

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	半导体信息显示技术 Semiconductor Information Display Technologies				
2.	授课院系 Originating Department	电子与电气工程系 Department of Electrical and Electronic Engineering				
3.	课程编号 Course Code	EE435				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Course				
6.	授课学期 Semester	秋季 Fall				
7.	授课语言 Teaching Language	中英双语 English & Chinese (教材、作业、考试、课件英语为主, 辅以中文解释) (Textbooks, Homework, Examinations and Lecture Notes: English. Detailed Explanations: 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)	陈树明 电子与电气工程系, 0755-88018522, chensm@sustech.edu.cn CHEN Shuming Department of Electrical and Electronic Engineering 0755-88018522 chensm@sustech.edu.cn				
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.	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	48	0	0	0	48

Credit Hours

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12.	先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	EE203 固态电子 EE203 Solid State Electronics EE204 半导体器件导论, EE204 Introduction to Semiconductor Devices
13.	后续课程、其它学习规划 Courses for which this course is a pre-requisite	无 NA
14.	其它要求修读本课程的学系 Cross-listing Dept.	无 NA

教学大纲及教学日历 SYLLABUS

15. **教学目标 Course Objectives**

讲授先进显示技术及当前研究前沿，介绍以下 4 大模块的知识：

1. 显示技术基础，讲授显示技术发展历史，人眼视觉，显示光学，光度学和色度学等；
2. 显示前面板技术，讲授现代主流显示技术，包括液晶显示、有机电致发光显示、量子点显示等；
3. 显示后面板技术，讲授主动显示驱动技术，包括非晶硅、低温多晶硅、金属氧化物、有机晶体管及驱动等；
4. 新兴显示技术，讲授显示前沿技术，包括 micro-LED，激光显示，柔性显示，透明显示等。

To introduce advanced display technologies. The main objective is to gain knowledge of four main modules of display:

1. Display fundamental including display development history, human visual perception, display optics, photometry and colorimetry;
2. Display frontplane technologies including liquid-crystal display (LCD), organic light-emitting display (OLED) and quantum-dot display;
3. Display backplane technologies including amorphous silicon, low temperature poly-crystalline silicon, metal oxide and organic thin-film transistors and active-matrix driving technologies;
4. Emerging display technologies including micro-LED, laser, flexible and transparent display.

16. **预达学习成果 Learning Outcomes**

通过这门课程的学习，学生能够：

1. 掌握人眼视觉特性、光度学和色度学等显示光学的基础知识；
2. 运用所学知识，分析、设计、改善平板显示的性能如分辨率、效率、亮度、对比度、色域等；
3. 掌握主流显示技术（液晶显示和有机电致发光显示）的工作原理、构造及制造技术；
4. 掌握基于薄膜晶体管的主动显示驱动技术；
5. 在平板显示领域从事相关研发工作如面板设计、面板制造等。

After completing this course, the students will be able to:

1. Understand the display optics including human eyes perception, photometry and colorimetry;
2. Understand the working principles, architectures and manufacturing technologies of modern

display including liquid crystal display and organic light-emitting display;

3. Understand thin-film transistor active-matrix driving technologies;
4. Have an ability to analyse/design/improve the performance of the display such as resolution, efficacy, brightness, contrast, color gamut and etc.
5. Have an ability to read relevant literature, write scientific essay and conduct further researches in the area of display technologies.

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.)

模块 1：显示技术基础

第 1 周：1. 课程介绍；2. 显示技术概论

第 2 周：显示和人眼视觉

第 3 周：显示光学、光度学与色度学

模块 2：显示前面板技术

第 4 周：液晶显示（1）：液晶显示原理、偏振光学

第 5 周：液晶显示（2）：光学部件

第 6 周：液晶显示（3）：制造技术

第 7 周：有机电致发光显示（1）：简介

第 8 周：有机电致发光显示（2）：器件物理

第 9 周：有机电致发光显示（3）：器件结构

第 10 周：有机电致发光显示（4）：制造技术

第 11 周：量子点显示（1）：光致发光

第 12 周：量子点显示（1）：电致发光

模块 3：显示后面板技术

第 13 周：主动显示驱动技术（1）：非晶硅、低温多晶硅晶体管及驱动

第 14 周：主动显示驱动技术（2）：金属氧化物、有机晶体管及驱动

模块 4：新兴显示技术

第 15 周：micro-LED 显示、激光显示、全息显示

第 16 周：柔性显示、透明显示、课程总结

Module 1: Display Fundamental

Week 1: 1. Course Introduction; 2. Display Technologies Introduction

Week 2: Display and Human Eyes Perception

Week 3: Display Optics, Photometry and Colorimetry

Module 2: Display Frontplane Technologies

Week 4: Liquid Crystal Display (LCD) (1): Display Principle and Polarization Optics

Week 5: Liquid Crystal Display (LCD) (2): Optical Components

Week 6: Liquid Crystal Display (LCD) (3): Manufacturing

Week 7: Organic Light-Emitting Display (OLED) (1): Introduction

Week 8: Organic Light-Emitting Display (OLED) (2): Device Physics

Week 9: Organic Light-Emitting Display (OLED) (3): Device Structures

Week 10: Organic Light-Emitting Display (OLED) (4): Manufacturing

Week 11: Quantum-Dot Display (1): Photoluminescence

Week 12: Quantum-Dot Display (2): Electroluminescence

Module 3: Display Backplane Technologies

Week 13: Active-Matrix (AM) Driving (1): A-Si, LTPS-TFT Technologies

Week 14: Active-Matrix (AM) Driving (2): Metal-Oxide, Organic-TFT Technologies

Module 4: Emerging Display Technologies

Week 15: Micro-LED, Laser and Holographic Display

Week 16: Flexible, Transparent Display; Course Summary

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

1. 平板显示技术导论（吴诗聪等著，Wiley 出版，ISBN: 9787121196935）
2. 平板显示技术基础（王丽娟等编，北京大学出版社，ISBN: 9787301221112）
1. Introduction to Flat Panel Displays (by S.-T. Wu et al, Wiley, ISBN: 9787121196935)
2. Flat Panel Displays Fundamental (by Lijian Wang et al, ISBN: 9787301221112)

课程评估 ASSESSMENT

19. 评估形式 评估时间 占考试总成绩百分比 违纪处罚 备注

Type of Assessment	Time	% of final score	Penalty	Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz	随机抽查 Random	10		5次小测验或出勤抽查, 每次 2% Each quiz/attendance takes up 2% score
课程项目 Projects	第 16 周 Week 16	20		Term-project report
平时作业 Assignments	第 3、6、10 周 Week 3, 6, 10	15		3次作业, 3* 5%=15% Each homework takes up 5% score
期中考试 Mid-Term Test	第 8 周 Week 8	15		
期末考试 Final Exam	第 18 周 Week 18	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

- 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