

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	工程电磁场理论 Engineering Electromagnetics
2.	授课院系 Originating Department	电子与电气工程系 Electrical and Electronic Engineering
3.	课程编号 Course Code	EE208
4.	课程学分 Credit Value	3
5.	课程类别 Course Type	专业基础课 Major Foundational Courses
6.	授课学期 Semester	春季 Spring
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)	蹇林旎, 副教授, 电子与电气工程系, jian.ln@sustech.edu.cn 嘉有为, 助理教授, 电子与电气工程系, jiayw@sustech.edu.cn Linni Jian, Associate Professor, Dept. of Electrical and Electronic Engineering, E-mail: jian.ln@sustech.edu.cn Youwei Jia, Assistant Professor, Dept. of Electrical and Electronic Engineering, E-mail: jiayw@sustech.edu.cn
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	已确定的实验员/助教联系方式 Please list all Tutor/TA(s) 牛岩松 (电子与电子工程系) 助教 11749179@mail.sustc.edu.cn 喻航 (电子与电子工程系) 助教 yuhang1123@foxmail.com Yansong Niu (Dept. of Electrical and Electronic Engineering), TA, 11749179@mail.sustc.edu.cn Hang Yu (Dept. of Electrical and Electronic Engineering), TA, yuhang1123@foxmail.com
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
学时数 Credit Hours	32		32		64
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	MA101B 高等数学(上) A MA103A 线性代数 I-A EE104 电路基础 MA101B Calculus I A MA103A Linear Algebra I A EE104 Fundamentals of Electric Circuits				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	本课程为通信工程、光电信息科学与工程、微电子科学与工程专业的基础课，是多门涉及电磁能量转换与传播、电磁电路与器件等课程的先修课程。通信方向的主要后续课程包括天线与电波传播和微波工程。 This course should be taken by everyone contemplating doing Communication Engineering, Optical information science and Engineering and Microelectronic science and Engineering in the following years. Moreover, this course is a prerequisite for most courses on electromagnetic energy conversion and transmission, electromagnetic circuits and devices, and so forth. The subsequent courses in communication include antenna and wave propagation, microwave engineering, etc.				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无 None				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

介绍静电场、静磁场、交变电场与电磁波的基本概念、原理及分析方法。系统讲解麦克斯韦电磁场方程的物理本质及具体应用。

To introduce the basic concepts, principles and analysis methods related to static electric field, steady magnetic field, time-varying fields, and electromagnetic waves. Also to build up comprehensive understanding on the physical essence of Maxwell electromagnetic equations and their detailed applications.

16. 预达学习成果 Learning Outcomes

通过这门课程的学习，学生能够

1. 掌握主要的矢量分析方法，并应用于工程电磁场问题分析求解
2. 掌握静电场的基本概念，包括：库伦定律、高斯定律、散度定理等
3. 掌握稳恒电流场的基本概念，包括导体和电介质的材料属性及边界条件
4. 掌握高斯拉普拉斯方程、泊松方程的矢量分析方法
5. 掌握恒定磁场的基本概念，以及毕奥-沙伐尔定律、安培环路定律、洛伦兹力定律等基本物理规律。
6. 利用麦克斯韦方程组求解电磁场基本问题

1. Understand the methods of vector analysis and essential principles for solving engineering electromagnetics problems
2. Understand the basic concepts of static electric field including Coulomb's law, Gauss' law, divergence theorem, etc.
3. Understand the basic concepts of static current field including the conductor properties and boundary conditions for dielectric materials
4. Understand the vector analysis methods of Laplace's Equation and Poisson's Equation.
5. Understand the basic concepts of static magnetic field and relevant physical laws including Biot-Shaval's law, Ampere's law and Lorentz's law.
6. Solve the fundamental problems on electromagnetics based on Maxwell's equations.

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.)

1. 矢量分析：介绍空间、场和坐标系的基本概念、以及矢量运算法则；2学时；
2. 静电场：从库伦定律入手，介绍电场强度、电通密度、标量电位等基本概念；推导高斯定律、静电场能量等基本规律；引入基于散度、梯度的矢量分析方法；8学时；
3. 稳恒电流场：介绍电流、电流密度、电容等基本概念；介绍导体和电介质的材料属性及边界条件；介绍基于拉普拉斯方程、泊松方程的矢量分析方法；8学时；
4. 恒定磁场：介绍磁场强度、磁感应强度、标量磁位、矢量磁位、电感等基本概念；介绍毕奥-沙伐尔定律、安培环路定律、洛伦兹力定律等基本物理规律；介绍磁性材料属性及边界条件；介绍基于旋度的矢量分析方法；8学时；
5. 麦克斯韦方程组：引入时变电磁场的基本概念；系统介绍麦克斯韦方程组；2学时；

1. Vector analysis: introduce the basic concepts of space, field, coordinate systems and principles of vector operation. (2 periods)
2. Static electric field: introduce Coulomb's Law; the concepts of electric field intensity, electric flux density, potential; Gauss' Law; energy in static electric field; vector analysis methods on divergence and gradient (8 periods)
3. Static current field: introduce the basic concepts of current, current density, capacitance, etc.; the conductor properties and boundary conditions for dielectric materials; vector analysis methods based on Laplace's equation and Poisson's equation (8 periods)
4. Steady magnetic field: introduce the basic concepts of magnetic field intensity, magnetic induction, scalar magnetic potential, vector magnetic potential, inductance; introduce the basic physical laws such as Biot-Shavall's law, Ampere's law, Lorentz's law; introduce the nature of magnetic materials and boundary conditions; introduce the vector analysis method based on curl (8 periods)
5. Maxwell's equations: introduce the basic concepts of time-varying electromagnetic field; systematically introduce Maxwell's equations (2 periods)

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

William H. Hayt, Jr., John A. Buck, Engineering Electromagnetics, 清华版双语教学用书(第7版), 清华大学出版社, 2008

海特 (Hayt, W.H.), [美] 巴克 (Buck, J.A.) 著 赵彦珍, 李程, 孙晓华 译 马西奎 校, 工程电磁场(第8版), 西安交通大学出版社, 2011

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				
课程项目 Projects		15		
平时作业 Assignments		15		
期中考试 Mid-Term Test				
期末考试		70		

Final Exam
期末报告
Final Presentation
 其它（可根据需要
 改写以上评估方
 式）
**Others (The
 above may be
 modified as
 necessary)**

20. 记分方式 **GRADING SYSTEM**

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

课程审批 REVIEW AND APPROVAL

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

