

课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	SME5029 射频与微波系统设计
2.	课程性质 Compulsory/Elective	专业选修课 / Elective
3.	开课单位 Offering Dept.	深港微电子学院 / School of Microelectronics
4.	课程学分/学时 Course Credit/Hours	4/80
5.	授课语言 Teaching Language	英文 / English
6.	授课教师 Instructor(s)	刘晓光 / Xiaoguang Liu
7.	开课学期 Semester	秋季学期 / Fall Semester
8.	是否面向本科生开放 Open to undergraduates or not	是 / Yes
9.	先修要求 Pre-requisites	<p>(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <p>工程电磁场 / Engineering Electromagnetics</p> <p>如 EE208 工程电磁场理论、SME205 电磁场与电磁波, 或其他学校的类似课程</p> <p>e.g. EE208 Engineering Electromagnetics, SME205 Electromagnetic Field and Electromagnetic Wave, or equivalent courses.</p>
10.	教学目标 Course Objectives	<p>(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)</p> <p>该课程 为对高频电子电路和系统感兴趣的入门级研究生和高年级本科生开设。本课程教授现代射频和微波系统的设计方法。课程中介绍的概念在一个课程实验设计项目中得以充分体现。该项目聚焦于频率调制连续波 (FMCW) 雷达系统的设计和实施。该系统可以执行距离、多普勒和合成孔径雷达 (SAR) 测量。在课程的前半部分, 学生们使用现成的组件构建 FMCW 雷达系统。在课程的后半部分, 学生们通过自己的设计来改进系统, 可将系统用于特定应用, 例如限速执法或远程生命体征检测。</p> <p>该课程为学生提供了与射频和无线系统相关的实践项目的机会, 涵盖微电子和电子工程的多个方面, 包括系统设计、天线设计、模拟电路设计、嵌入式系统和数字信号处理。本课程的主要目的是让学生更好地理解工程原理和掌握实际工程设计技巧。</p> <p>对于本科生来说, 以下内容不做要求</p> <ul style="list-style-type: none"> • 相控阵天线 • 射频收发机的高级架构

The course is designed for entry-level grad students and senior undergraduate students interested in high-frequency electronic circuits and systems. The course teaches on the design considerations of modern RF and microwave systems. The concepts introduced in the course are exemplified in a hands-on project that focuses on the design and implementation of a frequency modulated continuous wave (FMCW) radar system that can perform range, Doppler, and Synthetic Aperture Radar (SAR) measurements. In the first half of the course, the students build an FMCW radar system using off-the-shelf components. In the second half, the students focus on either improving the system by implementing their own design or utilizing the system for a specific application, such as speed detection.

The course provides an opportunity for the students to work on hands-on projects related to RF and wireless systems. The projects encompass multiple aspects of electrical engineering, including system design, antenna design, analog circuit design, embedded systems, and digital signal processing. The primary aim of the course is to prepare the students with a better understanding of engineering principles as well as practical engineering skills.

The following contents are not required for undergraduate students:

- Phased array antennas
- Advanced transceiver architectures

11. 教学方法
Teaching Methods

(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)

本课程采用理论与实践相结合的方式。教学内容包括 48 课时的理论授课和 32 学时的实验项目。理论课中主要讲授射频与微波系统的设计方法。实验课中学生通过设计并实现一个微波雷达系统对践行理论课中学习到的概念。

12. 教学内容
Course Contents

(如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)

Section 1	课程简介 / Course Introduction
Section 2	射频与微波系统发展史 / A Brief History on RF and Microwave Technologies
Section 3	射频与微波系统中的基本概念 / Fundamental Concepts of RF and Microwave systems
Section 4	射频与微波放大器 / RF and Microwave Amplifiers
Section 5	射频与微波振荡器与频率综合器 / RF and Microwave Oscillators and Frequency Synthesizers
Section 6	射频与微波混频器 / RF and Microwave Frequency Mixers
Section 7	天线 / Antennas
Section 8	无线通信系统 / Wireless Communication Systems
Section 9	雷达系统 / Radar Systems
Section 10	射频收发机架构 / Transceiver Architectures

13. 课程考核
Course Assessment

(①考核形式 Form of examination; ②.分数构成 grading policy; ③如面向本科生开放, 请注明区分内容。 If the course is open to undergraduates, please indicate the difference.)

本课程不设置考试。

分数构成:

作业: 30%

实验报告: 30%

项目竞赛成绩: 40%

本科生和研究生在作业难度上做出区分。研究生需要做更多的题目和更难题目。

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

无