

测控技术与仪器专业培养方案

专业名称与代码：测控技术与仪器 080301

专业培养目标：

本专业培养具有社会责任感和良好的科学、文化素养，较系统地掌握自然科学基础、工程基础、测量控制与仪器等方面的基础知识、基本理论和基本技能，具有创新意识、自主学习能力、实践能力，具有测控系统与仪器综合设计、实现和应用能力，具有一定的团队合作精神，能在国民经济各部门从事测量与控制领域内有关技术、仪器与系统的设计制造、科研开发、应用研究、运行管理等方面的工作，德、智、体、美全面发展，创新精神和实践能力突出，个性良好发展的多层次高级工程技术人才。

专业毕业要求：

1. 掌握本专业领域宽广的技术理论基础知识，主要包括电子学、物理学、机械学、测量、控制、计量学、误差理论与数据处理的基础理论、基本知识和基本技能；
2. 掌握电子技术、计算机、光电技术、机械工程基础、控制工程相结合的当代测控技术，具有测控系统或检测技术系统、仪器仪表的设计、研究和开发的基本能力；
3. 具有应用计算机进行工程设计、自动测试、数据处理、自动控制和应用软件开发的初步能力；
4. 了解本学科前沿及发展趋势；
5. 具有较强的自学能力、创新意识和较高的综合素质；
6. 具有一定的科学研究和实际工作能力，具有一定的批判性思维能力。

毕业要求实现及途径：

序号	毕业要求	实现途径（教学过程）
1	掌握信号获取与分析能力	<p>①课堂教学：《传感器原理及检测技术 A》、《信号与系统》、《数字信号处理 B》、《计量误差理论》等课程。</p> <p>②课外学习：学习课程相关的参考文献。</p>
2	掌握仪器电路设计能力	<p>①课堂教学：《电路理论》、《模拟电子技术》、《数字逻辑电路设计》、《嵌入式系统》、《智能仪器仪表设计基础》、《DSP 原理及应用》、《现代可编程逻辑器件》、《单片机技术及应用》等课程。</p> <p>②课外学习：电子技术课程设计、电路综合实习、各种课外科技实践创新活动。</p>
3	掌握自动化测试技术	<p>①课堂教学：《PLC 及自动化装置》、《过程控制与检测仪表》、《虚拟仪器》、《测控软件设计基础》等课程。</p>

序号	毕业要求	实现途径（教学过程）
		② 课外学习 ：检测技术教学实习及生产实习、各种课外科技实践创新活动。
4	测控系统及仪器设计能力	① 课堂教学 ：《工程光学及光电检测》、《测控系统设计与应用》、《地球物理仪器》、《精密机械设计基础》等课程。 ② 课外学习 ：检测技术教学实习、生产实习、毕业设计、各种课外科技实践创新活动。

主干学科：仪器科学与技术；控制科学与工程。

专业核心课程：电路理论、模拟电子技术、数字逻辑电路设计、自动控制原理 B、单片机技术及应用、数字信号处理 B、传感器原理及检测技术 A、智能仪器仪表设计基础、嵌入式系统、物联网技术等。

主要专业实验：电子电路、现代可编程逻辑器件、DSP 原理及应用、微机接口技术、智能仪器设计基础、计算机软件技术、虚拟仪器、嵌入式系统、传感器技术实验等。

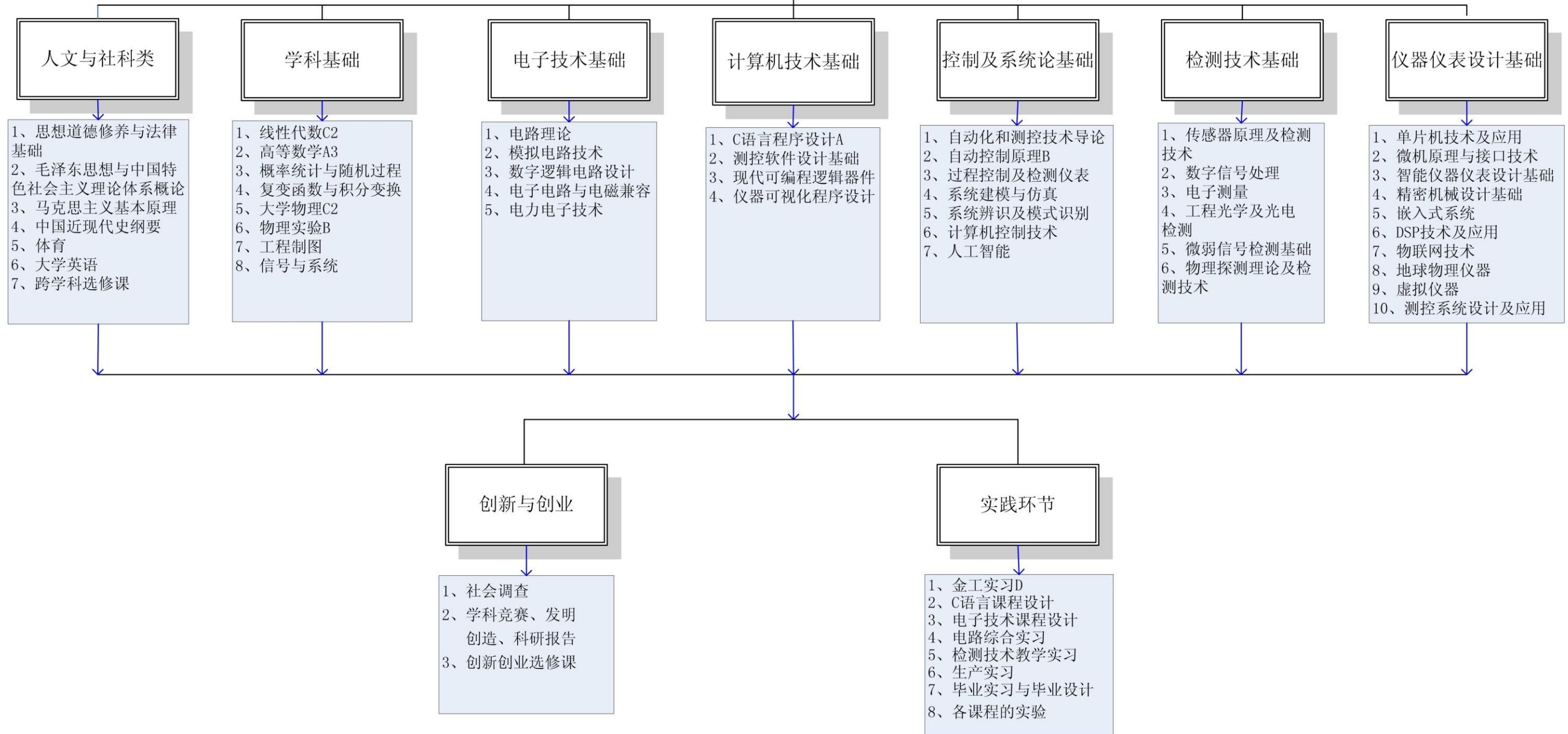
主要实践性教学环节：金工实习、C 语言课程设计、电子技术课程设计、电路综合实习、检测技术教学实习、生产实习、毕业实习与毕业设计等。

修业年限：四年。

授予学位：工学学士。

相近专业：自动化、电子信息工程、电子科学与技术。

测控技术与仪器专业培养目标及定位 (课程体系)



Program For Measurement & Control Technology and Instrumentation

Specialty and Code: Measurement & Control Technology and Instrumentation 080301

Education Objective:

The program aims to cultivate specialized talents who will have the sense of social responsibility and science & culture qualities; who can systematically master the foundational knowledge, theories and skills of natural science, engineering, measurement control and instruments; who will have the abilities of innovating, independent learning, practicing, designing and realizing the measurement and control system; who will have teamwork spirit and the abilities to engage in equipment designing & manufacture, scientific researches, technology developments, application analysis and operation management in related fields and departments. The students are also required to grow into advanced multi-level engineering and technical talents who have the outstanding creative mind, practical abilities and comprehensive characters with full development of morality, intelligence, health and aesthetics.

Graduation Requirements:

1. The wide basic knowledge of techniques and theories in professional field, mainly including electronics, physics, mechanics, surveying, control science, metrology, error theory and data processing
2. The contemporary control technology integrated with electronic technology, computer science, photoelectric technology, mechanical engineering and control engineering, as well as having good command of designing, researching and developing measurement and control system, detection system and instruments.
3. The basic abilities of engineering design, automatic test, data processing, automatic control and application software designing with the aid of computer.
4. Figuring down the cutting-edge technology and development trend of measurement & control technology and instrumentation.
5. Self-study ability, innovation consciousness and comprehensive inner qualities.
6. The abilities of doing scientific researches, practical work as well as the ability of critical thinking.

Graduation requirements and ways to achieve:

No.	Graduation requirements	Ways to achieve (teaching process)
1	Mastering signal acquisition and analysis	① Classroom Teaching: Sensor and Detection Technology A, Signals and Systems, Digital

No.	Graduation requirements	Ways to achieve (teaching process)
		Signal Processing B, Computation Error Theory etc. ② Out-of-class Learning: Course of study of related references.
2	The ability of circuit design of instrument	① Classroom Teaching: Theory of Circuitry, Analog Electronics, Digital Electronics, Embedded Systems, The Basis of Intelligent Instrument Design, Principle & Application of DSP , Modern Programming Logic Device, Micro Controller Unit-MCU Technology and Application etc. ② Out-of-class Learning: Electronic Technology Practice, Electronic Circuit Training, Various extracurricular innovation practical activity of science and technology.
3	Mastering automatic testing technology	① Classroom teaching : PLC and the Automation, Virtual Instrument, Process control and measuring instrument, Introduction to Measuring and Controlling Software Design, etc. ② Out-of-class Learning: Detection Technology Training, Production Training, Various extracurricular innovation practical activity science and technology.
4	The ability of designing measurement and control system and instrument	① Classroom teaching: Engineering Optics and optoelectronic detection, Measurement and Control system Design & Application, Geophysical instrument, Basis of Precision Mechanical Design etc. ② Out-of-class Learning: Detection Technology Training, Production Training, Graduate Practice and Bachelor Thesis, Various extracurricular innovation practical activity science and technology.

Major Disciplines: Instrument Science and Technology, Control Science and Engineering

Main Courses: Theory of Circuit, Analog Circuit, Digital Circuit, Principles of Automatic Control B, Micro Controller Unit-MCU Theory and Application A, Digital Signal Processing B, Sensors Principle and Detection technology A, the Basis of Intelligent Instrument Design, Embedded Systems, Wireless Sensor Network Technology, Process Control and Measuring Instrument etc.

Lab Experiments: Metalworking Practice, Electronic Technology Practice, Modern Programming Logic Device, Principle & Application of DSP, Principle and Interface of Computer, the Basis of Intelligent Instrument Design, Computer Software Technology, Virtual Instrument, Embedded Systems, Sensor and Detection Technology etc.

Practical Work: Course Design for Computer High-level Language(C), Electronic Technology Practice, Electronic Circuit Training, Detection Technology Training, Production Training, Graduate Practice and Bachelor Thesis etc.

Duration: Four years.

Degree Granted: Bachelor of Engineering.

Related Specialties: Automation, Electronic Information Engineering, Electronic Science and Technology.

测控技术与仪器专业课程教学计划表
Course Descriptions of Measurement & Control
Technology and Instrumentation

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits									
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th		
通识教育课 Liberal Education Courses	11706200	马克思主义基本原理 Principles of Marxism	3	48	48					3							
	11706500	毛泽东思想与中国特色社会主义理论体系概论 Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64				4								
	11711800	中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32						2						
	120002*0	思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	48				1.5	1.5							
	113076*0	体育 Physical Education	4	144	144				1	1	1	1					
	109116*0	大学英语 College English	12	192	192				3	3	3	3					
	11918901	C 语言程序设计 A C Language Programming A	3.5	56	40	16			3.5								
	22300100	自动化与测控技术导论 Introduction to Automation and Measuring & Control Technology	1	16	16				1								
	14300100	军事理论 Military Theory	2	32	32				2								
	选修 Elective	总计 12 学分，含创新创业选修课学分，跨学科选修课不低于 6 学分。“形势与政策”课程作为限选课，由马克思主义学院实施。		12	192					2	2	2	2	2	2		
	小计 Sum		46.5	824	616	16			14	11.5	9	8	2	2	0	0	
学科基础课 Disciplinary Fundamental Courses	21212802	线性代数 B Linear Algebra B	2.5	40	40				2.5								
	212127*1	高等数学 A Advanced Mathematic A	11.5	184	184				5	6.5							
	20714200	工程制图 Engineer Drawing	2.5	40	36	4				2.5							
	22300300	电路理论 Theory of Circuitry	4.5	72	64	8	高等数学 A、 线性代数 B		4.5								
	212130*3	大学物理 C College Physics C	6	96	96		高等数学 A		3.5	2.5							
	212132*1	物理实验 A Physical Experiment A	3.5	56		56	大学物理 C		2	1.5							
	21202400	概率统计与随机过程 Probability Statistics and Stochastic Processes	3.5	56	56		高等数学 A			3.5							
	21201902	复变函数与积分变换 B Complex Function and the Integral Transformation B	2.5	40	40		高等数学 A			2.5							
	20709000	模拟电子技术 Analog Electronics	3.5	56	44	12	电路理论			3.5							

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits									
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th		
	22300400	数字逻辑电路设计 Design of Digital Logic Circuit	3.5	56	44	12	电路理论			3.5							
	20731000	单片机技术及应用 Micro Controller Unit-MCU Technology and Application	3	48	40	8	数字电子技术				3						
	20731101	信号与系统 A Signals and Systems A	3	48	44	4	复变函数与积分变换 A				3						
	小计 Sum		49.5	792	688	104		7.5	19	17	6	0	0	0	0	0	0
	专业主干课 Main Specialty Courses	22301500	计量误差理论 Computation Error Theory	2	32	24	8	概率统计与随机过程				2					
22301602		现代可编程逻辑器件 Modern Programmable Logic Device	2	32	16	16	数字电子技术				2						
20712902		自动控制原理 B Principles of Automatic Control B	4	64	56	8	线性代数				4						
20703100		电子测量 Electronic Measurement	3	48	44	4	计量误差理论					3					
20711002		数字信号处理 B Digital Signal Processing B	3	48	40	8	信号与系统					3					
20718601		传感器原理及检测技术 A Sensors Principle and Detection Technology A	4	64	52	12	单片机技术及应用					4					
22305400		微机原理与接口技术 Principle and Interface of Computer	3	48	40	8	单片机技术及应用					3					
22301700		精密机械设计基础 Basis of Precision Mechanical Design	3	48	38	10	工程制图							3			
22301800		工程光学及光电检测 Engineering Optics and Optoelectronic Detection	3	48	38	10	大学物理 C							3			
20606200		智能仪器仪表设计基础 The Basis of Intelligent Instrument Design	2.5	40	32	8	模拟电子技术								2.5		
22301900		过程控制及检测仪表 Process Control and Measuring Instrument	3	48	40	8	传感器原理及检测技术 A									3	
小计 Sum			32.5	520	420	100		0	0	0	8	13	8.5	3	0	0	0
专业选修课 Specialty Elective Courses		具体见专业选修课列表	15	240													
合计 Sub-total			143.5	2376	1724	220		21.5	30.5	26	22	15	10.5	3	0	0	0
实践环节 Practical Work	44300200	军事训练 Military Training	2	2周				2									
	41919001	C语言课程设计 Course Design for C Programming Language	1.5	1.5周				1.5									
	40724604	金工实习 D Metalworking Practice D	1	1周						1							
	42302800	电子技术课程设计 Course Exercise in Electronic Technology	2	2周						2							
	42302700	电路综合实习 Electronic Circuit Training	3	3周							3						

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
	42302900	检测技术教学实习 Detection Technology Training	4	4周										4	
	42302500	生产实习 Production Training	2	2周											2
	42302600	毕业实习与毕业设计 Graduate Practice and Bachelor Thesis	16	16周											16
	小计 Sum		31.5	31.5周				3.5	0	3	3	0	4	2	16
	创新 Freedom study	ZZ35S	社会调查 Social Investigation	2											
		其他(学科竞赛、发明创造、科研报告) Others (Contest, Invention, Innovation and Research Presentation)	3												
	小计 Sum		5												
总计 Total			180	2376+ 31.5周	1724	220		25	30.5	29	25	15	14.5	5	16
可开出专业选修课列表 Specialty Elective Courses	22304400	电子电路仿真与电磁兼容 Electronic Circuit Simulation and EMC	1.5	24	12	12	模拟电子技术				1.5				
	22304500	*测控软件设计基础 Introduction to Measuring and Controlling Software Design	3	48	40	8	C 语言程序设计					3			
	22304101	虚拟仪器 A Virtual Instrument A	3	48	20	28	智能仪器仪表设计基础							3	
	22303800	测控系统设计与应用 Design & Application of Measurement and Control System	2	32	32		模拟电子技术、数字电子技术、							2	
	22300900	电力电子技术 Power Electronic Technology	3	48	40	8	电路理论、模拟电子技术							3	
	20605500	微弱信号检测基础 Introduction to Weak Signal Detection	2	32	32		概率统计与随机过程							2	
	22303300	嵌入式系统 Embedded Systems	1.5	24	12	12	单片机技术及应用							1.5	
	20716103	DSP 技术及应用 C DSP Technology & Application C	2	32	16	16	数字信号处理 B							2	
	20617100	地球物理方法概论 Introduction of Geophysical Method	1.5	24	24		大学物理 C								1.5
	20617200	地球物理仪器 Geophysical Instrument	2	32	20	12	地球物理方法概论								2
	22303600	物联网技术 Internet of Things Technology	2	32	24	8	单片机技术及应用								2
	22304700	物理探测理论及检测技术 Physical Detection Theory and Technology	2	32	24	8	大学物理 C 传感器原理及技术								2
	20731200	图像检测技术 Image Detection Technology	2	32	24	8	数字信号处理 B								2
	22304900	仪器可视化程序设计 Visual Programming for Instrument	2	32	24	8	C 语言程序设计								2
22305000	PLC 及自动化装置 PLC and the Automation	2	32	24	8	自动控制原理 B								2	

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crts	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					22300800	系统建模与仿真 System Modeling and Simulation	2	32	16	16	高等数学 A 大学物理 C				
22305100	系统辨识及模式识别 System Identification and Pattern Recognition	2	32	32		数字信号处理 B									2
22303700	人工智能 Artificial Intelligence	2	32	32		C 语言程序设计									2
22305300	计算机控制技术 Computer Control Technology	2	32	32		自动控制原理 B									2

- 注：1、 通识教育选修课学分和创新创业自主学习学分未列入具体学期。
 2、 标记*的课程为限选课。
 3、 第六学期限选 4 门选修课。

测控技术与仪器专业课程分类统计

	通识教育课程 Liberal Education Courses		学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环节 Practical Work	创新创业自主学习 Autonomous Learning	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/ 学分	632/34.5	192/12	792/49.5	520/32.5	240/15	31.5 周 /31.5	5	2376+31.5 周	180
学分所占比例	25.8%		27.5%	18.1%	8.3%	17.5%	2.8%		100%