

# 电子科学与技术

## 一、培养目标

培养具有较高的思想道德和文化素质修养、敬业精神和责任感，具有健康的体魄和良好的心理素质，具有电子科学与技术专业扎实的自然科学基础、宽广的专业知识和较强的实验技能，具有良好的外语能力，具有创新精神和工程实践能力以及跟踪掌握该领域新理论、新知识、新技术的能力，能从事电子科学与技术有关方向的研究、设计、制造及新产品、新技术、新工艺的研究与开发等工作的应用型和研究型专门人才。学生毕业后可在电子信息领域和相关交叉领域内从事科学研究、技术开发、生产管理、项目开发与实施等方面的工作，优秀者毕业后五年左右的时间可成为所从事领域或行业的知名学者或领军人才。

## 二、基本规格要求

本专业学生要求掌握以下十项核心能力：

1. 人文、艺术和社会科学素养、较强的社会责任感和良好的职业道德。
2. 具有在电子信息领域从事科学研究、工程开发和设计所需要的数学、物理等自然科学的基础知识以及从事该领域生产管理和项目实施所需要的经济和管理的基础知识的能力。
3. 掌握电子信息类相关的基本理论与技术，具有基本的计算机理论、应用与开发能力；具有系统的与电子信息类专业相关的工程实践学习经历，了解生产工艺、设备与制造系统，了解电子信息类专业的发展现状和趋势。
4. 能够熟练使用常用电子仪器仪表，初步具备设计与实施电子信息领域工程实验的能力，并能够对实验结果进行分析；具有分析、提出方案并解决电子信息领域理论或工程实际问题的基本能力，可参与相关系统的设计、运行与维护。
5. 具有创新意识，掌握基本的创新方法，初步具备电子信息领域中综合类实践、实验独立设计、分析和调试能力以及进行产品开发和设计、技术改造与创新、工程设计和分析等解决实际工程问题的能力；在设计过程中能够综合考虑经济、环境、法律、安全、健康、伦理等制约因素。
6. 掌握文献检索、资料查询及运用现代信息技术获取相关信息的基本方法，具备科技论文写作基本能力。
7. 了解与电子信息类专业相关行业的生产、设计、研究、开发、环境保护和可持续发展等方面的技术标准、方针、政策、法律、法规以及经济管理知识，能正确认识信息技术对于客观世界和社会的影响，具有良好的质量、安全、效益、环境、职业健康和服务意识。
8. 具有一定的组织管理能力、表达能力和人际交往能力以及良好的团队协作精神。
9. 养成良好的学习习惯，对终身学习有正确认识，具有不断学习和适应发展的能力。
10. 掌握一门外语，能阅读本专业外文资料，具有一定的国际视野和跨文化环境下的交流与合作能力。

## 三、培养特色

本专业培养方案体现工程教育与科学研究相结合的人才培养方式，以专用集成电路设计、光电信息检测、微纳传感技术作为专业特色。

1. 在强化半导体器件和半导体集成电路核心课程体系的基础上，突出纳米电子技术和光电子技

术相融合的特色。

2. 专业选修课程和导师课程突出与学科领域最新最前沿的发展成果相结合,以科学研究促进本科教育,培养学生从事科学研究的能力和创新能力。

#### 四、学制、毕业基本要求及学位授予

1. 本科基本学制 4 年,弹性学习年限 3—6 年,按照学分管理制度管理。

2. 电子科学与技术专业学生毕业最低学分数为 165 学分,其中各类别课程及环节要求学分数如下表:

课程类别	通识必修	学门核心	学类核心	专业核心	专业选修	通识选修	集中实践	合计
学分数	27	25	31	20	21	8	33	165

3. 学生修满培养方案规定的必修课、选修课及有关环节,达到规定的最低毕业学分数,并修完规定必修但不记学分的所有课程和环节,德、智、体合格,即可毕业。满足学位授予相关文件要求的,授予工学学位。

#### 五、课程设置及学分布

##### (一) 通识教育课程 [必修 27 + (6) 学分 + 选修 8 学分]

通识教育课程包括必修和选修两部分。通识选修课程按《湖南大学通识选修(文化素质教育)课程方案》实施,通识必修课程如下:

编码	课程名称	学分	备注
GE01101	毛泽东思想和中国特色社会主义理论体系概论	3+ (3)	
GE01039	思想道德修养与法律基础	1.5+ (1.5)	
GE01100	形势与政策	0.5+ (1.5)	
GE01102	中国近现代史纲要	2	
GE01103	马克思主义基本原理(上)	2	
GE01104	马克思主义基本原理(下)	2	
GE01012(-15)	大学英语	8	
GE01088	计算机基本能力测试	0.5	
GE01095	计算机导论与程序设计	2.5	
GE01107(-13)	心理素质与生涯发展	1	
GE01089(-92)	体育	4	

##### (二) 学门核心 (25 学分)

编码	课程名称	学分	备注
GE03025 (26)	高等数学 A	10	校定课程
GE03003	线性代数 A	3	
GE03004	概率论与数理统计 A	3	
GE03041	普通物理学(1)	3	
GE03042	普通物理学(2)	4	
GE03007 (08)	普通物理实验 A	2	
合计		25	

**(三) 学类核心 (31 学分)**

编码	课程名称	学分	备注	
PH04001	电科与物理专业导论课	1		
EI04029	电路	3		
EI04007	电路实验	1		
PH04003	模拟电子技术	3	学院或学科定课程	
PH04004	数字电子技术	3		
PH04005	电子技术实验	2		
PH04002	数学物理方法	3		
PH04006	电动力学	3		
PH04009	量子力学	3		
EI04030	信号与系统	3		
EI04031	高频电子线路	3		
EI04032	微机原理及其应用	3		
合计		31		

**(四) 专业核心 (20 学分)**

编码	课程名称	学分	备注
PH05024	固体物理 B	3	系或教研室定课程
EI05030	半导体物理	3	
EI05031	电子器件基础	3	
EI05032	微电子工艺及其实验	3	
EI05033	现代通信光电子学	3	
EI05034	半导体集成电路	4	
EI05035	电子科学与技术专业高级研讨课	1	
合计		20	

**(五) 专业选修 (21 学分)**

编码	课程名称	学分	备注
EI06004	半导体测试技术	2	专业选修课程 (共计 21 学分, 在本专业内选修 不少于 10 学分, 其他学分可跨专 业选修,其中须 选修至少一门管 理类课程)
EI06003	半导体薄膜技术	2	
EI06006	传感器原理与应用	2	
EI06009	电力电子技术	2	
EI06054	数字信号处理	2	
EI06012	集成电路应用	2	
EI06007	单片机原理与应用	2	
EI06015	数字通信原理	2	
EI06055	嵌入式系统	2	
EI06053	光波导原理与器件	2	
EI06011	光电子器件基础	2	
EI06056	激光原理与技术	2	
EI05017	光纤通信	2	
EI06057	纳米科学与技术基础	2	
EI06058	半导体纳米电子器件	2	
EI06059	纳米材料制备与表征	2	
EI06060	MATLAB 与科学计算	2	
EI06061	CST 电磁仿真	2	
EI06062	电子线路 CAD	2	
小 计		38	

注: 1) 选修课, 其中跨专业选修不超过 50%, 建议选修一门管理类课程。

2) 学生参加学科竞赛、科研项目或发表论文, 经学院学术委员会审定, 可以替代专业选修学分, 但最多不超过 4 学分。

**(六) 集中实践 (27 学分, 不包括通识教育课程中实践环节的 6 学分)**

编码	课程名称	学分	备注
GE09030	中文写作实训 A	1	
GE09001	程序设计训练	2	校定课程
GE09017	金工实习 B	1	
GE09020	电工电子实习	4	
EI10001	电子科学与技术专业综合实验 (1)	1	系或教研室 定课程
EI10002	电子科学与技术专业综合实验 (2)	1	
EI10022	认识实习	1	导师课程
EI10010	生产实习	2	
EI10014	毕业实习	2	
EI10051	毕业设计	12	
合计		27	

**六、课程责任教师一览表**

序号	姓名	职称	学历学位	专业特长	课程
					(专业核心、专业选修、通识选修)
1	曾云	教授	硕士	电子科学与技术	电科与物理专业导论课、电子科学与技术专业高级研讨课
2	范滇元	教授 (院士)	硕士	光电子与激光技术	
3	文双春	教授	博士	物理电子学、微波光子学	现代通信光电子学、光纤通信
4	王太宏	教授	博士	新能源技术、微纳器件与传感	纳米科学技术基础
5	许志	教授	博士	先进半导体工艺	微电子工艺及其实验、数字信号处理
6	张晗	教授	博士	非线性光学与激光技术	激光原理与技术
7	段辉高	教授	博士	微纳加工技术	微电子工艺及其实验、纳米材料制备与表征
8	陈迪平	教授	硕士	电子系统与专用集成电路设计	半导体集成电路、集成电路应用
9	胡锦涛	教授	硕士	电子系统与数字集成电路设计	数字电子技术、电力电子技术
10	曾健平	副教授	硕士	电子器件与专用集成电路	微机原理及其应用、单片机原理与应用
11	杨红官	副教授	博士	纳米电子器件及其集成研究	固体物理、半导体纳米电子器件
12	晏敏	副教授	硕士	电子通信和半导体测试技术	高频电子线路、半导体测试技术
13	王镇道	副教授	博士	数字系统设计、嵌入式系统	信号与系统、嵌入式系统
14	罗海陆	副教授	博士	微波光子学	现代通信光电子学、光电子器件基础
15	邹艳红	副教授	博士	微波光子学	电动力学、CST 电磁仿真
16	赵楚军	副教授	博士	激光技术	电路、数字通信原理
17	鲁兵安	副教授	博士	纳米材料的制备与应用	固体物理、纳米科学技术基础
18	项元江	副教授	博士	光电子	MATLAB 与科学计算
19	朱小莉	助理教授	博士	新型电子器件	电子器件基础、电子线路 CAD
20	胡伟	助理教授	博士	纳米光子学、新能源技术	半导体物理、半导体薄膜技术
21	刘建军	助理教授	博士	光电信息科学	模拟电子技术、光波导原理与器件
22	张明	助理教授	博士	电化学、纳米材料	微机原理及其应用、传感器原理与应用
23	李成超	助理教授	博士	电化学、纳米材料	纳米材料制备与表征

## 七、专业责任教授

序号	姓名	职称	学历学位	专业特长	承担授课课程
1	曾 云	教授	硕士	电子科学与技术	电科与物理专业导论课、电子科学与技术专业高级研讨课
2	文双春	教授	博士	物理电子学，微波光子学	现代通信光电子学、光纤通信

# Electronic Science and Technology

## I . Objectives

This Education Program will enable students to develop high moral and cultural quality, professionalism, social responsibility, good health, excellent psychological quality, to develop electronic science and technology professional foundation knowledge, widely domain expertise and strong experimental skills, to develop good foreign language ability, innovative and engineering practice ability, to track and master the new theories, knowledge and technology, to perform the research, design and manufacture works, to be engaged in new products, new technology, new manufacture works. After graduation, students can be engaged in scientific research, technology development, production management, project development and implementation in the field of electronic information and related cross industry, some extinguish graduates can become the well-known scholars or leading talents in their field five years later.

## II . Basic Specifications

The students required to master the following ten core competences:

1. High quality of humanities, arts and social science, strong social responsibility and good professional ethics.
2. Having the basic essential knowledge of the natural sciences in the electronic information field, such as mathematics, physics, and the knowledge of economic and management ability to be engaged in the production management and project implementation.
3. Having the basic electronic information of related theory and technology knowledge, application and development ability, electronic information engineering related experience of engineering practice, understanding the production manufacture process, equipment and manufacturing system, knowing the development status and trend of electronic and information industry.
4. Being able to use electronic instruments and meters skillfully, having the ability of preliminary design and implementation of electronic information engineering experiment, and experimental results analyzing, the basic ability of analysis, put forward the solutions to electronic information field theory or engineering practical problems, being involved in the system design, operation and maintenance.
5. Having innovation consciousness, grasping the basic methods of innovation, having the initially ability of the electronic information field, experiments with independent design, analysis, products developing, technical reform and innovation, engineering design and analysis to solve practical engineering problems, considering, in the design process, the economic, environmental, legal, safe, healthy and ethical constraints issues, etc.
6. Having the basic methods of literature search, data query and modern information technology, and basic writing ability of science and technology thesis.
7. Understanding the technical standards, guidelines, policies, laws, regulations and economic management knowledge of electronic information engineering related industry, including production, design, research, development, environment protection and sustainable development, can correctly un-

derstanding the electronic information technology influence on the objective world and society, having the good quality, safety, efficiency, environment, occupational health and service consciousness.

8. Having certain ability of organization management, expression, interpersonal and good team co-operation skill.

9. Developing study habits, having a correct understanding on lifelong learning, having the ability to constantly learn and adapt to the development.

10. Mastering a foreign language, having the ability of reading professional foreign language materials, having a certain international vision and cross-cultural environment communication and cooperation ability.

### III. Characteristics

This Education Program shows the combination training mode of engineering education and scientific research, it features the specific integrated circuit design, photoelectric information detection and micro-nano sensing technology .

1. By strengthening the foundation of the semiconductor device and semiconductor integrated circuit core curriculum system, outstanding the integration of nano-electronic technology and optical-electronic technology.

2. Combination of major elective courses and mentor courses to highlight the latest development, using the scientific research to promote the undergraduate education, training the students' ability to engage in scientific research and innovation thinking ability.

### IV. Length of Schooling, Basic Requirements for Graduation and Degree Conferment

1. The length of schooling for undergraduate studies is four years, with a flexible length lasting from 3 to 6 years, based on the regulation of credit system.

2. Students of Electronic Science and Technology majors are expected to complete a minimum of 165 credits upon graduation, and the required credits for different courses are illustrated in the following table.

Course Category	Required General Education Courses	Introductory Major Courses	Major Survey Courses	Required Core Courses	Restricted Electives	General Education Electives	Intensive Practice	Total
Credits	27	25	31	20	21	8	33	165

3. On successful completion of the prescribed courses and intensive practice, students, who are qualified enough to meet all the requirements of this program, will thus be awarded the Bachelor's Degree of Engineering.

### V. Curriculum and Credits

1. General Education Courses [required 27+(6) + elective 8 credits]

The general education courses consist of required courses and elective courses. General education electives are designed according to the *Curriculum Design of General Education Electives of Hunan University*. Required general education courses are illustrated in the following table.

Code	Course Title	Credit(s)	Remarks
GE01101	Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics	3+ (3)	
GE01039	Moral Cultivation and Law Basics	1.5+ (1.5)	
GE01100	Current Situation and Policies	0.5+ (1.5)	
GE01102	Outline of Modern Chinese History	2	
GE01103	Fundamentals of Marxism I	2	
GE01104	Fundamentals of Marxism II	2	
GE01012(-15)	College English	8	
GE01088	Computer Proficiency Test	0.5	
GE01095	Introduction to Computer Science and Programming	2.5	
GE01107(-13)	Psychological Health & Career Planning	1	
GE01089(-92)	Physical Education	4	

## 2. Introductory Major Courses(25 credits,6 courses)

Code	Course Title	Credit(s)	Remarks
GE03025(26)	Advanced Mathematics A	10	
GE03003	Linear Algebra A	3	
GE03004	Theory of Probability and Mathematical Statistics A	3	
GE03041	College Physics I	3	
GE03042	College Physics II	4	
GE03007(08)	Experiments of College Physics A	2	

## 3. Major Survey Courses (31 credits,12 courses)

Code	Course Title	Credit(s)	Remarks
PH04001	Introduction for Electronics and Physics	1	
EI04029	Principles of Electronic Circuit	3	
EI04007	Electronic Circuit Experiments	1	
PH04003	Fundamental of Analog Electronics	3	
PH04004	Fundamental of Digital Electronics	3	
PH04005	Electronic Technology Experiments	2	
PH04002	Equations of Mathematical Physics	3	
PH04006	Classical Electrodynamics	3	
PH04009	Quantum Mechanics	3	
EI04030	Signals and Systems	3	
EI04031	High-Frequency Electronic Circuits	3	
EI04032	Microcomputer Principles and Applications	3	

## 4. Required Core Courses (20 credits,7 courses)



Code	Course Title	Credit(s)	Remarks
EI05024	Solid-State Physics B	3	
EI05030	Semiconductor Physics	3	
EI05031	Fundamental of Electronic Devices	3	
EI05032	Microelectronic Processes and Experiments	3	
EI05033	Modern Communication Optical Electronics	3	
EI05034	Semiconductor Integrated Circuits	4	
EI05035	Advanced Seminar for Electronic Science and Technology	1	

### 5. Professional Electives(21 credits)

Code	Course Title	Credit(s)	Remarks
EI06004	Semiconductor Measurement Technique	2	
EI06003	Semiconductor Film Technique	2	
EI06006	Sensor Principles and Applications	2	
EI06009	Power Electronics Technology	2	
EI06054	Digital Signal Processing	2	
EI06012	Integrated Circuits Applications	2	
EI06007	Principles and Application of Microcomputer	2	
EI06015	Principles of Digital Communication	2	
EI06055	Embedded System	2	
EI06053	Optical Wave-guide Principles and Devices	2	
EI06011	Fundamental of Optoelectronic Devices	2	
EI06056	Laser Principle and Laser Technology	2	
EI05017	Optical Fiber Communication	2	
EI06057	Nanometer Science and Technology	2	
EI06058	Nano-Semiconductor Electronic Devices	2	
EI06059	Nano Materials Preparation and Representation	2	
EI06060	Matlab and Scientific Computation	2	
EI06061	CST Electromagnetic Simulation	2	
EI06062	Electronic Circuits CAD	2	

Note:1)To highly recommend students selecting one management course for the optional courses,which no more than 50% for the cross-functionally requirements.

2)Audited and approved by School Academic Assessment Committee,the students' participate in the discipline competition,scientific research projects or published papers can be deemed as the optional course credits,which no more than 4.

### 6. Intensive Practice (27 credits)

Code	Course Title	Credit(s)	Remarks
GE09030	Chinese Writing Training	1	
GE09001	Program Design Training	2	
GE09017	Metalworking Practice	1	
GE09020	Electrical Engineering Practice	2	
GE09020	Electronic Circuitry Practice	2	
EI10001	Comprehensive Experiments on Electronic Science and Technology Major I	1	
EI10002	Comprehensive Experiments on Electronic Science and Technology Major II	1	

Cont

Code	Course Title	Credit(s)	Remarks
EI10022	Cognition Practice	1	
EI10010	Production Practice	2	
EI10014	Graduation Practice	2	
EI10051	Graduation Design or Thesis	12	

## VI. Course Instructor List

No.	Name	Academic Title	Educational Background	Research Areas	Courses
01	Zeng Yun	Professor	M. S.	Electronic Science and Technology	Introduction for Electronics and Physics, Advanced Seminar for Electronic Science and Technology
02	Fan Dianyuan	Professor (Academician)	M. S.	Optoelectronic and Laser Technique	
03	Wen Shuangchun	Professor	Ph. D	Physical electronics, Microwave Photonics	Modern Communication Optoelectronics, Optical Fiber Communication
04	Wang Taihong	Professor	Ph. D	New Energy Technique, Micro & Nano Devices and Sensors	Fundermental of Nano Science and Technology
05	Xu Zhi	Professor	Ph. D	Advanced Semiconductor Process	Microelectronic Processes and Experiments, Digital Signal Processing
06	Zhang Han	Professor	Ph. D	Nolinear Optical and Laser Technique	Laser Principle and Laser Technology
07	Duan Huigao	Professor	Ph. D	Micro/Nano Fabrication Technologies	Microelectronic Processes and Experiments, Nano Materials Preparation and Representation
08	Chen Diping	Professor	M. S.	Electronic Systems and Application Specific Integrated Circuit Design	Semiconductor Integrated Circuits, Integrated Circuits Applications
09	Hu Jin	Professor	M. S.	Electronic systems and Digital Integrated Circuit Design	Fundamental of Digital Electronics, Power Electronics Technology
10	Zeng Jianping	Associate Professor	M. S.	Electronic Devices and Application Specific Integrated Circuit	Microcomputer Principles and Applications, Principles and Application of Microcomputer
11	Yang Hongguan	Associate Professor	Ph. D	Nano Electronic Devices and Intergration	Solid-State Physics, Nano Semiconductor Electronic Devices
12	Yan Min	Associate Professor	M. S.	Electronic Communication and Semiconductor Measurement Techniques	High-Frequency Electronic Circuits, Semiconductor Measurement Technique
13	Wang Zhengdao	Associate Professor	Ph. D	Digital System Design, Embedded Systems	Signals and Systems, Embedded System

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No.	Name	Academic Title	Educational Background	Research Areas	Courses
14	Luo Hailu	Associate Professor	Ph. D	Microwave photonics	Modern Communication Optical Electronics, Fundamental of Optoelectronic Devices
15	Zhou Yanhong	Associate Professor	Ph. D	Microwave Photonics	Classical Electrodynamics, CST Electromagnetic Simulation
16	Zhao Chujun	Associate Professor	Ph. D	Laser Techniques	Electronic Circuit, Principles of Digital Communication
17	Lu Bingan	Associate Professor	Ph. D	Nanomaterials Fabrication and Applications	Solid-State Physics, Nanometer Science and Technology
18	Xiang Yuanjiang	Associate Professor	Ph. D	Optoelectronics	MATLAB and Scientific Computation
19	Zhu Xiaoli	Assistant Professor	Ph. D	New Type Electronic Devices	Fundamental of Electronic Devices, Electronic Circuit CAD
20	Hu Wei	Assistant Professor	Ph. D	Nano Optoelectronics, New Energy Technology	Semiconductor Physics, Semiconductor Film Technology
21	Liu Jianjun	Assistant Professor	Ph. D	Optoelectronic Information Science	Fundamental of Analog Electronics, Optical Wave guide Principles and Devices
22	Zhang Ming	Assistant Professor	Ph. D	Electrochemistry, Nanomaterials	Microcomputer Principles and Applications, Sensor Principles and Applications
23	Li Chengchao	Assistant Professor	Ph. D	Electrochemistry, Nanomaterials	Nano Materials Preparation and Representation

## VII. Course Scheduler

No.	Name	Academic Title	Educational Background	Research Areas	Courses
01	Zeng Yun	Professor	M. S.	Electronic Science and Technology	Introduction for Electronics and Physics, Advanced Seminar for Electronic Science and Technology
02	Wen Shuangchun	Professor	Ph. D	Physical Electronics, Microwave Photonics	Modern Communication Optoelectronics, Optical Fiber Communication

(翻译:胡伟)