微电子科学与工程专业本科培养计划

Undergraduate Program for Specialty in Microelectronic Science and Engineering

一、培养目标

Ⅰ. Program Objectives

本专业培养掌握微电子科学与工程专业必需的基础知识、基本理论和基本实验技能，能够从事该领域的各种微电子材料、器件、封装、测试、集成电路设计与系统的科研、教学、科技开发、工程技术、生产管理等工作的高级专门人才。

This program trains advanced talents with basic knowledge, theory and experimental skills necessary for Microelectronic Science and Engineering. These talents can be engaged in various works in microelectronic materials, devices, packaging, testing, integrated circuit design and system as well as the scientific research, education, technique development, engineering technology, production management.

二、基本规格要求

Ⅱ. Learning Outcomes

毕业生应获得以下几个方面的知识和能力：

1、具有扎实的自然科学基础，良好的人文社会科学基础和外语能力；

2、掌握本专业领域较宽的基础理论知识，主要包括固体物理、半导体物理、微电子材料、微电子器件、集成电路设计等方面的基础理论知识；在本专业领域内具备从事科学研究的能力；

3、受到良好的工程实践训练，掌握各种微电子器件与集成电路的分析、设计与制造方法，具有独立进行微电子材料及器件性能分析、集成电路设计、微电子工艺流程的基本能力；具备一定的工程开发和组织管理能力；

4、了解本专业的最新发展动态和发展前景，了解微电子产业的发展状况。

The program requires that the learners have the knowledge and abilities listed as follows:

1. Have solid foundation in natural science, basic fine knowledge in humanities and social sciences and good foreign language skills;

2. Master wide branch of fundamental theoretical knowledge of this specialty, which mainly include the solid state physics, semiconductor physics, microelectronic materials, microelectronic devices, integrated circuit design and so on. Master the ability to conduct scientific research in the field of this specialty ;

3. Have good trainings in engineering practice, master the analysis, design and fabrication methods of different kinds of microelectronic devices and integrated circuits, have the fundamental ability to independently deal with the performance analysis of microelectronic materials and devices, integrated circuit design and microelectronics processing. Master the ability of engineering development and organization management ;

4. Have the knowledge of the latest developments and prospects in this specialty, have the knowledge of the current situation of microelectronic industry.

三、培养特色

Ⅲ. Program Highlights

本专业以微纳电子材料和工艺为基础，以微纳电子器件和集成电路制造为核心，以集成电路设计及其系统应用为方向；坚持理工结合，重视基础理论，强调实践技能，培养“基础-to-应用”与“器件-to-系统”相结合的综合思考及横向思维的能力，培养具有良好科学素养、微纳电子材料-器件-电路-版图-工艺-系统的综合设计与研究能力和组织管理能力的工程技术与科研人才。

Based on micro-/nano- electronics materials and processing, taking micro-/nano- electronic devices and integrated circuits fabrication as the core, oriented in integrated circuit design and its system application, this program insists on the combination of science and engineering, values the theoretical foundation and emphasizes the practical skills. By training the ability of comprehensive and lateral thinking with the combination of “basis-to-application” and “devices-to-system”, this program aims at cultivating scientific and engineering talents with good scientific quality, capability in integrated design of micro-/nano- electronics material-devices-circuits-layout-processing-systems, as well as the ability of research and organization management.

四、主干学科

Ⅳ. Main Discipline

电子科学与技术

Electronic Science and Technology

五、学制与学位

Ⅴ. Program Length and Degree

学制：四年

Duration: 4 years

授予学位：工学学士

Degrees Conferred: Bachelor of Engineering

六、学时与学分

Ⅵ. Credits Hours and Units

完成学业最低课内学分（含课程体系与集中性实践教学环节）要求：162 学分。

Minimum Credits of Curricular(Comprising course system and intensified internship practical training)：162 credits.

其中，专业基础课程、专业核心课程学分不允许用其他课程学分进行学分冲抵和替代。

Major-related basic courses and core courses cannot be covered using credits from other courses in the program

完成学业最低课外学分要求：3 学分。

Minimum Extracurricular Credits：3 credits.

1. 课程体系学时与学分

Course Credits Hours and Units

课程类别		课程性质	学时/学分	占课程体系学分比例（%）
通识教育基础课程		必修	1032/59	39.9
		选修	160/10	6.7
学科（专业）基础课程	学科大类基础课程	必修	528/30	20.3
	学科专业基础课程	必修	368/21.5	14.5
专业课程	专业核心课程	必修	248/15.5	10.5
	专业方向课程	选修	192/12	8.1
合计			2680/148	100

Course Type		Required /Elective	Hrs/Crs	Percentage (%)
General Education Core Curriculum		Required	1032/59	39.9
		Elective	160/10	6.7
Discipline-related Courses	General	Required	528/30	20.3
	Basic Subdisciplinary	Required	368/21.5	14.5
Major-specific Courses	Core	Required	248/15.5	10.5
	Elective	Elective	192/12	8.1
Total			2680/148	100

2. 集中性实践教学环节周数与学分

Practicum Credits

实践教学环节名称	课程性质	周数/学分	占实践教学环节学分比例（%）
军事训练	必修	2/1	7.1
电工实习	必修	2/1	7.1
认知实验	必修	1/0.5	3.6
生产实习（社会实践）	必修	3/1.5	10.7
课程设计	必修	8/4	28.6
毕业设计（论文）	必修	16/6	42.9
合计		32/14	100

Course Title	Required /Elective	Weeks/Credits	Percentage (%)
Military Training	Required	2/1	7.1
Electrical Engineering Practice	Required	2/1	7.1
Cognition Practice	Required	1/0.5	3.6
Engineering Internship (Social Practice)	Required	3/1.5	10.7
Course Project	Required	8/4	28.6
Undergraduate Thesis	Required	16/6	42.9
Total		32/14	100

3. 课外学分

Extracurricular Credits

序号	名 称	要 求		课外学分
1	社会实践活动	提交社会调查报告，通过答辩者		1
		个人被校团委或团省委评为社会实践活动积极分子者，集体被校团委或团省委评为优秀社会实践队者		2
2	英语及计算机考试	全国大学英语六级考试	获六级证书者	2
		全国计算机等级考试	获二级以上证书者	2
		全国计算机软件资格、水平考试	获程序员证书者	2
			获高级程序员证书者	3
			获系统分析员证书者	4
3	竞赛	校级	获一等奖者	3
			获二等奖者	2
			获三等奖者	1
		省级	获一等奖者	4
			获二等奖者	3
			获三等奖者	2
		全国	获一等奖者	6
			获二等奖者	4
			获三等奖者	3
4	论文	在全国性刊物发表论文	每篇论文	2-3
5	科研	视参与科研项目时间与科研能力	每项	1-3
6	实验	视创新情况	每项	1-3

注：参加校体育运动会获第一名、第二名者与校级一等奖等同，获第三名至第五名者与校级二等奖等同，获第六至第八名者与校级三等奖等同。

No.	Activities	Requirements		Extracurricular Credits
1	Community Engagement	Submitting a report and passing the oral defense		1
		Individuals awarded "Active Participant" / Teams awarded "Excellent Performance" by HUST or Hubei Youth League Committee		2
2	Qualifications	CET-6	Win certificate of Band-6 or higher	2
		National Computer Rank Examination	Certificate (Grade 1 / 2)	2
		Qualifications for Computer and Software Technology Proficiency	Programmer	2
			Senior Programmer	3
			System Analyst	4
3	Competitions	University Level	First Prize	3
			Second Prize	2
			Third Prize	1
		Provincial Level	First Prize	4
			Second Prize	3
			Third Prize	2
		National Level	First Prize	6
			Second Prize	4
			Third Prize	3
4	Academic Papers	Published in national-level journals	Each paper	2-3
5	Research Programs	Contribution and research capability	Each program	1-3
6	Experiments	Innovation capacity	Each experiment	1-3

Note: In HUST Sports Meeting, the first and the second prize, the third to the fifth prize, and the sixth prize to the eighth prize are deemed respectively the first prize, the second prize and the third prize of university level.

七、主要课程

Ⅶ. Main Courses

量子力学 Quantum Mechanics、固体物理 Solid State Physics、半导体物理 Semiconductor Physics、微电子材料 Microelectronic Materials、半导体器件物理 Physics of Semiconductor Devies、纳电子器件 Nanoelectronic Devices、微电子工艺学 Microelectronic Process、CMOS 模拟集成电路 CMOS Analog Integrated Circuit、数字集成电路基础 Fundamentals of Digital IC、微电子封装与测试 Microelectronic Packaging and Testing、微电子器件可靠性技术基础 Fundamental of Microelectronic Devices Reliability Technology.

八、主要实践教学环节（含专业实验）

Ⅷ. Practicum Module (experiments included)

新生专业认知实践 Professional Cognition Practice for Freshmen、电工实习 Electrical Engineering Practice、软件课程设计 Course Project for Software Design、集成电路课程设计 Course Project for ICs、微电子工艺课程设计 Course Project for Fabrication Process of Microelectronic Devices、微电子器件建模课程设计 Course Project for Modeling of Microelectronic Devices、微电子专业实验 Experiments of Microelectronics Specialty、专业实习 Professional Social Practice、毕业设计 Undergraduate Thesis.

九、教学进程计划表

Ⅸ. Course Schedule

院（系）：光学与电子信息学院　　专业：微电子科学与工程

School (Department): School of Optical and Electronic Information　　Specialty: Microelectronic Science and Engineering

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including			设置学期 semester
						课外 extra-cur.	实验 exp.	上机 operation	
通识教育基础课程 General Education Core Curriculum	必修 Required	0301902	思想道德修养与法律基础 Morals & Ethics & Fundamentals of Law	40	2.5	8			1
	必修 Required	0100721	中国近现代史纲要 Survey of Modern Chinese History	32	2	8			2
	必修 Required	0100733	思政课社会实践 Social Practice of Ideological and Political Theories Course	24	1.5	20			2
	必修 Required	0100932	马克思主义原理 Theory of Marxism	40	2.5	8			3
	必修 Required	0100322	毛泽东思想和中国特色社会主义理论体系概论 General Introduction to Mao Zedong Thought and Socialist Theory with Chinese Characteristics	56	3.5	0			4
	必修 Required	0100741	形式与政策 Situation and Policy	32	2	14			1-6
	必修 Required	0510071	中国语文 Chinese	32	2	10			1
	必修 Required	0508453	综合英语（一） Comprehensive English （Ⅰ）	56	3.5				1
	必修 Required	0508463	综合英语（二） Comprehensive English （II）	56	3.5				2
	必修 Required	0400111	大学体育（一） Physical Education (Ⅰ)	32	1				1
	必修 Required	0400121	大学体育（二） Physical Education (Ⅱ)	32	1				2
	必修 Required	0400131	大学体育（三） Physical Education (Ⅲ)	32	1				3
	必修 Required	0400141	大学体育（四） Physical Education (Ⅳ)	32	1				4
	必修 Required	0700011	微积分（一）(上) Calculus (Ⅰ)	88	5.5				1
	必修 Required	0700012	微积分（一）(下) Calculus (Ⅱ)	88	5.5				2
	必修 Required	0700051	线性代数 Linear Algebra	40	2.5				1
	必修 Required	0700063	概率论与数理统计（三） Probability and Mathematics Statistics (Ⅲ)	40	2.5				2
	必修 Required	0700071	复变函数与积分变换 Complex Function and Integral Transform	40	2.5				3

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including			设置学期 semester
						课外 extra-cur.	实验 exp.	上机 operation	
	必修 Required	0700081	数理方程与特殊函数（一） Equations of Mathematical Physics & Special Functions (Ⅰ)	40	2.5				3
	必修 Required	0700048	大学物理（一） Physics (Ⅰ)	64	4				2
	必修 Required	0700049	大学物理（二） Physics (Ⅱ)	64	4				3
	必修 Required	0706891	物理实验（一） Physical Experiments (Ⅰ)	32	1		28		2
	必修 Required	0706901	物理实验（二） Physical Experiments (Ⅱ)	24	1		20		3
	必修 Required	1100011	军事理论 Military Theory	16	1				1
			人文社科类选修课程 Electives in Humanities and Social Science	160	10				1-8
学科大类基础课程 Discipline-related General Courses	必修 Required	0801663	工程制图（一） Engineering Graphics (Ⅰ)	40	2.5				1
	必修 Required	0800441	信息技术导论 Introduction to Information Technology	24	1.5				1
	必修 Required	0800113	电路理论（三） Circuit Theory (Ⅲ)	88	5.5				3
	必修 Required	0803051	电路测试实验 Circuit Measurement Experiment	32	1		32		4
	必修 Required	0810011	C 语言程序设计 Advanced Programming Language C	56	3.5			20	2
	必修 Required	0800773	数字电路与逻辑设计（一） Digital Circuit Logic Design (Ⅰ)	56	3.5				4
	必修 Required	0800124	模拟电子技术（二） Analog Electronics (Ⅱ)	56	3.5				4
	必修 Required	0807632	电子测试与实验技术 Electronic Testing and Experiment Techniques	48	1.5		48		5
	必修 Required	0800155	信号与线性系统 Signal and Linear System	56	3.5		4		3
	必修 Required	0808462	单片机原理及应用 Principle and Application of Single Chip Microcomputer	56	3.5				5
	必修 Required	0804662	微机实验 Microcomputer Experiment	56	3.5				5
	必修 Required	0821752	半导体器件物理 Physics of Semiconductor Devices	56	3.5				5
	必修 Required	0800372	量子力学（二） Quantum Mechanics (Ⅱ)	48	3				4
	必修 Required	0800695	热力学与统计物理 Thermodynamics and Statistical Physics	32	2				4

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including			设置学期 semester
						课外 extra-cur.	实验 exp.	上机 operation	
学科专业基础课程 Basic Subdisciplinary Courses	必修 Required	0700143	固体物理 Solid State Physics	48	3				4
	必修 Required	0704863	半导体物理 Semiconductor Physics	48	3				5
	必修 Required	0800254	电磁场与电磁波 Electromagnetic Fields and Electromagnetic Waves	48	3				6
	必修 Required	0829221	微电子材料 Microelectronic Materials	40	2.5				5
	必修 Required	0829231	微电子学专业实验 Experiments of Microelectronics Specialty	48	1.5		48		5
专业核心课程 Major-specific Core Courses	必修 Required	0829241	纳电子器件 Nanoelectronic Devices	40	2.5				6
	必修 Required	0804801	微电子工艺学 Microelectronic Process	40	2.5				6
	必修 Required	0810834	CMOS 模拟集成电路（I） CMOS Analog Integrated Circuit（I）	40	2.5				6
	必修 Required	0804751	数字集成电路基础 Fundamentals of Digital IC	56	3.5				5
	必修 Required	0829251	微电子封装与测试 Microelectronic Packaging and Testing	40	2.5				6
	必修 Required	0813721	微电子器件可靠性技术基础 Fundamental Reliability Technology of Microelectronic Devices	32	2				6
专业方向课程 Major-specific Electives			专业选修课程 Elective Courses in Specialty	192	12				
	选修 Elective	0829261	微电子技术前沿报告 Frontiers Report in Microelectronic Technology	32	2				6
	选修 Elective	0804842	传感器原理与设计基础 Principle and Design Fundamental of Sensor	32	2				6
	选修 Elective	0821801	信息光电器件 Information Optoelectronic Devices	32	2				6
	选修 Elective	0823981	MEMS 系统与应用 MEMS System and Application	32	2				6
	选修 Elective	0829271	微纳器件分析技术 Micronanoelectronic device analysis technology	32	2				6
	选修 Elective	0829281	半导体微波器件 Semiconductor Microwave Devices	32	2				7
	选修 Elective	0816841	半导体功率器件 Semiconductor Power Devices	32	2				7
	选修 Elective	0810171	生物芯片技术 Biochip Technology	32	2				7

续表

课程类别 course type	课程性质 required/ elective	课程代码 course code	课程名称 course name	学时 hrs	学分 crs	其中 Including			设置学期 semester
						课外 extra-cur.	实验 exp.	上机 operation	
	选修 Elective	0804871	显示技术 Electronic Display Technology	32	2				7
	选修 Elective	0810131	信息存储技术基础 Information Storage Technology	32	2				7
	选修 Elective	0813692	化合物半导体器件 Compound Semiconductor Devices	32	2				7
	选修 Elective	0829181	太阳能电池 Solar Cell Technology	32	2				7
	选修 Elective	0829291	自旋电子学器件 Spintronics	32	2				7
实践环节 practical training items	必修 Required	1300014	军事训练 Military Training	2W	1				1
	必修 Required	1300032	电工实习 Electrical Engineering Practice	2W	1				4
	必修 Required	1300084	生产实习 Engineering Internship	3W	1.5				6
	必修 Required	130010a	专业认知实验 Experiments for specialty cognition	1W	0.5				1
	必修 Required	1300396	软件课程设计 Course Project for Software Design	2W	1				2
	必修 Required	1327961	微电子工艺课程设计 Course Project for Fabrication Process of Microelectronic Devices	2W	1				6
	必修 Required	1327022	集成电路课程设计 Course Project for ICs	2W	1				7
	必修 Required	1328201	微电子器件建模课程设计 Course Project for Modeling of Microelectronic Devices	2W	1				5
	必修 Required	130004i	毕业设计(论文) Undergraduate Thesis	16W	6				8