

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	功率半导体器件与应用实验 Power Semiconductor Devices and Application Laboratory
2.	授课院系 Originating Department	Department of Electrical & Electronic Engineering 电子与电气工程系
3.	课程编号 Course Code	EE349
4.	课程学分 Credit Value	1
5.	课程类别 Course Type	专业选修课 Major Elective Courses
6.	授课学期 Semester	春季及秋季 Spring and Fall
7.	授课语言 Teaching Language	中文 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)	
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	刘欢, 教学实验员, 电子与电气工程系, liuh3@sustech.edu.cn Huan Liu, Teaching Technician, Department of Electrical & Electronic Engineering, liuh3@sustech.edu.cn
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	48 (24 人/班, 共 2 班)

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours			32		32
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	EE347 功率半导体器件与应用 EE347 Power Semiconductor Devices and Application				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	无				
14. 其它要求修读本课程的学系 Cross-listing Dept.	无				

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

修读本实验课程需已修读或同时修读“功率半导体器件与应用（EE340）”。

本课程通过完成 1 个 AC-DC 电源实验项目，学习 PADS 等 EDA 工具及电子实验设备的使用，熟悉半导体器件、驱动及保护电路、交流-直流(AC-DC)变换电路等应用，各类工程文件及安规与环保要求。使学生获得功率器件应用的基础知识和实验技能，具有能够继续深入学习和接受电子技术创新发展的能力，为学生以后开展功率半导体器件领域的研究、设计与应用开发做好铺垫。

Take this Course should take or have been finished the “Power Semiconductor Devices and Application (EE340)”.

This course through an AC-DC power supply application project, learning the use of EDA tools such as PADS and electronic experimental equipment. Familiar with semiconductor power devices, driver IC, protection circuits, and the AC-DC conversion circuit applications. Making the engineering documents and learning about the Environmental Regulations and Safety requirement.

16. 预达学习成果 Learning Outcomes

1. Familiar with Schematic design and PCB Layout with EDA tools, such as PADS;
2. Know about the driver, snubber and protection circuits;
3. Have the ability of designing, adjusting, and analysis the power semiconductor convertors;
4. Familiar with the design process of power supply application;
5. Master the use of equipment such as Oscilloscope、Universal meter、Iron etc.

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. AC-DC 电路原理及拓扑分析(2 学时): 通过对 AC-DC 电路原理及拓扑结构的分析, 讲解功率器件的功能及应用, 并介绍如电感线圈等重要元器件的工作原理及应用

AC-DC Circuit Analysis (2 hours): Analysis of the AC-DC circuit and topology structure, introduce function and application about the power device and other key components.
2. 半导体功率器件及其它关键器件选型(2 学时): 半导体功率器件及其它关键元器件的主要参数讲解、选型规则及注意事项等

Power devices and other key components selection (2 hours): Introduce the Main parameters of power devices and other key components, and the selection rules about the AC-DC power application.
3. 原理图设计 (4 学时): 使用电路原理图和 PCB 设计工具软件 PADS 进行原理图设计的方法及注意事项、完成一个 AC-DC 电路的原理图设计

Schematic Design (2 hours): Use EDA tools to finish the AC-DC circuit schematic design
4. PCB 板、功率器件及其他元件的封装设计规则讲解 (2 学时): 讲解 PCB 板工艺及元器件封装知识及设计规则, 使用 PADS 软件建立元件库

Component Package and PCB board (2 hours): Introduce the Component Package and PCB board, and building package library
5. PCB 版图设计 (4 学时): 讲解 PCB 版图设计方法及注意事项, 使用 PADS 软件进行 PCB Layout 设计的方法, 完成一个 AC-DC 电路的 PCB Layout 设计

PCB Layout (4 hours): Use EDA tools to finish the AC-DC circuit PCB Layout
6. 工程文件制作 (2 学时): 使用 EDA 工具, 制作 Gerber 文档、BOM 文档、PCB 工艺要求文档等工程文件

Engineering Documents (2 hours): Make the Engineering documents such as Gerber file、BOM、Requirement,etc.
7. AC-DC 电源样机制作 (8 学时): 使用烙铁等工具完成 AC-DC 电源样机制作

Prototype Making (8 hours): Making the AC-DC Power Supply Prototype
8. AC-DC 电源调试 (4 学时): 使用小电压调试法及示波器、万用表、稳压电源等设备, 对 AC-DC 电源样机进行调试

Debug (4 hours): AC-DC Power Supply Prototype debug
9. 环保与安规 (2 学时): 讲解电源类产品安全规范及 Rohs、Reach 等环保要求, 以半导体功率器件为实例, 通过阅读物质成分表及 SGS 文件, 完成相关工程文件

Environmental Regulations and Safety (2 hours): Introduce the ROHS、REACH and the Safety about power supply. Use the MSDS and SGS file to finish the Engineering documents

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

唐颖.PADS 原理图与 PCB 设计[M].北京：电子工业出版社,2015.ISBN 978-7-121-26926-4

Sanjaya Maniktala,王健强.精通开关电源设计[M].北京：人民邮电出版社,2015.ISBN 978-7-115-36795-2

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		10		
课堂表现 Class Performance		40		
小测验 Quiz				
课程项目 Projects		0		
平时作业 Assignments				
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		50		
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