

课程详述

COURSE SPECIFICATION

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

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

1.	课程名称 Course Title	工程数学 Engineering Mathematics
2.	授课院系 Originating Department	电子与电气工程系 Department of Electronic and Electrical Engineering
3.	课程编号 Course Code	EE207
4.	课程学分 Credit Value	4
5.	课程类别 Course Type	专业基础课 Major Foundational Courses
6.	授课学期 Semester	秋季 Fall
7.	授课语言 Teaching Language	中英双语 English & Chinese
8.	授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	<div style="display: flex; justify-content: space-between;">  <div style="text-align: right;"> <p>Southern University of Science and Technology</p> </div> </div> <p>何志海, 讲席教授, 电子系 工学院南楼 430 hezh@sustech.edu.cn HE Zhihai, Chair Professor, Department of Electronic and Electrical Engineering Room 430 Engineering Building South 0755-88018510</p> <p>游昌盛, 助理教授, 电子系 工学院南楼 708 youcs@sustech.edu.cn You Changsheng, Assistant Professor, Department of Electronic and Electrical Engineering Room 708 Engineering Building South 0755-88015873</p>
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	待公布 To be announced

10. Maximum Enrolment (Optional)	选课人数限额(可不填)				
11. Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	64	0	0	0	64
12. Pre-requisites or Other Academic Requirements	先修课程、其它学习要求 高等数学(下)A; 大学物理B(下); 线性代数A Calculus II A General Physics B (II) Linear Algebra A				
13. Courses for which this course is a pre-requisite	后续课程、其它学习规划 本课程为电子专业基础课, 是部分专业核心课的先修课程。 This course is a Major Foundation Course of EEE courses, to prepare for the mathematics expected in more advanced physical courses.				
14. Cross-listing Dept.	其它要求修读本课程的学系 无 NA				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程教授学生如何使用数学工具和技术来解决物理问题; 使学生学到相关基础知识, 并引导学生从纯数学的学习转到将数学应用于实际工程问题。

As the Major Foundation of EEE courses, this course aims to introduce how to use mathematics as a tool & technique to deal with engineering problems. From the course, students should transform from learning pure mathematics to using mathematics solve actual engineering problems.



16. 预达学习成果 Learning Outcomes

掌握复变函数、数学物理方程和特殊函数的基本概念和理论。能用留数定理计算积分、提高抽象思维能力和符号运算能力、以及能把物理问题写成数学方程和边界条件等。

Master functions of a complex variable, ordinary and partial differentials closely related to physical problems and special functions. Master using the residue theorem to calculate definite integrals; improve abilities in abstract thinking and symbolic analysis.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

<p>1). 复函数和双曲函数（8学时） 第1周：复数运算、极坐标表示、de Moivre's 定理 第2周：复函数（对数、幂级数），复数简单的应用、微分和积分，双曲函数</p> <p>2). 复变量函数的微积分（16学时） 第3周：复变函数、复变函数微分、Cauchy–Riemann 关系 第4周：复数项幂级数，多值函数，函数的奇点、零点 第5周：复变函数的环路积分，Cauchy 定理、Cauchy 积分公式 第6周：Taylor级数和Laurent级数、留数定理、用留数定理计算定积分</p> <p>3). 偏微分方程：通解和特解（12学时） 第7周：重要的偏微分方程、通解、通解和特解 第8周：波动方程、扩散方程； 第9周：解的特征；期中考试</p> <p>4). 偏微分方程：分离变量法（8学时） 第10周：分离变量法、解的叠加 第11周：极坐标系下的分离变量法</p> <p>5). 常微分方程的级数解（8学时） 第12周：二阶线性常微分方程 第13周：常点的级数解、奇点的级数解</p> <p>6) 特殊函数（12学时） 第14周：Legendre 函数, 连带 Legendre 函数 第15周：球谐函数 第16周：Bessel 函数</p> <p>1). Complex numbers and hyperbolic functions Week 1: Manipulation of complex numbers, Polar representation of complex numbers, de Moivre's theorem Week 2: Complex logarithms and complex powers, Applications to differentiation and integration, Hyperbolic functions 2). Complex variables Week 3: Functions of a complex variable, The Cauchy–Riemann relations Week4: Power series in a complex variable, Multivalued functions and branch cuts, Singularities and zeros of complex functions, Week 5: Complex integrals, Cauchy's theorem, Cauchy's integral formula Week 6: Taylor and Laurent series, Residue theorem, Definite integrals using contour integration 3). Partial differential equations: general and particular solutions Week 7: Important partial differential equations, General form of solution, General and particular solutions Week 8: The wave equation, The diffusion equation, Characteristics and the existence of solutions Week 9: Midterm examination 4). Partial differential equations: separation of variables Week 10: Separation of variables: the general method, Superposition of separated solutions Week 11: Separation of variables in polar coordinates 5). Series solutions of ordinary differential equations Week 12: Second-order linear ordinary differential equations Week 13: Series solutions about an ordinary point, Series solutions about a regular singular point 6) Special functions Week 14: Legendre functions, Associated Legendre functions Week 15: Spherical harmonics Week 16: Bessel functions</p>

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

教材:
Mathematical Methods in the Physical Sciences, by Mary L. Boas. The third Edition; Wiley

其他参考资料:

- Mathematical Methods for Physics and Engineering; Third Edition; K.F. RILEY, M.P. HOBSON and S. J. BENICE; Cambridge university press
- Essential Mathematical Methods for Physicists; Hans J. Weber and George B. Arfken; Academic Press

Teaching materials:

- Mathematical Methods in the Physical Sciences, by Mary L. Boas. The third Edition; Wiley

Other references:

- Mathematical Methods for Physics and Engineering; Third Edition; K.F. RILEY, M.P. HOBSON and S. J. BENICE; Cambridge university press
- Essential Mathematical Methods for Physicists; Hans J. Weber and George B. Arfken; Academic Press

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz		15		
课程项目 Projects				
平时作业 Assignments		15		
期中考试 Mid-Term Test		30		
期末考试 Final Exam		40		
期末报告 Final Presentation				
其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

十三级等级制 Letter Grading

课程审批 REVIEW AND APPROVAL

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

电子与电气工程系

