能源卓越计划实验班本科培养计划

Undergraduate Experimental Program in Energy Engineering for Exemplary Engineer Education

一、 培养目标

Ⅰ. Program Objective

培养具备能源与动力工程知识与现代信息技术及工程应用能力为一体的高级专门技术人才和管理人才。能在电力、制冷低温、采暖空调、汽车、船舶、流体机械、电子信息、冶金、化工、铁路、医药等部门从事能源动力工程及自动化和相关方面的研究、设计、开发、教学、管理等工作。

This program is designed to prepare top-ranking technicians and managers of both energy and power engineering knowledge and modern information technique. Students can pursue a career in departments related to electric power, cryogenic refrigenration, air conditioning, automotive ergineering, fluid machinery, metallurgy, chemical industry, railways, medicine and other various sectors. Students are quealified for jobs concerning research, teaching, design, development, and management on energy and power engineering.

二、 基本规格要求

Ⅱ. Learning Outcomes

1. 具有数学、外语、自然科学和能源动力工程科学知识的应用能力；

2. 熟悉本专业领域内 1~2 个专业方向或有关方面的专业知识，了解其学科前沿和发展趋势；

3. 具有本专业必需的制图、计算、测试、调研、查阅文献和基本工艺、操作、运行等基本技能；

4. 具有对于能源动力工程问题进行系统表达、建立模型、分析求解和论证的能力；

5. 具有制订实验方案、进行实验、分析和解释数据的能力

6. 具有较强的自学能力、分析能力和创新意识。

7. 具有在多学科团队中发挥作用的能力和较强的人际交流能力。

1. Application of knowledge in mathematics, Foreign language, natural science and power engineering;

2. Having a good knowledge of one or two specialty-oriented aspects, understanding the front and trend of development in this flield;

3. Skills in deafting, calculating, test, investigating and study, literature searching, process and operating;

4. Systematic presentation, modeling, analyzing and demonstration of power engineering problem;

5. Experimental scheme drafting, operating and data analysis;

6. Good quality of self-learning, analysis and innovative thinking;

7. Advanced communication and team work.

三、培养特色

Ⅲ. Program Highlights

以能源、环境、动力为工程背景，以热流体科学为基础，兼顾装备制造、过程控制和信息技术，集热、机、电为一体的培养特色。

With energy, environment, power as its background, based on the science of heat fluid, this program gives consideration to facility manufacture procedure control and information technique, and is designed to combine thermology and electricity together.

四、主干学科

Ⅳ. Main Disciplines

动力工程与工程热物理 Power engineering and engineering thermal physics、机械工程 Mechanical Engineering、计算机科学与技术 Computer Science and Technology、自动化技术 Automatic Technique

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：169.5 学分

Minimum Credits of Curricular (Comprising course system and intensified internship practical training): 169.5 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	占课程体系学分比例（%）
通识教育基础课程		必修	984/59.5	40.7
		选修	160/10	6.62
学科（专业）基础课程	学科大类基础课程	必修	584/40	24.17
	学科专业基础课程	必修	320/20	13.25
专业课程	专业方向核心课程	必修	240/15	9.93
	专业方向选修课程	选修	128/8	5.30
合计			2416/152.5	

Course Type		Required/ Elective	Hrs/Crs	Percentage (%)
Basic Courses in General Education		Required	984/59.5	40.7
		Elective	160/10	6.62
Basic Courses in Discipline	Basic Courses in General Discipline	Required	584/40	24.17
	Basic Courses in Discipline	Required	320/20	13.25

continue

Course Type		Required/ Elective	Hrs/Crs	Percentage (%)
Courses in Specialty	Common Core Courses	Required	240/15	9.93
	Specialty-Oriented Courses	Elective	128/8	5.30
Total			2416/152.5	

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	5.9
公益劳动	必修	1/0.5	2.9
金工实习	必修	3/1.5	8.8
电工实习	必修	1/0.5	2.9
机械基础工程训练	必修	3/1.5	8.8
认知实习	必修	2/1	5.9
生产实习（社会实践）	必修	2/1	5.9
课程设计	必修	4/2	11.8
科研训练	选修	2/1	5.9
毕业设计（论文）	必修	16/8	47.1
合计		34/17	

Course Type	Required/ Elective	Weeks/Credits	Percentage (%)
Military Training	Required	2/1	5.9
Laboring for Public Benefit	Required	1/0.5	2.9
Industrial Practice	Required	3/1.5	8.8
Electrical Engineering Practice	Required	1/0.5	2.9
Mechanical Engineering Training	Required	3/1.5	8.8
Recognizing internship	Required	2/1	5.9
Engineering Internship	Required	2/1	5.9
Course Project	Required	4/2	11.8
Research and Training	Elective	2/1	5.9
Undergraduate Thesis	Required	16/8	47.1
Total		34/17	

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

续表

序号	名 称	要 求		课外学分
3	竞赛	全国	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：各院（系）应视具体情况，自行制定本院（系）课外活动和社会实践内容、形式及要求；院（系）在制定课外活动学分时，应参照课内学分和全校性课外活动要求记载学分；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.	Extracurricular Activities and Social Practice	Requirements		Extracurricular Credits
1	Activities of Social Practice	Submit report and pass oral defense		1
		Entitled as Activist by the Communist Youth League of HUST or Hubei Province; Membership of the group which is entitled as Excellent Social Practice Group by the Communist Youth League of HUST or Hubei Province		2
2	Examinations in English and Computer	CET-6	Win certificate of Band-6 or higher	2
		National Computer Rank Examination	Win certificate of Band-3 or higher	2
		National Computer Software Qualification	Win certificate of programmer	2
			Win certificate of Advanced Programmer	3
			Win certificate of System Analyst	4
3	Competitions	University Level	Win first prize	3
			Win second prize	2
			Win third prize	1
		Provincial Level	Win first prize	4
			Win second prize	3
			Win third prize	2
		National Level	Win first prize	6
			Win second prize	4
			Win third prize	3
4	Thesis	Those whose thesis appears in national publications	Per piece	2～3
5	Scientific Research	Depending on both the time spent in and ability demonstrated in scientific research project	Each item	1～3

七、主要课程

Ⅶ. Main Courses

材料力学 Material Mechanics、理论力学 Theoretical Mechanics、流体力学 Fluid Mechanics、工程热力学 Engineering thermodynamics、工程传热学 Engineering Heat Transfer、机械原理 Principle of machinery、机械设计 Design of Machinery、工程控制基础 Foudation of Engineering Control、工程测试技术 Project Measure technology、能源动力装置基础 Foundation of Devics in Energy and Power Engineering、动力工程计算机控制系统 Computer Control System of Power Engineering、工程数值计算方法 Numerical methods of Engineering

八、主要实践教学环节（含专业实验）

Ⅷ. Practicum Module（Experiments Included）

军事训练 Military Training、公益劳动 Laboring for Public Benefit、机械基础工程训练 Mechanical Engineering Training、金工实习 Industrial Practice、电工实习 Electrical

Engineering Practice、生产实习 Engineering Internship、专业社会实践 Professional Social Practice、课程设计 Course Project、毕业设计 Undergraduate Thesis

九、教学进程计划表

Ⅸ. Course Schedule

院（系）：能源与动力工程学院　　专业：能源与动力工程

School (Department): School of Energy and Power Engineering　　Specialty: Energy and Power 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	马克思主义基本原理 Basic Theory of Marxism	40	2.5	8			3
	必修 required	0100932	思政课社会实践 Social Practice of Ideological and Political Theories Course	24	1.5	20			2
	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				4
	必修 required	0100741	形势与政策 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	0700011	微积分（一）上 Calculus (Ⅰ)	88	5.5				1
	必修 required	0700012	微积分（一）下 Calculus (Ⅰ)	88	5.5				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	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

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	
通识教育基础课程 General Education Core Curriculum	必修 required	0706891	物理实验（一） Physics Experiments (Ⅰ)	32	1		32		2
	必修 required	0706901	物理实验（二） Physics Experiments (II)	24	0.8		24		3
	必须 required	0827781	计算机与程序设计基础（C++） Fundamental of Computer Programming (C++)	48	3				1
	必修 required	1200011	军事理论 Military Theory	16	1				1
	必须 required	0700051	线性代数(一) Linear Algebra	40	2.5				2
	必须 required	0400022	学科（专业）概论 Introduction to Discipline (Specialty)	16	1				2
	必须 required	0833174	数据库技术及应用(二选一) Database Techniques and Their Applications	32	2				2
	必须 required	0811163	计算机网络技术及应用(二选一) Advanced Programming Language (C)	32	2				2
	必须 required	0700071	复变函数与积分变换 Complex Function and Integral Transform	40	2.5				3
	必须 required	0705941	概率论与数理统计（三） Probability and Mathematics Statistic (Ⅲ)	40	2.5				3
			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	必须 required	0800463	工程制图（三）上 Engineering Graphics s(Ⅲ)	40	2.5				1
	必须 required	0800462	工程制图（三）下 Engineering Graphics s(Ⅲ)	32	2				2
	必须 required	0800118	电路理论 Electrical & Magnetic Circuits	40	2.5				3
	必须 required	0800084	理论力学（二） Theoretical Mechanics (II)	56	3.5				3
	必须 required	0800073	材料力学（二） Material Mechanics (Ⅱ)	56	3.5				4
	必须 required	0800096	机械原理 Theory of Machines and Mechanisms	32	2				4
	必须 required	0820943	工程控制基础 Foundation of Project Control	32	2				4
	选修 Elective	0806712	工程力学实验 Engineering Mechanics Lab.	16	1				4
	选修 Elective	0800123	模拟电子技术（三） Analogue Electronics(Ⅲ)	40	2.5				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
						课外 extra-cur.	实验 exp.	上机 operation	
学科大类基础课程 Discipline-related General Courses	必须 required	0807301	工程材料学 Engineering Materials	32	2				4
	必须 required	0800080	流体力学（二） Fluid Mechanics (Ⅱ)	56	3.5				4
	必须 required	0820962	工程测试技术 Project Measure Technology	32	2				4
	选修 Elective	0815671	工程控制实验(一) Experiment on Foundation of Project Control(Ⅰ)	8	0.5				4
	选修 Elective	0800363	机械制造技术基础 Foundation of Mechanical Manufacture	40	2.5				4
	必须 required	0809811	机械设计 Machine Design	32	2				5
	必须 required	0812472	工程传热学（二） Heat Transfer (Ⅱ)	56	3.5				5
	选修 Elective	0815661	工程测试技术实验(一) Experiment on Project Measure Technology (Ⅰ)	8	0.5				5
学科专业基础 Basic Sub-disciplinary Courses	必须 required	0701812	工程化学 Engineering chemistry	32	2				1
	必须 required	0840511	学科基础引论 Discipline-based introduction	16	1				1
	必须 required	0833031	工程导论 Introduction of Engineering	16	1				2
	必须 required	0802392	工程热力学(二) Engineering hermodynamics(Ⅱ)	64	4				5
	必须 required	0802092	能源与动力装置基础 Fundamentals of Devices in Energy and Power engineering	64	4				5
	必须 required	0840041	工程数值计算方法 Numerical methods of Engineering	32	2				5
	必须 required	0822083	动力工程计算机控制系统 Computer Control System of Power Engineering	32	2				6
	必须 required	0800913	CAD 技术 Technology of CAD	32	2				6
	必须 required	0833321	计算机辅助技术 Computer-aided technologies	32	2				6
			专业核心选修课程 （四组选一组） Common Core Electives in Specialty						
			课程组 A(制冷组) Group A（224 学时）						
	选修 Elective	0802132	制冷原理与装置自动化 Principles and Plant of Refrigeration	48	3				6

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	
专业方向核心课程 specialty-oriented courses	选修 Elective	0822104	低温技术原理与装置 Principles and Plant of Cryogenics	40	2.5				6
	选修 Elective	0819123	现代制冷压缩机技术 Modern technology of refrigeration compressor	40	2.5				6
	选修 Elective	0802151	空气调节 Air Conditioning	40	2.5				6
	选修 Elective	0819131	制冷与低温应用技术 Application technique in refrigeration & cryogenics project	40	2.5				7
	选修 Elective	0819143	制冷、低温实验（一） Refrigeration & cryogenics experiment (I)	16	0.5				7
			课程组 B(热动组) GroupB（240 学时）						
	选修 Elective	0822641	现代电站汽轮机（一） Modern Power Plant Turbine（一）	48	3				6
	选修 Elective	0822652	现代电站锅炉（一） Modern Power Plant Boiler（一）	48	3				6
	选修 Elective	0802234	热力发电厂 Thermal Power Plant	40	2.5				6
	选修 Elective	0827601	热工自动化 Control System of Thermal Engineering	32	2				6
	选修 Elective	0822871	发电厂电气设备 Electrical equipment of power plznt	24	1.5				7
	选修 Elective	0819152	大型发电机组控制 Controu of longe generating unit	40	2.5				7
	选修 Elective	0819163	热动实验（一） Thermal Power Experiment(I)	16	0.5				7
			课程组 C(动机组) Group C（240 学时）						
	选修 Elective	0822184	内燃机原理 Principles of Internal Combustion Engines	56	3.5				6
	选修 Elective	0822193	发动机现代设计 Design of Engine Engineering	56	3.5				6
	选修 Elective	0818502	动力机械先进制造技术 Advanced Manufactural Technlolgy for Power Machinery	32	2				6
	选修 Elective	0800365	机械制造技术基础	40	2.5				6
	选修 Elective	0832112	动力机械电子控制技术 Control Technology for Power Machinery	40	2.5				7
	选修 Elective	0822671	燃气轮机 Gas Turbine	40	2.5				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	
专业方向核心课程 specialty-oriented courses	选修 Elective	0819173	发动机实验（一） Engrine Testing(I)	16	0.5				7
			课程组 D(流机组) Group D（240 学时）						
	选修 Elective	0802243	流体机械原理 Principles of fluid machine	32	2				6
	选修 Elective	0828521	现代径流式流体机械设计方法 Modern design of radial flow fluid Machinery	40	2.5				6
	选修 Elective	0828541	现代轴流式流体机械设计方法 Modern design of propeller flow fluid Machinery	32	2				6
	选修 Elective	0828551	流体机械的运行与调节 Performance Monitoring and Operation Control for Fluid Machine system	24	1.5				6
	选修 Elective	0828561	流体机械可靠性分析 Reliability Analysis of Fluid Machine	32	2				6
	选修 Elective	0819264	流体机械综合性能实验（一） Syntetic Experiments for Fluid Machinery(Ⅰ)	16	0.5				7
	选修 Elective	0840452	容积式流体机械 Positive displacement fluid Machinery	32	2				7
	选修 Elective	0828571	现代水电站生产过程 Operation of modern water power station	32	2				7
专业方向选修课程 Courses in Specialty direction			专业方向选 修课程（鼓励选择机械大类其他专业或本专业其他专业方向的课程 2 学分,不包含课外综合实践） Specialty-Oriented Electives 128/8						
	选修 Elective	0842081	课外综合实践 Extra-curricular integrated practice	90	5	90			8
	选修 Elective	0822991	核电站安全 Nuclear power plant safety	32	2				7
	选修 Elective	0827372	核电站材料 Material of Nuclear Power Plant	24	1.5				7
	选修 Elective	0835371	核电站通用机械设备 Nuclear Power General Machinery	32	2				7
	选修 Elective	0828581	核电厂化学 Chemistry in Nuclear Power Plant	32	2				7
	选修 Elective	0822701	核工程导论 Introduction to Nuclear Engineering	16	1				7
	选修 Elective	0835281	核电站入门 Nuclear power plant	48	3				7
	选修 Elective	0835271	反应堆物理基础 Reactor physics-based	48	3				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	
专业方向选修课程 Courses in Specialty direction	选修 Elective	0840171	热力发电厂与汽轮机 Thermal Power Plant and turbine	40	2.5				8
	选修 Elective	0828091	核电站英语 Nuclear Professional English	40	2.5				8
	选修 Elective	0832282	反应堆热工水力分析 Reactor thermal-hydraulics analysis	32	2				8
	选修 Elective	0828601	核电站测量仪表与控制 Nuclear power plant instrumentation and control	48	3				8
	选修 Elective	0819231	流体机械先进制造技术 Modern Manufacture Technique of Fluid Machine	24	1.5				8
	选修 Elective	0828551	流体机械的运行与调节 Performance Monitoring and Operation Control for Fluid Machine system	24	1.5				8
	选修 Elective	0822112	流体机械现代设计 Modern design of Fluid Machinery	40	2.5				8
	选修 Elective	0828572	现代水电站生产过程 Operation of modern water power station	16	1				8
	选修 Elective	0819571	Matlab 技术的工程应用 Application of MATLAB in engineering	32	2				8
	选修 Elective	0819601	流体机械振动噪声及控制 Oscillate noise and its control of fluid machine	16	1				8
	选修 Elective	0840441	CFD 技术及应用 Application of CFD	32	2				8
	选修 Elective	0819661	现代水电站及泵站生产过程（二） Operation of water power station and pump station II	24	1.5				8
	选修 Elective	0819671	流体机械故障诊断技术 Technology of failure diagnosis for fluid machine	16	1				8
	选修 Elective	0819681	现代空调用风机技术 Modern Technology of Fan for Air-conditioning System	24	1.5				8
	选修 Elective	0819691	电厂风机的设计与节能 The design and energy-saving of air blower in plant	16	1				8
	选修 Elective	0819701	空调风机的设计与降噪 The design and the method of dropping noise in aircondition fan	16	1				8
	选修 Elective	0819711	电厂用泵阀设计与节能 The energy-saving and design in pump valve of plant	16	1				8
	选修 Elective	0819742	流体机械工磨蚀与防护 Particle Erosion and Protection in Fluid Machinery	16	1				8

续表

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						课外 extra-cur.	实验 exp.	上机 operation	
专业方向选修课程 Courses in Specialty direction	选修 Elective	0819751	流体机械综合性能实验（二） Synthetic Experiments of fluid Machinery (II)	16	1				8
	选修 Elective	0828611	计算流体动力学 Computational Fluid Dynamics	32	2				8
	选修 Elective	0822315	LabVIEW 软件及应用 LabVIEW Software and Application	32	2				8
	选修 Elective	0840461	液体机械 CAD/CFD Fluid Mechanics CAD/CFD	32	2				8
	选修 Elective	0822623	流体机械系统的性能监测与运行管理 Performance Monitoring and Operation Maintenance in Fluid Mechanical System	16	1				8
	选修 Elective	0828101	水电厂动力设备故障诊断与状态检修技术 Hydropower power equipment fault diagnosis and condition-based maintenance technology	32	2				8
	选修 Elective	0822094	制冷原理与装置自动化 Principles and Plant Automation of Refrigeration	24	1.5				8
	选修 Elective	0802154	空气调节 Air-conditioning	24	1.5				8
	选修 Elective	0822303	现代小型制冷空调器具 Modern refrigeration and air-conditioning appliance	24	1.5				8
	选修 Elective	0822102	低温技术原理与装置 Principles and Plant of Cryogenic System	24	1.5				8
	选修 Elective	0822391	大型锅炉安全评价与监测 Safety Evaluation and Monitoring of Large Boilers	24	1.5				8
	选修 Elective	0822901	洁净燃烧技术 Clean Combustion Technology	32	2				8
	选修 Elective	0822882	火焰可视化 Flame Visualization	32	2				8
	选修 Elective	0822142	现代电站锅炉 Modern Power Plant Boiler	32	2				8
	选修 Elective	0822451	发电厂性能分析与监测 Power plant Performance Analysis and Monitoring	16	1				8
	选修 Elective	0802282	热工控制系统 Control System of Thermal Engineering	32	2				8
	选修 Elective	0822441	发电设备故障诊断 Fault Diagnosis of Power Equipment	24	1.5				8
	选修 Elective	0832111	动力机械电子控制技术 Electronic Control Technology for Power Machinery	32	2				8

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专业方向选修课程 Courses in Specialty direction	选修 Elective	0822192	发动机现代设计 Design of Engine Engineering	40	2.5				8
	选修 Elective	0818502	动力机械先进制造技术 Advanced Manufact ural Technology for Power Machinery	32	2				8
	选修 Elective	0822521	发动机三维造型技术 Three-dimensional Molding Technology for Engines	24	1.5				8
	选修 Elective	0802303	面向对象程序设计 Object-oriented Programming	32	2				8
	选修 Elective	0822183	内燃机原理 Principles of Internal Combustion Engines	40	2.5				8
	选修 Elective	0822672	燃气轮机 Gas Turbine	32	2				8
	选修 Elective	0801922	汽车概论 An Introduction to Automotive Engineering	24	1.5				8
	选修 Elective	0834215	可再生能源概论 Introduction to Renewable Energy	32	2				8
	选修 Elective	0843161	能源化工概论 Introduction to Chemical Energy	32	2				8
	选修 Elective	0828111	过程装备制造与控制 Equipment manufacturing and process control	32	2				8
	选修 Elective	0843181	未来能源 Future Energy	32	2				8
	选修 Elective	0828122	能源与动力装置专业英语 Energy and power plant Professional English	32	2				8
实践环节 practical training items	必须 required	1300013	军事训练 Military Training	1w	0.5				3
	必须 required	1304412	电工实习 Electrical Engineering Practice	1w	0.5				3
	必须 required	1302332	金工实习 Industrial Practice	3w	1.5				4
	必须 required	130044b	科研训练 Research and Training	2W	1				4
	必须 required	1302431	机械基础工程训练 Mechanical Engineering Training	3w	1.5				5
	必须 required	1300534	认知实习 Recognizing internship	2w	1				5
	必须 required	1327695	生产实习（社会实践） Engineering Internship	2w	1				6
	必须 required	1300024	公益劳动 Labouring for Public Benefit	1w	0.5				7

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	必须 required	1325026	专业课程设计 Course Project	4w	2				7
	必须 required	130004h	毕业设计（论文） Undergraduate Project(Thesis)	18w	9				7-8