5）

16 学时/周

学生于大三暑假期间进行为期 4 周的校外工业实习和 1 周的校内实习，实习内容与方法由实习单位与指导老师共同决定，应体现材料科学与工程专业课程知识内容的应用与实践。最后以出勤率(50%)、平时成绩(20%)和实习报告(30%)作为考核标准。

MSE470. Industrial Practice (5)

16 hours per week.

This class includes four weeks of industrial practice and one week of laboratory experimentation inside the campus. Co-supervised by tutors from the Department and the practice company, students should use what they learn during practice. Assessment in this class is based on attendance, operation, and reports.

MSE480. 科技创新项目（2）

16 学时/周

科技创新项目为学生尽早在实验室进入实验学习阶段提供了良好的机会。 学生的题目由学生的科研导师拟定或根据学生的兴趣拟定。项目目的是突出新颖性和创新性，为学生开拓思路提高科研水平打下基础。 学生在科技创新试验课中学到了良好的实验设计，表征， 分析， 及论文写作技能。

MSE480. Projects of Science and Technology Innovation (5)

16 hours per week.

Science and technology innovation projects provide excellent opportunities for students to perform their laboratory experiments as early as possible. Students researching on different subjects can be assigned by students’ tutors or be prepared according to students' interests. This project aims to highlight the novelty and innovation, providing a solid foundation for broadening students’ idea development and improving students’ research abilities. Students in this science and technology innovation course will learn the abilities and skills for experimental design, materials characterization, analysis, and research paper writing.

物理系

理论课（Lecture）

PHY101A. 大学物理 A (上)

理论课，4 学分，4 学时/每周。课程内容为介绍物理学几个基本主题：运动学、牛顿力学、弹性、流体力学、振动、波和热学。

PHY101A General Physics A (I) (4)

Lecture, 4 credits, 4 hours per week. To understand basic topics in physics including kinematics, Newtonian mechanics, elasticity, fluid dynamics, oscillations, waves and thermal physics.

PHY101B. 大学物理 B (上) （4）

理论课，4 学分，4 学时/每周。课程内容为介绍物理学几个基本主题运动学、牛顿力学、流体力学、振动、波和热学。这门课程面向非理工科专业学生。

PHY101B General Physics B (I) (4)

Lecture, 4 credits, 4 hours per week. To understand basic topics in physics including kinematics, Newtonian mechanics, fluid dynamics, oscillations, waves and thermal physics. This course is aimed for non-science/engineering majors.

PHY102A 大学物理 A （下）（4）

理论课，4 学分，4 学时/每周。课程内容为介绍物理学几个基本主题电学，磁学，光的波动性质，相对论和量子力学简介。

PHY102A General Physics A (II) (4)

Lecture, 4 credits, 4 hours per week. To understand basic topics in physics including electricity, magnetism, wave nature of light, and the introduction to relativity and quantum mechanics.

PHY102B 大学物理 B （下）（4）

理论课，4 学分，4 学时/每周。课程内容为介绍物理学几个基本主题电学, 磁学, 光的波动性，相对论和量子力学简介。这门课程面向非理工科专业学生。

PHY102B General Physics B (II) (4)

Lecture, 4 credits, 4 hours per week. To understand basic topics in physics including electricity, magnetism, wave nature of light, and the introduction to relativity and quantum mechanics. This course is aimed for non-science/engineering majors.

PHY203-15. 数学物理方法(4)

理论课，4 学分，4 学时/每周。课程主要包括以下内容：复变函数，傅里叶级数和傅里叶变换，偏微分方程，微分方程的级数解和特殊函数。

PHY203-15. Introduction to Mathematical Methods in Physics (4)

Lecture, 4 credits, 4 hours per week. The course' s main contents include: functions of a complex variable, Fourier series and Fourier transforms, partial differential equations, series solutions of differential equations and special functions.

PHY205-15. 分析力学(3)

理论课，3 学分，3 学时/每周。本课程主要介绍分析力学的两种等价体系:拉格朗日力学与哈密顿力学，以及一些典型模型中运动方程的求解。具体模型包括中心力场问题、粒子碰撞、微振动、以及刚体运动等。通过本课程的学习，学生应该熟练掌握分析力学的两种表述形式，并能求解经典力学中典型模型的运动方程。

PHY205-15. Analytical Mechanics (3)

Lecture, 3 hours, 3 hours per week. This course introduces two equivalent formalisms of analytical mechanics--Lagrange formalism and Hamilton formalism, and the applications in some typical models by solving the equation of motion. Specifically, the models include the central force question, collisions between particles, small oscillations, and the motion of a rigid body. After learning this course, students should be familiar with the two formalisms of analytical mechanics and utilize the knowledge to solve the classical motion of some typical models.

PHY207-15.电动力学 I（3）

理论课，3 学分，3 学时。本课程主要讲授静电学、静磁学的相关知识。内容包括：电动力

学的基本定律，几种求解静电、静磁学边界值问题的特殊方法，以及物质与静电场、静磁场的相互作用。此外，还会介绍麦克斯韦方程组的基本理论。

PHY207-15. Electrodynamics I (3)

Lecture, 3 hours, 3 hours per week. This course is to teach the theory of electrostatics and magnetostatics, which will include the fundamental laws of electrodynamics, special techniques to solve the boundary problems in electrostatics and magnetostatics and the interaction between the matter and electrostatic and magnetic field. Further, the basic theory will be extended to Maxwell's equation.

PHY204. 热力学与统计物理 I (3)

理论课，3 学分，3 学时/每周。介绍热力学和统计物理的基本知识，包括热力学基本定律，热力学势及其相互转换，相变和相平衡，热力学稳定性，近独立系统的统计分布等内容。

PHY204. Thermodynamics and Statistical Physics I (3)

Lecture, 3 credits, 3 hours per week. Introduce the basics of Thermodynamics and Statistical Physics including the zeroth, first, second and third laws, thermodynamical potentials and Legendre transformation, phase coexistence and phase transition, thermodynamical stability, statistical distribution of almost independent systems, and others.

PHY206-15. 量子力学 I (3)

理论课，3 学分，3 学时/每周。本课程主要介绍量子力学的基本原理以及薛定谔方程的简单应用。具体内容包括一维势阱与散射、三维氢原子模型、全同粒子、以及微扰理论等。通过

本课程的学习，学生应该熟练掌握量子力学的基本原理，一些简单模型的求解，以及微扰系统的计算。

PHY206. Quantum Mechanics I (3)

Lecture, 3 credits, 3 hours per week. This course introduces the fundamental principles of quantum mechanics and its applications in simple models by solving the Schrodinger equation. Specifically, the content includes one-dimensional well and scattering, the Hydrogen atom, identical particles, and the perturbation theory. After learning this course, students should be familiar with the fundamental principles of quantum mechanics and utilize the knowledge to deal with the quantum phenomena of some simple systems.

PHY208. 电动力学 II (3)

理论课，3 学分，3 学时/每周，习题答疑 1 学时/每周。本课程为电动力学 I 的后续课程，在 Maxwell 方程组的基础上，讲授各种电磁学现象，包括电磁场的中的守恒定律，电磁波的形成和其在各种介质中传播，电磁场的规范不变性，电磁辐射，以及狭义相对论。

PHY208. Electrodynamics II (3)

Lecture, 3 credits, 3 hours per week, discussion 1 hour per week. Introduce various electromagnetic phenomena based on the Maxwell's equations, including conservation law in electrodynamics, the propagation of electromagnetic wave in different media, the gauge invariance of electromagnetic field, electromagnetic radiation and special relativity.

PHY210. 原子物理学 (3)

理论课，3 学分，3 学时/每周。原子物理重点介绍原子结构，原子光谱，原子与其它物质以及原子间的相互作用。

PHY210. Atomic Physics (3)

Lecture, 3 credits, 3 hours per week. Atomic Physics mainly conveys the basic knowledge of the atomic structure, atomic spectrums and interactions among atoms.

PHY305. 量子力学 II (3)

理论课，3 学分，3 学时/每周。本课程介绍描述量子力学原理和应用，包括定态微扰理论，变分法，WKB 近似，含时微扰，绝热近似，散射理论。通过本课程，学生应熟练掌握量子力学的基本原理以及各种近似方法，并能够运用量子力学的知识解释和处理相关的微观量子物理现象。

PHY305. Quantum Mechanics II (3)

Lecture, 3 credits, 3 hours per week. It introduces the principles of quantum mechanics and its applications, including the time-independent perturbation, variational principle, WKB approximation, time-dependent perturbation, adiabatic approximation, scattering theory, and other relative topics. After learning this course, students should be familiar with the fundamental principles of quantum mechanics and several approximate methods, and utilize these knowledge to deal with microscopic quantum phenomena.

PHY303. 统计物理 II（3）

理论课，3 学分，3 学时/每周。讲授统计物理学的基本知识：相空间，最可几分布，近独立系统的统计，系综理论，相互作用系统，非平衡系统和相变理论。

PHY303. Statistical Mechanics II (3)

Lecture, 3 credits, 3 hours per week. Introduction to statistical mechanics: phase space (mu-space and Gamma-space); most probable distribution; nearly independent system (classical and quantum case); Ensemble theory (microcannonical, cannonical and grand cannonical ensembles) ; interacting system; Nonequilibrium system; Phase transition.

PHY307. 近代光学(3)

理论课，3 学分，3 学时/每周。它介绍波动光学、几何光学、基础傅立叶光学与现代光学等部分。修完本课程，要求了解电磁场理论基础、光在界面的反射透射，光的干涉、衍射、偏振，了解几何光学原理以及像差，傅立叶光学基础以及现代光学（激光原理与非线性光学基础）

PHY307 Modern Optics (3)

Lecture, 3 credits, 3 hours per week. This course introduces based Fourier optics, wave optics, geometrical optics, and modern optical. Completion of this course, students should understand the basic electromagnetic field theory, reflection and transmission of light at the interfaces, and interference, diffraction and polarization of light. They also should master the knowledge of aberration and principles of geometrical optics, basic Fourier optics, and modern optical (basis of laser principle and nonlinear optics)

PHY321-15. 固体物理(4)

理论课，4 学分，4 学时/每周。本课程主要学习固体物理的基础知识，主要涵盖晶体结构，晶体衍射和倒格子，晶体结合，晶格振动，晶体热学性质，费米电子气，能带结构，半导体晶体，以及费米面。通过本课程的学习，学生将熟悉固体的基本现象与现象背后的物理原理。

PHY321-15. Introduction to Solid State Physics (4).

Lecture, 4 credits, 4 hours per week. This course studies how the large-scale properties of solid materials result from their atomic-scale properties. It covers crystal structure, wave diffraction and reciprocal lattice, crystal binding, crystal vibrations, thermal properties, Fermi electron gas, energy bands, semiconductor crystals, and Fermi surfaces. After learning this course, students should be familiar with the relationship between the phenomena of solids and the physical principles behind these phenomena.

PHY322. 科研软件选讲(2).

理论课，2 学分，2 学时/每周。本课程简单介绍物理学研究中常用的计算机软件。包括：labview，material studio， latex，mathematica，origin，等。

PHY322. Lectures on Selected Research Software (2).

Lecture, 2 credits, 2 hours per week. In this lecture, we briefly introduce the popular softwares in physics studies, including: labview, material studio, latex, mathematica, origin, etc.

PHY330 固体光电子学（3）

理论课，3 学分，3 学时/每周。本课程主要涉及固体材料的光学性质，课程从固体材料中的光传输和反射经典描述开始，接着用量子理论处理固体材料中光的吸收和发光问题，又进一步说明和讨论绝缘体，半导体，和金属等材料的光学性质和物理现象，此外还讨论离子系统的红外特性，最后简单介绍一下非线性晶体的一些内容。

PHY330　Optical Properties of Solids

Lecture, 3 credits, 3 hours per week. The course covers the optical physics of solid state materials. It begins with the classical description of optical propagation and reflectivity. It then covers the treatment of absorption and luminescence by quantum theory, and the modifications caused by excitonic effects. The phenomena are illustrated by discussing the optical properties of insulators, semiconductors, and metals. The infrared properties of ionic systems are discussed, and the course concludes with a brief introduction to nonlinear crystals.

PHY334. 固体理论导论(4)

理论课，4 学分，4 学时/每周。本课程对固体材料的量子理论进行介绍，主要内容包括其中的基本思想，模型，概念，近似方法，重要结果，以及各种元激发（如声子，磁振子，等离激元等等）的物理图像等。

PHY334. Introduction to Solid State Theory (4)

Lecture, 4 credits, 4 hours per week. It introduces the quantum theory of solids, including basic ideas, models, concepts, approximations, important results, and physical pictures of various elemental excitations (such as phonon, magnon, plasmon etc.)

PHY332-15. 表面物理(4)

理论课，4 学分，4 学时/每周。本课程涵盖了与表面相关的基本理论，主要包括表面结构，表面电子性质，表面动力学过程等，这些内容在了解表面现象及后续表面相关研究领域至关重要。

PHY332-15. Surface Physics (4)

Lecture, 4 credits, 4 hours per week. This course covers the physics and theories related to surfaces, including surface structure, surface electronic properties, surface dynamic processes, etc., which are of prime importance in understanding different surface phenomena and performing further surface related research works.

HY324. 激光原理（3）.

理论课，3 学分，3 学时/每周。本课程从光的波动与量子特性出发，讲述集居数反转、增益、光强饱和、阈值、激发与泵浦以及谐振腔等概念，并在此基础上阐述典型的三能级与四能级激光的工作原理，以及典型谐振腔的工作机制。

PHY324. Laser Fundamentals (3)

Lecture, 3 credits, 3 hours per week. This course starts from the fundamental wave and quantum properties of light, and then uses these properties to develop the concepts of population inversion, gain, saturation intensity, laser operation above threshold, excitation and pumping and cavities. It then introduces the operation principle of three and four energy level system and the typical resonator cavities will be discussed.

PHY326-15. 半导体物理与器件(4)

理论课，4 学分，4 学时/每周。半导体物理与器件是物理专业的专业选修课程。本课程将比较全面地讲解半导体的基础物理知识及其在器件上的应用，侧重于对相关物理过程的基本理解。该课程为学生以后更深入地学习半导体物理的高阶内容或利用所学知识开展有关半导体材料的物理研究打下基础。

PHY326-15. Semiconductor Physics and Devices (4)

Lecture, 4 credits, 4 hours per week. Semiconductor Physics and Devices is a physics major selective course. It will systematically introduce the fundamental physics of semiconductors and its application in devices, with the emphasis on the understanding of relevant physical processes in semiconductors. It is not only the prerequisite course for studying advanced semiconductor physics, but also important to students who aim to study the physical properties of various semiconductor materials

PHY328. 低温物理学(3)

理论课，3 学分（含实验学分 1），4 学时/每周。本课程主要讲解低温的获得和测量方法。我们将侧重于基本原理的讲解与学习。课程同时会介绍低温下的部分物理现象及相应理论，如超导电性，超流动性和波色爱因斯坦凝聚等。

PHY328. Low Temperature Physics (3)

Lecture, 3 credits (1 credit for experiment), 4 hours per week. This course covers the basic aspects

of different cooling techniques and temperature measurement methods. We focus on the physical principles on which these methods are based rather than on technical details. Some low temperature physical phenomena, including superconductivity, superfluidity, and Bose-Einstein condensation, will also be introduced.

PHY336 计算物理(3)

理论课，3 学分，3 学时/每周。本课程介绍计算物理及计算材料科学中所用的各种计算模拟方法，包括微分方程的各种数值解法，蒙特卡洛模拟、分子动力学模拟等内容。

PHY336. Introduction to Computational Physics (3)

Lecture, 3 credits, 3 hours per week. This course provides an introduction to some of the most widely used methods of computational physics, including numerical solutions of differential equations (initial and boundary value problems), molecular dynamics simulations, Monte Carlo simulations. In addition to giving the students a basic working knowledge of these particular techniques, the goal is to make them comfortable with scientific computing in general, so that they will be prepared to tackle also other computational problem that they may encounter in the future.

PHY423-15. 薄膜物理(3)

理论课，3 学分，3 学时/每周。本课程详细介绍了薄膜科学的各个方面的知识，包括真空技术、薄膜沉积技术以及原子过程、薄膜的结构与性能表征等主要内容。

PHY423-15. Physics of Thin Films (3).

Lecture, 3 credits, 3 hours per week. The course covers all aspects of thin films science and

technology, including vacuum science and technology, the atomic deposition methods and nucleation processes as well as the structural characterizations of thin films.

PHY425. 现代材料分析技术（3）

理论课，3 学分（含实验学分 1），4 学时/每周。本课程主要讲解部分常用现代材料分析技术的原理和应用要点。包括离子束技术、表面分析技术、质谱技术等。这些都是揭示和理解材料多种性质（例如化学组分、电子学性质和电子结构等）的重要手段。

PHY425. Modern Techniques in Materials Characterization (3).

Lecture, 3 credits (1 credit for experiment), 4 hours per week. This course covers the underlying theories and operation principles of some modern materials characterization techniques, including ion beam techniques, surface analytical techniques, mass spectroscopic techniques, etc., which are of prime importance in unveiling and understanding different properties of materials (e.g. chemical composition, electrical properties, and electronic structures).

PHY427. 微纳结构加工(2)

理论课，2 学分（含实验学分 1），3 学时/每周。微纳结构加工是物理专业的专业选修课程。本课程将系统介绍微纳电子器件制造相关的基本工艺过程，核心内容包括光学与电子束光刻、湿法及干法刻蚀、热氧化与热扩散、薄膜生长工艺、器件封装等。

PHY427. Introduction to Microelectronic Fabrication (2)

Lecture, 2 credits (1 credit for experiment), 2 hours per week. Introduction to Microelectronic Fabrication is a physics major selective course. It will systematically introduce the basic processes used in microelectronic fabrication, with the main focuses on lithography, wet/dry etching, thermal processing, thin film deposition, and device packaging.

PHY429. 先进电子显微学(3)

理论课，3 学分（含实验学分 1），4 学时/每周。本课程介绍电子显微镜的原理和应用，由透射电子显微镜，扫描电子显微镜和扫描透射电子显微镜三大部分组成。修完本课程，要求了解透射电子显微镜的工作原理以及各种电子显微镜技术手段，并能应用到相关领域的科学研究。

PHY429. Advanced Electron Microscopy (3)

Lecture, 3 credits (1 credit for experiment), 4 hours per week. This course introduces fundamental principles and application of electron microscope, including TEM, SEM and STEM. After learning this course, students should be familiar with operating principles of TEM and other electron microscope technology. All these can be applied to the related fields of scientific research.

实验课（Laboratory）

PHY104 基础物理实验 （1.5）

实验课，1.5 学分，3 学时/每周。学习掌握基本物理量的测量、基本实验仪器的使用、基本实验技能、基本物理实验方法及不确定度分析与数据处理方法等，是学生系统接受科学实验

思想和科学实验方法基本训练的开端。

PHY104 Physics Laboratory I (1.5)

Laboratory, 1.5 credits, 3 hours per week. This course is a beginning of systemic and basic training of scientific thoughts and scientific experiments methods. After finishing this course, students should master the knowledge including the measurement of basic physical quantities, the use of basic experimental instruments, the basic experiment skills, basic physics experiment methods and the uncertainty analysis and data processing methods.

PHYS001 基础物理开放实验 （1）

实验课，1 学分，2 学时/每周。基础物理开放实验课程是对基础物理实验课程内容的拓展，为学生提供自主学习、自主探究和创新的平台，采用开放性教学模式。由学生自主选时间，自主选实验题目，以学生自主学习为主，完成实验。培养学生的自主学习能力。

PHYS001 Open Physics Laboratory I (1)

Laboratory, 1 credits, 2 hours per week. This course is an expansion of basic physics experiment course. It adopts the open teaching mode, and provides students with independent learning, independent exploration and innovation platform.Students can select the experiment via the physics experiment elective system on internet. The aim of the course is to satisfy the innovative desire of students and to train the initiative learning ability of students.

PHY201-15 综合物理实验 （2）

实验课，2 学分，4 学时/每周。综合物理实验课程涉及力学、热学、电磁学、光学、近代物理学等各个知识领域,每个实验涉及多个知识领域或多种实验方法和实验技术的综合应用。本课程突出物理实验的设计思想和实验方法。物理实验的设计思想与实验方法是物理学历史

的发展中凝练的精华,既反映了各个学科科学思想与方法的共性,也是与各学科相互作用推动科技发展的基础，是培养创新型人才的基础。本课程的教学模式以综合性、设计性、探究性为主。本课程的目的是开拓学生的思路，系统培养学生的科学思想和实验方法，培养学生综合应用知识的科学思维能力和实践能力。

PHY201-15 Physics Laboratory II (2)

Laboratory, 2 credits, 4 hours per week. Physics Laboratory II includes experiments of mechanics, thermal physics, optics and advanced physics. Every experiment involves multi-disciplinary methods and technology. This course focuses on the designing idea and technique of the physics experiments, which develops innovative talent of students. The aim of this course is to broaden the thinking mind of students, to train the students of scientific thoughts and methods systematically and to improve the practical ability of multiple utilization of knowledge.

PHY221 综合物理开放实验 （1）

实验课，1 学分，2 学时/每周。综合物理开放实验课程是对综合物理实验课程的拓展，开放实验教学中，实验在教学内容和实验教学时间上对学生开放，由学生自主选时间、自主选实验题目、自主设计实验方案，以学生自主学习为主，完成实验。该课程目标是进一步满足学生的创新欲望，培养学生的自主学习能力、探究精神与创新能力。

PHY221 Open Physics Laboratory II (1)

Laboratory, 1 credits, 2 hours per week. Open Physics Laboratory II is the supplement of the course Physics Laboratory II. In the teaching process, experiments are open to the students in contents and schedule. Students can select the experiment via the physics experiment elective system on internet. The aim of the course is to satisfy the innovative desire of students, to train the initiative learning, exploring spirit and creative ability of students.

PHY202 现代物理技术实验 （2）

实验课，2 学分，4 学时/每周。现代物理技术实验涉及现代物理实验技术的综合性、设计性实验，并逐步增加研究性实验内容。本层次物理实验涉及广泛的应用技术领域，包含光谱技术、磁共振技术、光信息处理技术、真空镀膜技术等等。本课程将学习现代物理技术实验的基本科学思想，科学方法，现代技术及其应用，使学生站在课堂眺望前沿，进一步激发学生的兴趣，培养学生实践能力、创新思维、创新能力。

PHY202 Physics Laboratory III (2)

Laboratory, 2 credits, 4 hours per week. This course involves comprehensive and designing experiments of modern physics experiment technology, and gradually increases the research-oriented experiment content. This level of physics experiments involves a wide range of applications，including techniques of spectra, nuclear magnetic resonance(NMR), information optics and so on.

PHY301 研究型物理实验 （3）

实验课，3 学分，6 学时/每周。研究型实验课程涉及领域为现代物理技术与现代物理综合实验，包括原子分子光谱实验、脉冲核磁共振与核磁共振成像实验、光信息处理综合实验、光纤干涉与通讯综合实验、光的力学效应系列实验、扫描隧道显微实验、原子力显微实验、材料制备与性能测试实验等,涵盖着广阔的现代科技与研究领域。上课模式以开放型、科研小实践课题研究型为主。本课程是教学与科研相结合的课程，其目的是使教学与科研接轨，使学生了解科研的全过程、学习科研思想、科研方法、科研精神，进一步激发学生的学习兴趣、提高他们的自主学习能力、探究精神和创新能力，特别是提高他们理论与实际相结合的应用能力和实践能力。

PHY301 Physics Laboratory IV (3)

Laboratory, 3 credits, 6 hours per week. Physics Laboratory IV includes experiments of the atom and molecule spectroscopy, pulse nuclear magnetic resonance (pNMR) and magnetic resonance imaging (MRI), interference and communication of optical fiber, optical tweezer, scanning tunneling microcopy (STM), atomic force microscopy (AFM), etc. The teaching schedule includes the process of open experiment elective via internet (8 labs of 10 weeks) and the research project of 5 weeks. This course is a combination of teaching and research, aiming to let students know the research process and learn the research thoughts, methods and spirit to stimulate the physics interests. It specially improves the application and practical ability of physics theory.

公共基础课部（含艺术中心）

GEH207 道家对中国与西方思想的影响

本课程介绍了道家哲学对中国与西方思想的影响。道家思想针对诸如人与自然，自由，死亡之类等等问题。而这些问题往往被以孔孟思想为主流的儒家所忽视。这正是了解道家思想的重要性的所在。道家具有很多不同的分类，从治国理论到保护健康和得到长寿的原则。除此之外，本课程也将讨论最近几十年里新发现的文献，这些文献大大丰富了我们对早期道家的知识。在西方，道家学说也越来越受人们的欢迎：它强调的人与大自然之间的和谐关系被许多人视为对现代社会的各种弊病的补救。

GEH207 Daoism in China and the West

This course is designed to introduce students to the main systems of thought within the Daoist tradition as well as the influence Daoism exerted on the modes of thinking in China and, after its introduction in the 18th century, in the West. The significance of understanding Daoism cannot be overstated as it addresses questions that are often neglected by the mainly socially oriented teachings of Confucius, such us the relation between man and nature, freedom, death and others. The variety of Daoist traditions is astounding, ranging from teaching on ideal governance to precepts for improving health and attaining longevity. This course will also discuss newly excavated materials which significantly expand our knowledge of early Daoism. In the West, Daoist teaching has also been receiving increased attention: its emphasis on harmony with nature is seen by many as a remedy for the ills of modern society.

GEH211 中国与西方思想中的美的概念

本课程介绍了西方与中国美学的历史。其主题为艺术的本质和价值，美和品味的概念以及审美判断。本课程从古代中国和古希腊的宗教性的审美观到现代的后现代主义美学大约跨度了两千五百年。参加这门课程将帮助学生形成判断艺术和美学理论的能力，并了解其出现的历史和文化条件。本课程使用的比较方法将使得学生学到中国和西方的美学理论上的主要差异和共性，并了解艺术的促进跨文化的对话的作用。

GEH211 Notions of Beauty in Chinese and Western Thought

This course is an introduction to the history of philosophical aesthetics in China and the West. The

primary topics are the nature and value of art, the concept of beauty, taste and aesthetic judgment as developed in Western and Chinese thought. This course covers a time span of roughly 2500 years beginning with the aesthetic aspects of religious beliefs in China and Ancient Greece and concluding with the latest postmodern theories of art and aesthetics. Participation in this course will help students develop a critical view on the main aesthetic theories and understand the historical and cultural conditions of their emergence. The comparative approach will allow students to recognize main differences and commonalities in aesthetic theories from China and the West and the pivotal role of art in stimulating intercultural understanding.

GEH204 世界最伟大的思想家

本课程旨在向学生介绍最重要的来自中国与西方的思想家。科目所涵盖的时间范围约有两千五百年，从孔子至德里达。课程探讨诸如形而上学、认识论、治国论之类等等重要哲学论题。哲学思维反映了我们对世界的最基本的看法。通过对过去和现代的主要哲学传统的认识学生将接触到最深刻、最有影响的理解现实的方式。本课程使用的比较方法将使得学生了解中国和西方在理解现实的本质和人生的意义上的主要差异和共同点。参加这门课程将帮助学生得到跨文化知识，而这种知识在当今的全球化世界中是必不可少的。

GEH204　The World's Greatest Thinkers

This course is designed to introduce students to the most influential thinkers from the Chinese and Western philosophical traditions. Covering a time span of roughly 2500 years, it focuses on the development of thought in both China and the West and examines main theories in such different areas as metaphysics, ethics, political theory, aesthetics and so on. Philosophical thinking reflects our general view of the world. Knowing the main philosophical traditions of the past and of modernity will introduce students to the ways in which most influential thinkers strived to understand reality. Comparative approach will allow students to get acquainted with the main differences and commonalities between the Chinese and Western approaches to life. This will enable them to develop the intercultural expertise that is necessary in the modern globalized world.

GEJ011 身体美学 Body Aesthetics

学习美学的理论和实践意义，美的历程，美的本质，人类对美的追求和探索，美的最高境界，日常生活与审美主义，福柯的生命美学；当代美学向身体美学的回归，身体既是审美主体也是审美对象；美即身体：身体一元论的美学观；身体美论：身体乃美之最，身体认知与艺术审美，身体美学的实用性；后人类社会中的身体美学：审美的人格化；解放美学和艺术革命：爱欲和人性的解放，审美和新感性，身体美学与真理和自由。

GEJ012 科学方法论 Methodology of Science

批判传统方法论，论述何谓理性和理性方法，何谓归纳法和演绎法、分析法和综合法、模型法和模拟法，何谓经验建构论。介绍非理性方法，直觉、灵感等非逻辑思维，欲望生产说，块状思维模式，“无政府主义”的认识论、“怎么都行的”方法论原则，反对科学沙文主义，与理性告别，多元方法论，身体思维，后现代思维，科学虚构，赛博虚构，思维革命和科技创新，极简主义和经济思维，以及艺术、方法与真理。

GEJ013 人格塑造十五讲

课程主要从生物遗传、社会经验与文化土壤等视角，介绍人格形成的过程与机制，以及健全人格塑造的路径和方法。这门课程将通过个案的剖析，把看似复杂的心理学人格理论化入到完善人格典范与不完善人格特例中，与学生一起进入具有典型意义人物的生活史，理解和掌握人格形成规律和原理，同时通过心理训练活动促进学生深入理解影响人格发展的关键要素，独特的我及依恋是如何形成的，完善的人格修习应该从哪些方面着手。帮助学生自知自觉去自我培养、自我成长以完善人格。

GEJ013 Fifteen Lectures of Personality Shaping

Upon successful completion of this course, students will be able to describe and grasp what is the personality and the principle of its development. They will also understand the unique self and how to use some psychological principle in their self-improvement and health personality shaping.

GEM014 朗诵艺术与演讲技巧

《朗诵艺术与演讲技巧》这一课程主要向学生们将启发学生进行更深入的，有意义的对朗诵演讲的思考。朗诵是口语交际的一种重要形式。朗诵不仅可以提高阅读能力，增强艺术鉴赏，更为重要的是，通过朗诵，大者可以陶冶性情，开阔胸怀，文明言行，增强理解;小者，可以有效地培养对语言词汇细致入微的体味能力，以及确立口语表述最佳形式的自我鉴别能力。而演讲则是以宣传鼓动为目的，带艺术性的严肃的社会实践活动。在这个教学过程中要求学生学习面对听众，以有声语言为主要表达形式，以态势语言为辅助形式，系统、鲜明的阐明自己的观点和主张。真正达到让每一个学生意识到朗诵要达到感情充沛激情慷慨， 节奏分明使听众感到强烈的感染，演讲说辞要达到结构严谨自然和谐 句式错落有致富有变化。在学期末通过举办全体学生的演讲朗诵比赛来评估核定每一位学生对这一课时真正所学。

GEM015 流行音乐赏析

《流行音乐赏析》这一课程能让学生对流行音乐有一个全面且通俗的了解。在课程中，我们会一起探讨“流行音乐为何流行？”“该如何欣赏流行歌曲？”“乐坛巨星是怎么产生的？”等等大学生们深感兴趣的音乐话题。向学生全景展现各种不同风格和类型的流行音乐，以及流行音乐的制作，发行，消费及其意义。讨论围绕流行文化和流行音乐分析展开的问题和争论。包括音乐制作、音乐人和明星、音乐文本、音乐媒体、观众、乐迷和亚文化等。发展和培养学生对流行音乐的感知能力和创作能力。

GEM016 艺术实践课程

艺术实践课程由艺术中心主任毕宝仪教授主持，旨在向全校学生提供专业，一流的艺术实践平台。将从器乐（交响乐，民乐），声乐，舞蹈，戏剧，个人艺术专长等六大方面开展专业的艺术实践教育课程。学生将通过对不同艺术专业课程的学习，参与课堂组织的日常排练，以及舞台表演实践等多方面的艺术课程培训，全面提高自身的综合艺术专业素养，培养其专项艺术才能。使其具备专业艺术表演者的演出水准。在全校发展，普及高质量的美育教育。

GEM017 艺术大讲堂

艺术实践课程由艺术中心主任毕宝仪教授主持开展。旨在向全校学生提供专业，一流的艺术实践平台。将从器乐（交响乐，民乐），声乐，舞蹈，戏剧，个人艺术专长等六大方面开展专业的艺术实践教育课程。学生将通过对不同艺术专业课程的学习，参与课堂组织的日常排练，以及舞台表演实践等多方面的艺术课程培训，全面提高自身的综合艺术专业素养，培养其专项艺术才能。使其具备专业艺术表演者的演出水准。在全校发展，普及高质量的美育教育。选择该课程的同学需在春季开学时参加艺术实践课的入学考试，通过考核后，方可加入该课程的学习。艺术中心艺术团成员可直接免试选此课程。

语言中心

CLE008/009 基础汉语 I II

本课程是为汉语非第一语言学习者设计的基础汉语课程。通过本课程的学习，留学生将掌握

汉语语音、词汇及基本语法，能够完成简单的实用情景会话，具备基本的汉语社会交际能力。

通过本课程的学习:
学生能够独立完成汉语语音、词语的查询、认读与识记；
掌握不少于六百个常用汉语词语及相关语法知识；
可以用汉语完成生活、学习与工作等方面的基本交际任务；
听、说、读、写能力达到相当于汉语水平测试 HSK 三级水平。

CLE008/009 Elementary Chinese I　II

This course provides language training in Mandarin Chinese to second/foreign language learners. The course introduces basic structures and sentence patterns of Chinese language, and fosters students' abilities in listening, speaking, reading and writing in conversations about daily life, study and work. By the end of the course, students should be able to use about 600 Chinese words and develop an equivalent language ability of level-3 of Chinese Proficiency Test (HSK).

GE1215A 学术英语 (大一)

理论课，4 学分，每周 4 学时。本课程将采用英语分级教学。A1 学生将使用 Quest 1 系列教材（听说教材、读写教材）的 2 章内容，A2 的学生将使用 Quest 2 系列教材中的 2-3 章。内容包括 STEM（科学、技术、工程、数学）方面词汇以及与大学相关的术语和词汇，旨在帮助学生理解英语科技文献、熟悉英语国家教学环境。第二学期，科技相关内容会有所增加。本课程也包括记笔记、剽窃意识等学习策略，注重培养大一新生对学术诚信的理解。同时，学生要能够用英语做报告和进行 300 字的论文写作。课程将采用整体教学，包括学术与非学术语境下的听、说、读、写四项基本技能的训练。

GE1215A English for Academic Purposes (Year 1)

Lecture, 4 credits, 4 hours per week. The course will adopt level-based English teaching. For A1 students, about two chapters of each Quest 1 book, listening and speaking, reading and writing will be used while for A2 students, 2-3 chapters of each Quest 2 book will be taken. It will introduce STEM (Science, Technology, Engineering, Mathematics)-specific vocabulary, university-related terms and vocabulary to students to help them comprehend STEM materials in

English and navigate the English-language university environment. The amount of STEM-related content will increase in Semester II. In addition, general study strategies, such as note-taking and plagiarism awareness will be included to develop a comprehensive understanding of academic honesty among the freshmen. It will also require the students to conduct several public presentations and 300 word essay writing. The class will be holistic, covering reading, writing, listening, and speaking in both academic and non-academic settings.

GE1215A **学术英语** （大二）

理论课，3 学分，3 学时/平均每周。先修课程：无。这门专为大二学生所设计的英语课程综合了四项基本语言技能 （听、说、读、写），其主要目标是帮助学生掌握学术英语技能，从而使我们的学生能够顺利完成以英语为媒介的大学学习。

本门课程将主要介绍以下内容：

- 如何在学术以及非学术环境下整体性地使用英语。
- 如何在课堂上听取重要信息并有效地做记录。
- 如何做学术及非学术演讲。
- 如何阅读、组织、并写作学术文章。

GE1215A English for Academic Purposes (Year 2)

Lecture，3 credits, 3 hours on average per week. Pre-requesites：N/A. This course, designed for second year English students, integrates the four skills (reading, listening, speaking, and writing) with a primary goal of building academic English skills. It aims to help students acquire academic English skills in order to better enable them to pursue their studies at university. Students will practice all four skills interchangeably or simultaneously wherever appropriate.

This course is designed to teach students:

- How to utilize English holistically (listening, speaking, reading, and writing) in both academic and non-academic settings.
- How to listen for information from other classes which can be applied to their English courses, and how to attend to and properly engage speakers. Additionally, students will learn how to listen for specific information and record what they hear.
- How to give proper non-academic and academic presentations.
- How to read, organize, and write academic papers.

人文中心

HUM001 人文名家专题系列讲座

理论课，2 学分。本专题系列课程，将在一学期内邀请国内人文学界（含文、史、哲，传媒，文化史，人类学，科学史，学术史等）的知名学者 8 至 10 人，前来南科大，面向全体同学，就上述学科领域的知识视野，学术意义，中外进展和前沿热点做专题讲座，目的在于让同学了解国内外人文学的前沿知识进展和研究水准，扩展同学的知识视野，领受国内一流人文学者的学术风采，并由此感受精彩的人文通识知识影响，为今后各门人文课程的深入学习开启兴趣之门，营造氛围和打下最初的知识基础。

HUM002 中国现在哲学

理论课，2 学分。中国现代哲学课程涉及中国传统文化思想与西方文化思想的比较、传统文化与现代文化的转换及中国文化现代化的进程、现代思维方式对传统思维方式的冲击、现代学术研究方法论要素等跨学科的内容。通过本课程的学习可以使学生对上述传统及现代文化的进程有深度的掌握和理解的。本课程教学方式是以教师讲述为主，并辅以课堂的讨论。

HUM003 艺术设计：从理论到实践

理论课，2 学分。艺术设计是通识教育中最富于魅力的课程，但其意义和教学方法也属于最模糊，最难界定的一种。一些人文通识教育课将教授的内容看作学生知识体系中“丰富”“增加”的那一部分。本课的设计与此有所不同，它将艺术-设计所牵涉到的思考模式看作一个受教育者的思考能力的核心组成部分。本课程将为大学本科阶段的学生提供一定的艺术-设计基础常识，但是教师更强调的不是死记硬背，而是理解这一领域的复杂性，综合性，现实性，以及它与学生一般思考能力养成的密切关系，培养学生将来以相应的工具手段介入日常生活的能

力。课程设计为一半的教师讲授加上一半的学生实作，加上数目待定的课外讲座（任课教师或邀请校外专家），实作形式包括课堂内教师给定形式和要求的命题创作、手工小作业，以及给定条件和问题的学期作业。最后将进行集体讲评，根据实际上课人数多少决定具体指导和讲评的形式。

HUM004 中国文学名家系列讲座

理论课，2 学分。“中国文学名家专题课程“”由前北大中文系系主任，现我校讲座教授，人文中心主任陈跃红教授主持，将邀请著名作家曹文轩、麦家、阿来、徐则成等和国内著名文学学者陈引驰、韩敬群等前来展开专题讲座和研讨。就文学创作和研究的现状、热点加以重点介绍，请作家谈创作体会，请学者讲文本分析以及理论进展，目的在于让同学了解当前文学创作的前沿进展和研究水准，扩展同学的知识视野，领受国内一流作家和文学研究者的学术风采，并为今后各门文学性课程的深入学习开启兴趣之门。

HUM005 科幻电影鉴赏与批判

理论课，2 学分。“科幻电影鉴赏与批评”课程，由科幻作家，北京师范大学教授，科幻创意研究中心主任、科幻博士生导师、科幻电影专业委员会首席专家、世界华人科幻协会会长吴岩教授主讲。教学目的在于通过对《星球大战》、《2001 太空漫游》等多部中外科幻电影作品的鉴赏分析，有选择地将科幻小说和相关电影的鉴赏和批评方法传达给学生。通过鉴赏增加审美能力，获取科技时代文化享受的基本技巧。通过批评，了解这种独特艺术跟社会和的关系。

HUM006 理论与实践：新媒介与青年亚文化研究

理论课，2 学分。“理论与实例：新媒介与青年亚文化研究”课程由苏州大学凤凰传媒学院教授，博士导师，新媒介与青年文化研究中心主任，《中国广告》学

术顾问马中红教授主讲。课程拟通过新媒介基础理论、青年亚文化理论核心关键词、媒介文化研究方法的讲授，并结合文化实例的介绍、评析，培养学生新媒介基础知识、青年亚文化知识、媒介文化知识的“三知”，和会敏锐发现现象，会甄别和梳理现象，会使用相应的理论和方法评析现象的“三会”能力。并进而理性认知属于这一代人的青年亚文化实践。

HUM007 艺术设计的绘画表达

理论课，2 学分。“艺术设计的绘图表达”由哈佛大学设计学博士，原中国人民大学教授，著名策展人，艺术批评家和建筑设计师，现我校人文中心唐克扬教授主讲并带领同学实践作业。本课程与常规的艺术绘画课程有所不同，不再着眼于“绘画”而是“绘图”，旨在训练学生初步掌握以图形方法表达三维设计的能力，并结合图绘方法和现实项目的关系，理解绘图的复杂性、系统性和现实性，在提高艺术修养和审美能力的同时，为修习这些相关学科打下良好的基础。

HUM008 艺术造型初步

理论课，2 学分。“造型艺术初步”由哈佛大学设计学博士，原中国人民大学教授，著名策展人，艺术批评家和建筑设计师，现我校人文中心唐克扬教授主讲并带领同学实践作业。本课程旨在培养非艺术专业的学生具备最基本的造型素养和造型能力，在提高艺术修养和审美能力的同时，使得学生可以初步理解生活和专业中的各种“类型”和“形式”。本课程与一些造型学科如建筑学和工业设计有着密切的关系，对于一些空间相关的设计也有着独特的启发意义。

社科中心

SS001.市场机制、政府治理、创新与发展（2）

理论课，2 学分，2 学时/每周。本课程系统性讲授有关市场机制和公共管理的基本知识，其中涉及到企业、非营利组织和公立组织的治理模式，以及市场治理和行政治理对社会经济发展（包括企业创新和科技发展）的影响等内容

SS001. Market Mechanism, Public Governance, Innovation, and Development (2)

Lecture，2credits, 2 hours per week.

This course teaches the basic knowledge of market mechanism and public management in a systematical manner, which includes the governance modes of firms, nonprofit organizations and public organizations, as well as the impacts of market and bureaucratic governance upon socioeconomic development, in particular upon enterprise innovation and scientific and technological development.

SS002.世界考古大发现（2）

理论课，2 学分，3 学时/每周。本课程是针对文、理、工各专业本科生开设的通识教育课程。本课程介绍和讨论世界范围内的一系列考古重大发现，包括非洲奥杜威峡谷人类起源的探索、法国南部冰川时代岩画洞穴（艺术和认知的起源）、土耳其东部哥贝克力石阵（宗教起源）、英国威尔特新时期巨石阵、伊拉克南部乌尔王陵（最早的城市）、古埃及法老图坦卡门墓、中美洲玛雅文明科潘城、北美最早古印第安城市卡基亚、中国的世界奇迹秦始皇兵马俑、意大利庞贝罗马古城、以及南美洲印加帝国的马丘比丘。通过了解这些不同时期和地区的重大考古发现和研究，本课程旨在认识灿烂多元、丰富的古代文物质文化和人类文明发展历史，更好地理解考古发现和研究在当今社会中所扮演的重要角色，以古鑑今，展望未来。本课程以讲座为主，配合与考古发现和研究相关的纪录片。

SS002. Great Archaeological Discoveries (2)

Lecture，2credits, 3 hours per week.

This course explores a selection of the world’s momentous discoveries in archaeology that have shaped our knowledge of the ancient world, discussing breath-taking finds and the remarkable stories behind the discoveries. The discoveries discussed and examined come from a wide array of different contexts, in terms of places, times and culture (both prehistoric and historic), ranging from ice age cave paintings to Olduvai Gorge, from the volcanic mummified ruins of Pompeii to the great tomb of King Tut, from the terracotta army of the First Emperor in China to Machu Picchu, lost city of the Incas. By learning major archaeological discoveries, students are expected to learn and understand the ways in which archaeology transforms ancient ruins and discarded rubbish into representations of the everyday lives of our ancestors; and to increase their appreciation of the importance of archaeological discoveries in shaping and transforming our understanding of the human past, and the relevance of archaeological knowledge to the contemporary world. The course is primarily in form of lectures, supplemented with selected documentaries, primarily those authoritative and accessible ones produced by PBS NOVA and BBC Horizon programs.

SS003.食品与文化（2）

理论课，2 学分，2 学时/每周。食物与人类的生活紧密相关，有关饮食的问题，不仅涉及生物学，也和多样的人类文化、生态、政治和经济联系在了一起。本课程将从饮食人类学的视角，对饮食和文化之间的关系予以讲述。

饮食人类学是一门从人类学的文化视角研究饮食文化和饮食行为相关问题的分支学科，其关涉的问题十分多元，包括饮食与相应人群的社会关系的表达、饮食象征与社会身份、饮食文化与族群认同建构、饮食所反映的人群认知和心智、饮食与身体认知和社会性别，以及食物的生产和消费与文化之间的关系等。

SS003. Food and Culture (2)

Lecture，2credits, 2 hours per week.

Food is closely related to human life. The problem of diet, is not only involved in biology, but also connected to the diversity of human culture, ecology, politics and economy. This course will describe the relationship between diet and culture from the perspective of diet anthropology.

Diet anthropology is a branch of the study of food culture and behavior related issues from the perspective of anthropology. The related problems are very diverse, including diet and the corresponding social relations, diet symbol and the social identity, diet culture and ethnic recognition construction, the people's cognition and mental, diet and body awareness and gender, and the relationship between food production, consumption and culture etc.

SS004.文化研究(2)

通识课，2 学分，2 学时/周。

本课程目的在于向非文科类本科生介绍文化研究的基本理论、方法，使学生理解这一跨学科多元研究范式对理解人类社会多样性的重要意义。课程将梳理文化研究的理论脉络，检视当下研究热点，注意强调学科发展与社会背景之间的关系（例如女性主义、后现代主义）。力图使学生能够将所学内容应用于对自身生活的反思，以便具备文化敏感性的基本素质。

SS004. Cultural Studies (2)

Lecture，2credits, 2 hours per week.

This course aims to introduce students to the inquiries of Cultural Studies. The objective is: to define Cultural Studies as a multiple discipline and to examine the specific methodologies it employs in the study of human being. To study the history of Cultural Studies as a field, we will attempt to investigate its intellectual genealogy such as feminist and postmodernism; and to explore its relationship to social background. We will encourage students turn to practical applications of these theories and methodologies, with purpose of gaining basic cultural sensitivity.

SS005.西方社会与政治理论（2）.

理论课，2 学分，2 学时/每周。本课程从西方社会形态的演变与特性出发，讲述西方思想家对其社会演变的理论阐释，尤其是城邦、政体、自由、法治、共和、民主、宪政等关键概念的来龙去脉，并在此基础上开启学生中西文明比较的视野。

SS005. Western Social and Political Theory (2)

Lecture，2 credits, 2hours per week. This course starts from the evolution and particularity of western society, and then introduces the western social and political theory, especially the concepts of polis, freedom, the rule of law, republic, democracy and constitutionalism. It will open the mind of student and understand the comparison between Chinese and Western civilization.