集成电路设计与集成系统本科培养计划

Undergraduate Program for Specialty in IC Design and Integrated System

一、培养目标

Ⅰ．Program Objectives

以集成电路及电子信息系统设计为目标，培养掌握集成电路基本理论、基本方法及 EDA 工具，能在集成电路及系统集成相关领域从事科研、教学、科技开发、工程技术、生产管理与行政管理等工作的高级专门人才。

Targeted to design integrated circuit and all sorts of electronic information systems, this program aims at training advanced talents who can grasp fundamental integrated circuit theories, methods and EDA tools. These talents can meet the demands of scientific research, education, technique development, engineering technology, production management and administration management for the integrated circuit and system and its related fields.

二、基本规格要求

Ⅱ．Learning Outcomes

要求学生具有良好素质、道德修养和创新能力，具备扎实的数学、物理、外语基础，掌握大规模集成电路及集成系统所必需的基本理论和方法，具有超大规模集成电路分析及设计、版图设计和系统集成等的基本能力。具体而言，毕业生应获得以下几个方面的知识和能力：

1. 具有较扎实的自然科学基本理论基础和宽阔的科学视野；

2. 对全球信息科学和技术的前沿、发展动态及其影响具有足够的理解力和敏感性；

3. 具备较强的分析问题和解决问题的综合应用能力；

4. 具有较强的外语和计算机应用能力；

5. 掌握文献检索、资料查询的方法和撰写科学论文的能力；

6. 具有良好的人文素质、有效的交际能力以及较强的协调、组织能力；

7. 具有较强的创新精神和竞争意识；

8. 具有较强的在未来生活和工作中继续学习的能力。

The program requires that the learners, with good quality, moral cultivation and innovation capability, be equipped with solid mathematics, physics and English, bases fundamental theories and methods essential to VLSI, basic capabilities of VLSI analysis and design, layout design and system integration. Specifically speaking, our graduates are expected to have the knowledge and abilities listed as follows:

1. Have solid fundamental theoretical knowledge in natural science and wide scientific horizon;

2. Have enough apprehension and sensitivity to the new developments and the impacts of the global information science and technology；

3. Have good comprehensive ability to analysis and solve problems；

4. Have good ability to use foreign language and computer；

5. Master the method of literature retrieving and data-inquiring, and the ability to write scientific articles；

6. Be of good quality in humanities, effective ability in social intercourse and good ability in coordinating and organizing；

7. Have strong consciousness of creativity and competition；

8. Have good ability to continuous studying in future life and work.

三、培养特色

Ⅲ．Program Highlights

本专业融合电子工程与计算机科学，形成从信息系统体系结构出发到嵌入式系统以及片上系统硬件实现的“Top-to-Down”的专业人才培养体系。课程设置上，覆盖半导体器件与集成电路设计，以及体系结构与嵌入式系统。提供系列化的综合型和研究型课程设计，以及学科交叉、特色鲜明的任选课程组合。坚持理工结合，重视基础理论，强调宽口径培养，着眼全面提高学生的综合素质。

This specialty converges electronic engineering and computer science , setting up a “Top-to-Down” talent training system from system architecture to hardware implementation respectively via embedded system and system on chip. Two professional directions are divided for course system into semiconductor device and IC design, as well as computer architecture and embedded system. Comprehensive course projects, as well as featured and cross-disciplinary optional

course combination are available in curriculum. Converging science and engineering, strengthening fundamental knowledge, and multi-disciplinary education system, improve the overall performance of the students.

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：158.8 学分。

Minimum Credits of Curricular(Comprising course system and intensified internship practical training)：158.8 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.

完成学业选修课程最低学分要求（不含人文社科类选修课程）：25 学分

Minimum Credits for Elective Courses（Non-Electives in Humanities and Social Science）:

25 credits

包括：在本专业范围内完成专业任选课程累积不低于 15 学分，其它可以在全校工科专业（含本院各专业）范围内选修。

Including: Specialty-oriented courses offered by Specialty, accumulated no less than 15 credits, the other courses can be taken within the scope of elective courses offered by engineering Specialty (including all of Specialty in our school).

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（%）
素质教育通识课程		必修	504/28	17.6
		选修	160/10	6.3
学科基础课程		必修	1048/60.8	38.3
专业课程	专业核心课程	必修	360/21	13.2
	专业选修课程	选修	400/25	15.7
集中性实践教学环节		必修	32W/14	8.8
		选修		
合计			2472+32W/158.8	100

Course Type		Required /Elective	Hrs/Crs	Percentage (%)
Essential-qualities-Oriented Education General Courses		Required	504/28	17.6
		Elective	160/10	6.3
Discipline-related Courses		Required	1048/60.8	38.3
Specialty Courses	Specialty Core Courses	Required	360/21	14.1
	Specialty Elective Courses	Elective	400/25	15.7
Practical Training		Required	32W/14	8.8
		Elective		
合计			2472+32W/158.8	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
专业认知实验	必修	1/0.5	3.7
生产实习	必修	3/1.5	10.7
课程设计	必修	10/5	35.6
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
Experiments for Specialty Cognition	Required	1/0.5	3.7
Engineering Internship	Required	3/1.5	10.7
Course Project	Required	10/5	35.6
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	思政课 社会实践	必修，其中 4 个理论学时安排在第二学期开课		2
2	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
3	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
4	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
5	论文	在全国性刊物发表论文	每篇论文	2-3
6	科研	视参与科研项目时间与科研能力	每项	1-3
7	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	Social Practice of Ideological and Political Theories Course	Required		2
2	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
3	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
4	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
5	Academic Papers	Published in national-level journals	Each paper	2~3
6	Research Programs	Contribution and research capability	Each program	1~3
7	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、专业主干课程

Ⅶ．Main Courses in Specialty

计算机组成原理 Principles of Computer Organization、处理器体系结构 Processor Architecture、信号与线性系统 Signal and Linear System、嵌入式系统原理与设计 Principles and Design of Embedded System、硬件描述语言与数字系统设计 Hardware Description Language and Design of Digital System、微电子工艺学 Microelectronic Process、数字集成电路基础 Fundamentals of Digital Integrated Circuit、CMOS 模拟集成电路 CMOS Analog Integrated Circuit、半导体器件物理 Physics of Semiconductor Devices.

八、主要实践教学环节（含专业实验）

Ⅷ．Practicum Module (experiments included)

专业认知实验 Experiments for Specialty Cognition、工程训练 EngineeringTraining、集成电路设计与集成系统专业实验 Specialized Experiments of IC Design and Integrated System、软件课程设计 Course Project for Software Design、数字集成电路课程设计 Course Project for Digital IC、模拟集成电路课程设计 Course Project for Analog IC、微电子工艺课程设计 Course Project for Microelectronic Fabrication、嵌入式系统课程设计 Course Project for Embedded system、专业实习 Engineering Internship、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：集成电路设计与集成系统

School (Department): School of Optical and Electronic Information　　Specialty: Integrated Circuit Design and Integrated System

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	
素质教育通识课程Essential-qualities-Oriented Education General Courses	必修 Required	0301902	思想道德修养与法律基础 Morals & Ethics & Fundamentals of Law	48	3	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	马克思主义基本原理 Theory of Marxism	48	3	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	64	4	0			4
	必修 Required	0100741	形式与政策 Situation and Policy	32	2	14			5-7
	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	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

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	
学科基础课程 Discipline-related Courses	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				2
	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
	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		24		3
	必修 Required	0706901	物理实验（二） Physical Experiments（Ⅱ）	24	0.8		24		3
	必修 Required		软件技术基础 Fundamental of Software Programming	48	3				1

	必修 Required	0800441	信息技术导论 Introduction to Information Technology	24	1.5				1
	必修 Required	0800115	电路理论（五） Circuit Theory (V)	64	4				2
	必修 Required	0803051	电路测试实验 Circuit Measurement Experiment	32	1		32		4
	必修 Required	0800773	数字电路与逻辑设计（一） Digital Circuit and Logic Design（Ⅰ）	56	3.5				4
	必修 Required	0800124	模拟电子技术（二） Analog Electronics（Ⅱ）	56	3.5				3
	必修 Required	0807632	电子测试与实验技术 Electronic Testing and Experiment Techniques	48	1.5		48		4
	必修 Required	0800155	信号与线性系统 Signal and Linear System	56	3.5			4	3
	必修 Required		单片机原理及应用 Principle and Application of Single Chip Microcomputer	48	3				4
	必修 Required	0804662	微机实验 Microcomputer Expreriments	16	0.5				4
	必修 Required	0844561	量子力学（三） Quantum Mechanics（Ⅲ）	48	3				4
	必修 Required	0800695	热力学与统计物理 Thermodynamics and Statistical Physics	32	2				4
专业核心课程 Specialty Core Courses	必修 Required	0704863	半导体物理 Semiconductor Physics	40	2.5				5
	必修 Required	0821751	半导体器件物理 Physics of Semiconductor Devices	40	2.5				5
	必修 Required	0821271	数字集成电路基础 Fundamentals of Digital Integrated Circuit	56	3.5				5
	必修 Required	0823861	集成电路专业基础实验 Specialized Fundamental Experiments Of IC	48	1.5		48		5
	必修 Required	0810834	CMOS 模拟集成电路（Ⅰ） CMOS Analog Integrated Circuit（Ⅰ）	40	2.5				5
	必修 Required	0801611	计算机组成原理 Principles of Computer Organization	56	3.5				5
	必修 Required	0821342	嵌入式系统原理与设计 Principles and Design of Embedded System	40	2.5				6
	必修 Required	0804801	微电子工艺学 Microelectronic Process	40	2.5				6
课选专程修 Specialty-oriented Cour	选修 Elective	0801663	工程制图（一） Engineering Graphics（Ⅰ）	40	2.5				1

	选 修 Elective	0700143	固体物理 Solid State Physics	48	3				5
	选 修 Elective	0823871	处理器体系结构 Processor Architecture	40	2.5				6
	选 修 Elective		高频集成电路基础 Fundamentals of High frequency IC	40	2.5				6
	选 修 Elective	0810835	CMOS 模拟集成电路（II） CMOS Analog Integrated Circuit(II)	40	2.5				6
	选 修 Elective	0823981	MEMS 系统与应用 MEMS System and Application	32	2				6
	选 修 Elective	0800163	数字信号处理 Digital Signal Processing	32	2				6
	选 修 Elective	0804842	传感器原理与设计基础 Principle and Design Fundamental of Sensors	32	2				6
	选 修 Elective	0813721	微电子器件可靠性技术基础 Fundamental of Microelectronics Device Reliability Technology	32	2				6
	选 修 Elective	0800433	通信原理 Principles of communication	32	2				6
	选 修 Elective	0814261	集成电路工程前沿技术概论 Frontier Introduction to IC Engineering	24	1.5				7
	选 修 Elective	0813681	光电子器件导论 Introduction to Optoelectronic Device	32	2				7
	选 修 Elective	0814241	化合物半导体器件 Compound Semiconductor Devices	32	2				7
	选 修 Elective	0823921	功率集成电路 Power Integrated Circuits	32	2				7
	选 修 Elective	0823961	多媒体原理与技术 Theory and Technology for Multimedia	32	2				7
	选 修 Elective	0823991	集成电路封装与系统测试 Package and System Test for IC	32	2				7
	选修 Elective	0804161	光纤通信技术 Optical Fiber Communication Technology	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	130010a	专业认知实验 Experiments for Specialty Cognition	1W	0.5				1
	选修 Elective		工程训练 Engineering Training	2W	1				4
	必修 Required	1300084	生产实习 Engineering Internship	3W	1.5				6
	必修 Required	1300396	软件课程设计 Course Project for Software Design	2W	1				1
	必修 Required	1300962	数字集成电路课程设计 Course Project for Digital IC Design	2W	1				5

	必修 Required	1300952	模拟集成电路课程设计 Course Project for Analog IC Design	2W	1				6
	必修 Required	1327961	微电子工艺课程设计 Course Project for Microelectronic Fabrication	2W	1				6
	必修 Required	1300932	嵌入式系统课程设计 Course Project for Embedded system	2W	1				7
	必修 Required	130004i	毕业设计(论文) Undergraduate Thesis	16W	6				8