

生医卓越计划实验班本科培养计划

Undergraduate Experimental Program in Biomedical Engineering for Exemplary Engineer Education

一、培养目标

I. Program Objectives

面向医疗器械产业应用，培养德、智、体、美、劳全面发展，具有科学正确的世界观、人生观和价值观，文化自信、遵纪守法、具有良好道德品质和文明行为习惯，敬业爱岗、诚信友善；具有较强的人际沟通、团队协作、组织管理能力；具有高度的社会责任感与良好的人文素养；基础理论扎实、创新创业能力突出、实践动手能力强、综合素质高、具有国际视野能从事生物医学工程领域的研究与应用的卓越人才。

This program aims to foster the high-level talents to get balanced development among moral, intelligent and physical abilities; to have scientific and correct world outlook, outlook on life and values, cultural self-confidence, discipline and law-abiding, good moral quality and civilized behavior habits, dedication, honesty and friendliness, and sense of social responsibility; to obtain strong capabilities of communication, team-work and leadership; to have strong social responsibility and excellent humanistic quality; with solid basic theories, outstanding ability to innovate and starting business for the applications in medical device industry, strong practical skills, good personal qualities and international horizons, who can undertake the research and applications in bio-medical engineering areas.

二、基本规格要求

II. Learning Outcomes

本专业学生应掌握扎实的数理化基础、系统的生物科学与技术专业基础理论、知识和技能，具有良好的科学素质和创新创业能力。

毕业生应获得以下几方面的知识和能力：

1. 具有爱国敬业精神、社会责任感和追求卓越的态度；
2. 具有良好职业道德，在工程实践中理解并遵守职业道德和规范；
3. 具有好的团队意识和协作能力，能在多学科团队合作中承担个体、团队成员或负责人的角色；
4. 具备健全的心理素质和健康的体魄，达到国家规定的大学生体育和军事训练合格标准，养成良好的体育锻炼和健康生活方式；
5. 具备人文社科和经济管理科学的基本知识和综合素质；
6. 具备良好的自主学习和探索实践能力，以及较好的表达交流能力和计算机及信息技术的应用能力；
7. 具有较好的国际视野、外语应用能力以及跨文化交流合作能力；
8. 具有良好的创新意识和创业精神，以及批判性思维和可持续发展理念；
9. 扎实的数理化基础；
10. 生物科学与技术、医学、药学、信息科学等基本理论和基本技能；
11. 文献检索、资料查询、和撰写科学论文的能力。

By the time of graduation, the students of this program are required to possess:

1. Possess the spirit of patriotic dedication, the social responsibility and the attitude of pursuing excellence;
2. Possess the professional ethics, understand and abide the professional ethics and specification in scientific practice;
3. Possess the good team work spirit and coordination ability, and could undertake the roles of individual, team member, or team leader under the background of multidisciplinary;
4. Have a good psychological and physical health, to meet the national standards for college students sports and military training, to establish good physical exercise and healthy lifestyle;
5. Gain basic knowledge and comprehensive quality of humanities, social sciences and economic managements;
6. Have a good ability to self-learn and explore independently, as well as good communication skills and the ability to use computer and information technology;
7. Have a good international perspective, foreign language ability and cross-cultural communication and cooperation ability;
8. Have a good sense of innovation and entrepreneurship, and critical thinking and sustainable development concept;
9. Solid ground in mathematics, physics and chemistry;
10. Fundamental theory and skills in the areas of biological science and technology, medicine, pharmacy, and information science
11. Abilities to search academic literature, query information, and write scientific papers.

三、培养特色

III. Program Highlights

理医、理工交叉渗透，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，培养具有创新能力的复合型人才。

With its prominent feature on cross-penetration of science-medicine and science-engineering and its traits on attaching importance to basic theories and stressing wide-bore training styles, this program focus on comprehensively improving the overall quality of students and aims at bringing up multiple-skilled creative talents.

四、主干学科

IV. Main Disciplines

生物医学工程 Biomedical Engineering

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：161 学分。

Minimum curriculum credits (including courses and practicum) : 161 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：5 学分。

Minimum Extracurricular Credits: 5 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	(%)
素质教育通识课程		必修	636/33	20.7
		选修	160/10	5.2
学科基础课程		必修	1280/73.9	41.6
专业课程	专业核心课程	必修	248/12.6	8.1
	专业选修课程	选修	256/16	8.3
集中性实践教学环节		必修	31w/15.5	16.1
合计			2580+31w/161	100
其中，总实验（实践）			393+31w	29.2

Course Type		Required /Elective	Hrs/Crs	Percentage (%)
Essential-qualities-oriented Education General Courses		Required	636/33	20.7
		Elective	160/10	5.2
Basic Courses in Discipline		Required	1280/73.9	41.6
Courses in Specialty	Common Core Courses	Required	248/12.6	8.1
	Specialty-Oriented Courses	Elective	256/16	8.3
Intensified Internship Practical Training		Required	31w/15.5	16.1
Total			2580+31w/161	100
Practicum Credits			393+31w	29.2

2. 集中性实践教学环节周数与学分

Weeks/Credits of Intensified Internship and Practical Training

实践教学环节名称	课程性质	周数/学分	占实践教学环节学时比例 (%)
军事训练	必修	2/1	6.5
工程训练（二）	必修	3/1.5	9.7
工程训练（五）	必修	1/0.5	3.1
行业产业认知实习	必修	1/0.5	3.2
生产实习	必修	4/2	12.9
学科交叉综合训练	必修	2/1	6.5
专业创新创业训练	必修	2/1	6.5
课程设计	必修	4/2	12.9
毕业设计（论文）	必修	12/6	38.7
合计		31/15.5	100

Course Title	Required /Elective	Weeks/Credits	Percentage (%)
Military Training	Required	2/1	6.5
Engineering Training II	Required	3/1.5	9.7
Engineering Training V	Required	1/0.5	3.1
Industry Cognitive Practice	Required	1/0.5	3.2
Engineering Internship (Social Practice)	Required	4/2	12.9
Interdisciplinary Comprehensive Training	Required	2/1	6.5

continue

Course Title	Required /Elective	Weeks/Credits	Percentage (%)
Specialty Innovation and Entrepreneurship Training	Required	2/1	6.5
Course Project	Required	4/2	12.9
Undergraduate Thesis	Required	12/6	38.7
Total		31/15.5	100

3. 课外学分

Extracurricular Credits

序号	课外活动和	课外活动和社会实践的要求		课外学分
1	社会实践活动 (必选)	思政课社会实践 (必修)		2
		安全教育		0.5
		生涯教育 (必修, 16 学时/1 学分)		1
2	劳动教育 (必修)	(劳动教育) (必修, 32 学时/2 学分)		2
3	英语及计算机考试	全国大学英语六级考试	考试成绩达到学校要求者	2
		托福考试	达 90 分以上者	3
		雅思考试	达 6.5 分以上者	3
		GRE 考试	达 300 分以上者	3
		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	5
			获二等奖者	4
			获三等奖者	3
		国际级	获一等奖者	6
			获二等奖者	5
			获三等奖者	4
5	论文	发表 SCI 论文, 论文级别根据华中科技大学学术期刊分类办法确定	每篇论文	2-6
		发表中文论文及会议论文	每篇论文	1
6	参与教师科研课题	视参与科研项目取得的成果、时间与科研能力	提交有关个人参与情况的课题研究报告 (指导教师签名)	1-3
7	大学生创新科研课题	视创新成果和参与度	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	Activities of Social Practice (Required)	Ideological and political course Social Practice		2
		Safety Education		0.5
		Career Education (required 16 Hours/1 Credits)		1
2	Public service work	(Labor education) (required 32 Hours/2Credits)		2
3	Examinations in English and Computer	CET-6	Students passing Band-6 exam	2
		TOEFL	90 Points or Higher	3

continue

No.	Activities	Requirements		Extracurricular Credits
3	Examinations in English and Computer	IELTS	6.5 Points or Higher	3
		GRE	300 Points or Higher	3
		National Computer Rank Examinations	Winner of certificate of Band-2 or higher	2
		National Computer Software Qualification	Winner of certificate of programmer	2
			Winner of certificate of Advanced Programmer	3
			Winner of certificate of System Analyst	4
4	Competitions	University Level	First prize winner	3
			Second prize winner	2
			Third prize winner	1
		Provincial Level	First prize winner	4
			Second prize winner	3
			Third prize winner	2
		National Level	First prize winner	5
			Second prize winner	4
			Third prize winner	3
		International	First prize winner	6
			Second prize winner	5
			Third prize winner	4
5	Academic papers	SCI papers depending on the classification of academic journals by HUST	Each piece	2-6
		Papers in Chinese and conference papers	Each piece	1
6	Teacher's Research Project	Depending on research outcome, the time spent in and ability demonstrated in scientific research project	Each Project (with report about the personal contribution)	1-3
7	Training Program of Innovation and Entrepreneurship for Undergraduates	Depending on innovative outcome and participation level	Each item	1-3

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

七、主要课程及创新（创业）课程

VII. Main Courses and Innovation (Entrepreneurship) Courses

(一) 主要课程 Main Courses

电路理论 Circuit Theory、模拟电子技术 Analogue Electronics、数字电路与逻辑设计 Digital Circuit and Logic Design 应用光子学基础 Fundamental of Applied Photonics、微机原理与接口技术 Principle of Microcomputer and Interface、生物医学传感检测与仪器 Biomedical Sensing, Testing and Instrumentation、生物医学数字信号处理 Biomedical Digital Signal Processing、医学影像系统原理 Medical Imaging System Principle、医学图像处理 Medical Image Processing、生物材料学 Biomaterials、微机式医学仪器设计 Design of Microcomputer Based Medical Instrumentation Experiment、细胞生

物学 Cellular Biology、生物化学与分子生物学 Biochemistry and Molecular Biology、解剖与生理学 Anatomy and Physiology 等。

(二) 创新(创业)课程 Innovation (Entrepreneurship) Courses

创新意识启迪: 工程导论 Introduction of Engineering、科学思维与研究方法(新生研讨课) Scientific Thoughts and Research Methods、课程设计 Course Project

创新能力培养: 生物医学传感检测与仪器 Biomedical Sensor, testing and Instrumentation、医疗器械设计与制造业界课程 Medical Device Design and Manufacturing Industry Seminar、

创新实践训练: 行业产业认知实习 Industry Perceive Practice、工程训练(二) Engineering Training II、工程训练(五) Engineering Training V、专业创新创业训练 Specialty Innovation and Entrepreneurship Training

八、主要实践教学环节(含专业实验)

VIII. Practicum Module (Experiments Included)

物理实验 Physical Experiment、电路测试基础实验 Experiments in Circuit Measurement、电子测试与实验 Experiments in Electronics、生物医学传感检测与仪器实验 Experiments in Biomedical Sensing, Detection and Instrumentation 生物医学数字信号处理实验 Experiments in Biomedical Digital Signal Processing、解剖与生理学实验 Experiments in Anatomy and Physiology、生物化学与分子生物学实验 Experiments in Biochemistry and Molecular Biology、行业产业认知实习 Industry Perceive Practice、工程训练(二) Engineering Training II、生产实习 Engineering Internship、学科交叉综合训练 Interdisciplinary Comprehensive Training、专业创新创业训练 Specialty Innovation and Entrepreneurship Training、课程设计 Course Project、毕业设计 Undergraduate Thesis。

除基本思政课程外,所有专业课程也均将思想政治教育元素有机融入到课程教学内容中,注重科学思维方法的训练和科学伦理的教育,提高学生正确认识问题、分析问题和解决问题的能力,培养学生探索未知、追求真理、勇攀科学高峰的科学精神和精益求精的大国工匠精神,寓价值观引导于知识传授和能力培养之中,帮助学生塑造正确的世界观、人生观、价值观。

九、企业实习

IX. Enterprise practice

按照卓越工程师培养计划要求,本专业卓越班培养采用“3+1”模式,即入学后前3年在学校完成理论、体育、实验等课程的学习,第四学年在企业和学校进行实习。企业实习是锻炼和培养学生能力,尤其是实际动手能力的重要环节,其中在企业实习的实际时间一般不少于半年。为了更好地完成对于学生能力的培养,学校将在实习企业制定具体的实习方案,明确企业导师,并建立有效的考核机制。企业实习不合格者,不能取得卓越工程师教育培养计划实验班毕业证书。

According to the requirement of Undergraduate Experimental Program for Exemplary Engineer Education, the student in the class will take the “3+1” mode, i.e., the first 3 years in the university have to finish main courses including theoretical courses, physical education as well as the experiment courses while the 4th year will do the practice in the enterprises or research institutions. Enterprise practice is critical for training the ability of student, specially for the problem solving ability. The time in enterprise is usually not less than half year. In order to better perform the training of the ability, the detail training program and evaluation mechanism will be set up in the enterprise, and the supervisor in the enterprise is assigned for each student. The student who is failed in the enterprise practice will not be awarded the certificate of Undergraduate Experimental Program for Exemplary Engineer Education.

十、教学进程计划表

X. Course Schedule

华中科技大学 2023 级本科专业培养计划

院（系）：生命科学与技术学院

专业：生物医学工程（卓越实验班）

School (Department) : School of Life Science & Technology

Major: Biomedical 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
						实验 exp.	上机 operation	
素质教育通识课程 Essential-qualities-oriented Education General Courses	必修 Required	MAX0022	思想道德与法治 Morals & Ethics & Fundamentals of Law	40	2.5			1
	必修 Required	MAX0042	中国近现代史纲要 Survey of Modern Chinese History	40	2.5			2
	必修 Required	MAX0013	马克思主义基本原理 Basic Principles of Marxism	40	2.5			3
	必修 Required	MAX0063	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	48	3			4
	必修 Required	MAX0072	习近平新时代中国特色社会主义思想概论 Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	48	3			3
	必修 Required	MAX0032	形势与政策 Situation and Policy	48	1.5			5-7
	必修 Required	RMWZ0002	军事理论 Military Theory	36	2			1
	必修 Required	CHI0001	中国语文 Chinese	32	2			2
	必修 Required	SFL0002	综合英语（一） Compressive English (I)	32	2			1
	必修 Required	SFL0012	综合英语（二） Compressive English (II)	32	2			2
	必修 Required	SFL0131	综合英语（三） Compressive English (III)	16	1			3
	必修 Required	SFL0141	综合英语（四） Compressive English (IV)	16	1			4
	必修 Required	PHE0002	大学体育（一） Physical Education (I)	60	1.5			1-2
	必修 Required	PHE0012	大学体育（二） Physical Education (II)	60	1.5			3-4
	必修 Required	PHE0022	大学体育（三） Physical Education (III)	24	1			5-6
	必修 Required	QMX0001	工程导论 Introduction of Engineering	16	1			2
	必修 Required	BIO0001	软件技术基础 Software Programming Technology	64	4			1
	必修 Required	QMX0011	科学思维与研究方法（新生研讨课） Scientific Thoughts and Research Methods	16	1			1
			从不同的课程模块中修读若干课程，美育类、大学生心理健康课程均不低于 2 学分，总学分不低于 10 学分 General Education Courses (elective)	160	10			2-8
必修 Required	MAT0001	高等数学（A）（上） Calculus (A)	88	5.5			1	

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
						实验 exp.	上机 operation	
学科基础课程 Basic Courses in Discipline	必修 Required	MAT0011	高等数学 (A) (下) Calculus (A)	88	5.5			2
	必修 Required	MAT0721	线性代数 Linear Algebra	40	2.5			1
	必修 Required	MAT0561	复变函数与积分变换 Complex function and Intergral Transform	40	2.5			3
	必修 Required	MAT0701	数理方程与特殊函数 Equation in Physics and Special Function	40	2.5			4
	必修 Required	MAT0591	概率论与数理统计 Probability and Statistics	40	2.5			2
	必修 Required	PHY0511	大学物理 (一) Physics (I)	64	4			2
	必修 Required	PHY0521	大学物理 (二) Physics (II)	64	4			3
	必修 Required	PHY0551	物理实验 (一) Laboratory for Physics (I)	32	1	32		2
	必修 Required	PHY0561	物理实验 (二) Laboratory for Physics (II)	24	0.8	24		3
	必修 Required	MESE0891	工程制图 (一) Engineering Graphics (I)	40	2.5			1
	必修 Required	BIO0751	生物医学工程前沿 Frontiers in Biomedical Engineering	16	1			1
	必修 Required	BIO0781	细胞生物学 Cell Biology	48	3			4
	必修 Required	BIO0541	基础化学 General Chemistry	48	3			1
	必修 Required	CHE0801	有机化学 Organic Chemistry	64	4			2
	必修 Required	CHE0831	有机化学实验 Laboratory for Organic Chemistry	32	1	32		2
	必修 Required	EEE0691	电路理论 (四) Circuit Theory (IV)	72	4.5			3
	必修 Required	EEE0711	电路测试基础实验 Fundamentals of Circuit Measurement Laboratory	32	1	32		3
	必修 Required	EIC0591	模拟电子技术 (二) Analogue Electronics (II)	56	3.5			3
	必修 Required	EIC0661	信号与线性系统 Signals and Linear Systems	64	4		8	4
	必修 Required	EIC0751	数字电路与逻辑设计 Digital Circuits and Logic Design	56	3.5			4
必修 Required	BIO0691	生物化学与分子生物学 (一) Biochemistry and Molecular Biology (I)	56	3.5			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
						实验 exp.	上机 operation	
Basic Courses in Discipline 学科基础课程	必修 Required	BIO0681	生物化学与分子生物学（二） Biochemistry and Molecular Biology（II）	32	2			4
	必修 Required	BIO0711	生物化学与分子生物学实验（一） Laboratory for Biochemistry and Molecular Biology（I）	24	0.8	24		3
	必修 Required	BIO0701	生物化学与分子生物学实验（二） Laboratory for Biochemistry and Molecular Biology（II）	24	0.8	24		4
	必修 Required	BIO2081	解剖与生理学 Anatomy and Physiology	64	4			5
	必修 Required	BIO2091	解剖与生理学实验 Laboratory for Anatomy and Physiology	32	1	32		5
专业核心课程 Core Courses in Specialty	必修 Required	EIC0531	电子测试与实验（一） Electronic Test Laboratory（I）	56	1.8	56		5
	必修 Required	CST0531	微机原理与接口技术 Principle of Microcomputer and Interface	48	3	16		5
	必修 Required	BIO2261	生物医学传感检测与仪器 Biomedical Sensor, Testing and Instrumentation	40	2.5			6
	必修 Required	BIO2271	生物医学传感检测与仪器实验 Laboratory for Biomedical Sensing, Detection and Instrumentation	24	0.8	24		6
	必修 Required	BIO2281	生物医学数字信号处理 Biomedical Digital Signal Processing	48	3			5
	必修 Required	BIO2291	生物医学数字信号处理实验 Laboratory for Biomedical Digital Signal Processing	16	0.5	16		5
	必修 Required	BIO2371	医疗器械设计与制造业课程 Medical Device Design and Manufacturing Industry Seminar	16	1			3
			专业方向课程 如今后在本校读研，选修课程必须从带*课程中选择至少三门课程 Technical Electives	256	16			
专业选修课程 Elective Courses in Specialty	选修 Elective	BIO5621	医学图像处理* Medical Image Processing	32	2			6
	选修 Elective	BIO5631	医学影像系统原理* Principles of Medical Imaging Systems	32	2			6
	选修 Elective	BIO5641	医学图像处理实验* Laboratory for Medical Image Processing	24	0.8	24		6
	选修 Elective	BIO5501	微机式医学仪器设计* Design of microcomputer - Based Medical Instruments	40	2.5			6
	选修 Elective	BIO5511	微机式医学仪器设计实验* Laboratory for Design of Microcomputer Based Medical Instruments	16	0.5	16		6
	选修 Elective	BIO5571	微弱信号获取方法 Introduction to Advanced Materials	32	2			5
	选修 Required	BIO2391	应用光子学基础 Fundamentals of Applied Photonics	56	3.5			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
						实验 exp.	上机 operation	
专业选修课程 Elective Courses in Specialty	选修 Required	BIO2401	应用光子学基础实验 Experiments in Fundamentals of Applied Photonics	8	0.5	8		4
	选修 Elective	BIO5451	生物医学光子学 Biomedical Photonics	32	2			5
	选修 Elective	BIO5461	生物医学光子学实验 Laboratory for Biomedical Photonics	16	0.5	16		5
	选修 Elective	BIO5061	超声概论 Introduction to Ultrasound	32	2			6
	选修 Elective	BIO5051	PET 概论 Fundamentals of PET	32	2			6
	选修 Elective	BIO5161	化学与生物传感器 Chemistry and Biomedical Sensor	32	2			6
	选修 Elective	BIO5681	组织工程导论* Introduction to Tissue Engineering	32	2			6
	选修 Elective	BIO5361	生物材料学* Biomaterials	48	3			5
	选修 Elective	BIO5271	纳米生物医学分析技术 Nano-biomedical Analysis	32	2			5
	选修 Elective	BIO5371	生物材料与组织工程实验 Biomaterials and Tissue Engineering Laboratory	24	0.8	24		6
	选修 Elective	BIO5591	心理学概论 Introduction to Psychology	16	1			7
	选修 Elective	BIO5571	新材料概论 Introduction to Advanced Materials	32	2			5
	选修 Elective	BIO5341	生物材料的分子结构 Molecular Structure of Biological Materials	32	2			6
	选修 Elective	BIO5111	分子医学影像学 Molecular Medical Imaging	32	2			6
	选修 Elective	BIO5841	细胞力学与生物力学 cellular mechanics and Mechanomedicine	32	2			6
	选修 Elective	BIO0281	生物医学微器件系统 Micro Device and System for Biomedicine	32	2			6
	选修 Elective	BIO5851	生物 3D 打印 3D Bioprinting	32	2			6
	选修 Elective	BIO5351	生物材料相容性评价 Evaluation of Biomaterial Compatibility	32	2			6
	选修 Elective	BIO5291	人工器官概论 Introduction to Artificial Organs	16	1			6
	选修 Elective	BIO2381	仪器分析 Instrumental Analysis	32	2			6
	选修 Elective	BIO5611	医学统计学 Medical Statistics	16	1			5
	选修 Elective		统计光学及其生物医学应用 Statistical Optics and It's Biomedical Application	32	2			7
	选修 Elective		医疗器械监管科学 Medical Device Regulatory Science	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
						实验 exp.	上机 operation	
			可选修生命科学与技术学院其它专业课程					
跨专业选修课程 Elective Courses in Cross-specialty			跨专业选修课程（须选修非本专业 3 门或 3 门以上课程且学分不少于 7 学分） Elective courses in Cross-specialty					
	选修 Elective	MESE5281	机械原理（四） Theory of Machines and Mechanisms（IV）	40	2.5	4		4
	选修 Elective	MESE5891	机械设计（四） Machine Design（IV）	40	2.5			5
	选修 Elective	MESE0621	机械制造技术基础 Fundamentals of Mechanical Manufacturing Technology	40	2.5	4		4
	选修 Elective	OEI5181	工程光学 Engineering Optics	48	3			4
	选修 Elective	OEI2161	光电探测与信号处理 Optoelectronic Detect & Signal Processing	48	3			5
	选修 Elective	OEI5251	光纤通信技术 Optical Fiber Communication Technology	48	3			6
	选修 Elective	CEM6101	土木工程材料 Civil Engineering Materials	32	2	4		4
	选修 Elective	CEM5401	房屋建筑学 Building Construction	32	2			5
	选修 Elective	CEM5091	地基处理技术 Ground Improvement Techniques	24	1.5			6
集中性实践环节 Practical Training Items	必修 Required	RMWZ3511	军事训练 Military Training	2w	1			1
	必修 Required	BIO3581	行业产业认知实习 Industry Perceive Practice	1w	0.5			1
	必修 Required	ENG3581	工程训练（二） Engineering Training（II）	3w	1.5			3
	必修 Required	ENG3521	工程训练（五） Engineering Training（V）	1w	0.5			4
	必修 Required	QMXY3511	学科交叉综合训练 Comprehensive Training for Interdisciplinary	2w	1			2
	必修 Required	BIO3561	生产实习 Engineering Internship	4w	2			6
	必修 Required	BIO3601	专业创新创业训练 Specialty Innovation and Entrepreneurship Training	2w	1			5
	必修 Required	BIO3541	课程设计 Course Project	4w	2			7
	必修 Required	BIO3512	毕业设计（论文） Undergraduate Thesis	12w	6			8