

车辆工程专业国际班（新能源和智能网联汽车方向）

2020 版本科培养方案

Undergraduate Education Plan for Specialty in Automotive Engineering International Class (New Energy and Intelligent Connected Vehicle, 2020)

专业名称	车辆工程	主干学科	机械工程，车辆工程
Major	Automotive Engineering	Major Disciplines	Mechanical engineering, Vehicle Engineering
计划学制	四年	授予学位	工学学士
Duration	4 Years	Degree Granted	Bachelor of Engineering

最低毕业学分规定

Graduation Credit Criteria

课程性质 Course Nature	课程分类 Course Classification	通识教育课程 Public Basic Courses	专业教育课程 Specialized Courses	个性课程 Personalized Course	集中性实践教学环节 Practice Courses	课外学分 Study Credit after Class	总学分 Total Credits
必修课 Required Courses		30	77	\	30.5	\	175
选修课 Elective Courses		9	18.5	\	\	10	

一、培养目标与毕业要求

I Educational Objectives & Requirement

(一) 培养目标

本专业培养德、智、体、美、劳全面发展，具有扎实的机械工程、车辆工程、材料和信息科学基础知识和应用能力，具有较强创新精神、突出实践能力和宽广国际视野，并具有卓越追求和卓越能力的汽车行业拔尖创新人才。

本专业培养的学生毕业五年左右应达到以下目标：

- (1) 具有良好的职业素养和社会责任感，并有服务社会的意愿和能力；
- (2) 能从事车辆工程复杂问题研究，能从事汽车（特别是新能源汽车和智能网联汽车）的理论研究、产品开发、生产制造、企业管理等工作；
- (3) 具备管理工作团队及协调项目的的能力，能准确把握项目团队成员的角色定位，组织制定工作计划并有效实施；
- (4) 能够适应汽车科技和汽车产业发展要求，能不断学习和适应发展；
- (5) 具备创新精神、可持续发展理念和国际化视野。

(I) Cultivation objectives

This specialty aims at training automotive industry leaders with comprehensive development of Virtue, Wisdom, Body, Beauty and Labor, those have the solid mechanical engineering, the vehicle engineering, the material and the information science basic knowledge and the application ability, have the strong innovation spirit, the outstanding practice ability and the broad international view, and have the outstanding pursuit and the outstanding ability.

The graduates after 5 years should achieve the following objectives:

1. Have good professionalism and social responsibility, and the willingness and ability to serve the community;
2. Be able to study complex problems of vehicle engineering, be engaged in automobile (Especially in new energy vehicle and Intelligent Connected Vehicle) theory research, automobile product development, automobile design and manufacture, automobile production management and so on.
3. With the ability to manage the work team and coordinate the project, can correctly understand the role of the project team positioning, can organize the work plan and effective implementation.
4. Be able to adapt to the requirements of automotive technology and automotive industry development, can continue to learn and adapt to the development;
5. With the spirit of innovation, the concept of sustainable development and international vision.

(二) 毕业要求

- (1) 能够将数学、自然科学、工程基础和专业知用于解决车辆工程领域的复杂工程问题。
 - (2) 能够应用数学、自然科学和工程科学的基本原理, 识别、表达、并通过文献研究分析车辆工程领域复杂工程问题, 以获得有效结论。
 - (3) 能够设计针对车辆工程领域复杂工程问题的解决方案, 涉及满足特定需求的车辆系统、单元、部件或工艺流程, 并能够在设计环节中体现创新意识, 考虑社会、健康、安全、法律、文化以及环境等因素。
 - (4) 能够基于科学原理并采用科学方法对车辆工程领域复杂工程问题进行研究, 包括设计实验、分析与解释数据, 并通过信息综合得到合理有效的结论。
 - (5) 能够针对车辆工程领域复杂工程问题, 开发、选择与使用恰当的技术、资源、现代工程工具和信息技术工具, 包括对发展工程问题的预测与模拟, 并能够理解其局限性。
 - (6) 能够基于工程相关背景知识进行合理分析, 评价车辆工程专业工程实践和车辆工程领域复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响, 并理解应承担的责任。
 - (7) 能够理解和评价针对车辆工程领域复杂工程问题的专业工程实践对环境、社会可持续发展的影响。
 - (8) 具有人文社会科学素养、社会责任感, 能够在工程实践中理解并遵守工程职业道德和规范, 履行责任。
 - (9) 能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色。
 - (10) 能够就车辆工程领域复杂工程问题与业界同行及社会公众进行有效沟通和交流, 包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。熟练掌握英语, 具备较强的国际视野, 能够在跨文化背景下进行沟通和交流。
 - (11) 理解并掌握工程管理原理与经济决策方法, 并能应用于车辆工程领域多学科交融的环境中。
 - (12) 具有自主学习和终身学习的意识, 有不断学习和适应发展的能力。
1. Be able to apply mathematics, natural science, basic and professional knowledge of engineering to solve complex engineering problems in vehicle engineering.
 2. Be able to apply the basic principles of mathematics, natural sciences and engineering sciences, and identify, express and analyze the complex engineering problems in vehicle engineering through literature studies so as to gain valid conclusion.
 3. Be able to design solutions to complex engineering problems of the vehicle engineering field, design the vehicle system, units, parts or technical process which can meet the special demands, and can demonstrate the innovation awareness and consider the social, healthy, safe, legal, cultural and environmental factors in the design links.
 4. Be able to study the complex engineering problems of the vehicle engineering field on the basis of scientific principles and with scientific methods, including designing the test, analyzing and explaining

- the data, and integrating the information to get rational and valid conclusion.
5. In light of complex engineering problems in the vehicle engineering field, be able to develop, choose and use proper technology, resources, modern engineering tools and information technology tools, including prediction and simulation of the developing engineering problems, and can understand their limitations.
 6. Be able to reasonably analyze and evaluate the impacts of professional practices of vehicle engineering and solutions to complex engineering problems of vehicle engineering field on the society, health, safety, law and culture on the basis of the relevant background knowledge of engineering and understand the responsibilities that they should undertake.
 7. Be able to understand and evaluate the impact of engineering practices in the field of vehicle engineering on the environmental and social sustainable development.
 8. Have quality of humanities and social sciences and sense of social responsibilities and can understand and abide by the professional ethics and codes and perform the responsibilities in the engineering practices.
 9. Be able to take on the role of individual, team members and leaders in a multidisciplinary team.
 10. Proficiency Master English language and be able to communicate and exchange in a cross-cultural context. Have strong international perspective and be able to effectively communicate and exchange with the industry peers and the public on the complex engineering problems of vehicle engineering field and the related fields, including preparing reports and design documents, making presentations, clearly expressing or responding to the instructions and etc.
 11. Understand and master the engineering management principles and economic decision-making methods and be able to apply them in multidisciplinary environment of vehicle engineering field.
 12. Have the awareness of self-learning and lifelong learning and ability of continuous studying and adapting themselves to the social development.

附：培养目标实现矩阵

	培养目标 1 Cultivation objective 1	培养目标 2 Cultivation objective 2	培养目标 3 Cultivation objective 3	培养目标 4 Cultivation objective 4	培养目标 5 Cultivation objective 5
毕业要求 1 Graduation requirement 1	√			√	
毕业要求 2 Graduation requirement 2		√			
毕业要求 3 Graduation requirement 3		√			
毕业要求 4 Graduation requirement 4		√		√	
毕业要求 5 Graduation requirement 5		√			
毕业要求 6 Graduation requirement 6		√	√		
毕业要求 7 Graduation requirement 7	√	√	√		
毕业要求 8 Graduation requirement 8	√	√		√	
毕业要求 9 Graduation requirement 9			√		
毕业要求 10 Graduation requirement 10					√
毕业要求 11 Graduation requirement 11			√		
毕业要求 12 Graduation requirement 12				√	

二、专业核心课程与专业特色课程

II Core Courses and Characteristic Courses

(一) 专业核心课程

机械原理、工程设计、汽车工程学、机械制造工艺、汽车电子与测试

(I) Specialized Core Courses:

Mechanism and Machine, Engineering Design, Automotive Engineering, Manufacturing Technology, Automobile Electronics and Testing.

(二) 专业特色课程

车辆控制理论基础、算法导论、整车开发与项目管理、新能源汽车结构与原理、电动汽车电驱动理论与控制、人工智能概论、智能汽车环境感知技术、智能汽车决策规划与控制、汽车新技术概论、智能汽车概论。

(II) Specialized Characteristic Courses:

Vehicle Control Theory Basic, Introduction to Algorithms, Vehicle Development and Project Management, Structures and Theory of Electric Vehicle, Electric Drive Theory and Control of Electric Vehicle, Introduction to Artificial Intelligence, Intelligent Vehicle Environment Awareness Technology, Decision Planning and Control of Intelligent Vehicle, Automobile New Technology Introduction, Introduction to Intelligent Automobile.

附：毕业要求实现矩阵：

专业 核心 课程	专业 特色 课程	课程名称	车辆工程专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		思想道德修养与法律基础	√							√	√				
		中国近现代史纲要	√												√
		毛泽东思想和中国特色社会主义理论体系概论	√												
		马克思主义基本原理	√												√
		军事理论	√												
		体育	√												
		英语精读											√		
		英语听说										√			
		C 程序设计基础						√							
		计算机基础与 C 程序设计综合实验						√							
		创新创业类公选课	√									√	√	√	
		人文社科类通识选修课程													√
		经济管理类通识选修课程											√		
		科学技术类公选课		√						√					

专业 核心 课程	专业 特色 课程	课程名称	车辆工程专业毕业要求												
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
		艺术体育类公选课	√										√		√
		车辆工程专业导论	√						√	√					
		高等数学		√											
		工程图学		√	√				√	√					
		线性代数		√											
		大学物理		√											
		工程化学		√											
		工程化学实验						√							
		物理实验						√							
		工程材料学 1								√	√				
		概率论与数理统计		√											
		工程力学 1		√											
		数值计算							√						
		工程力学 2		√											
√		机械原理		√											
		电工电子工程		√											
		工程材料学 2							√						
√		汽车工程学 1			√	√									
		工程科学基础 1			√			√							
√		工程设计		√	√	√								√	
		机械制造工艺 1			√					√					
√		汽车工程学 2			√	√	√								
	√	车辆控制理论							√	√					
√		汽车工程学 3			√	√	√								
		汽车性能实验						√	√			√			
√		汽车电子与测试 1						√		√					
√		机械制造工艺 2				√									
√		汽车工程学 4			√	√	√								
		汽车 CAD/CAE		√	√	√		√							

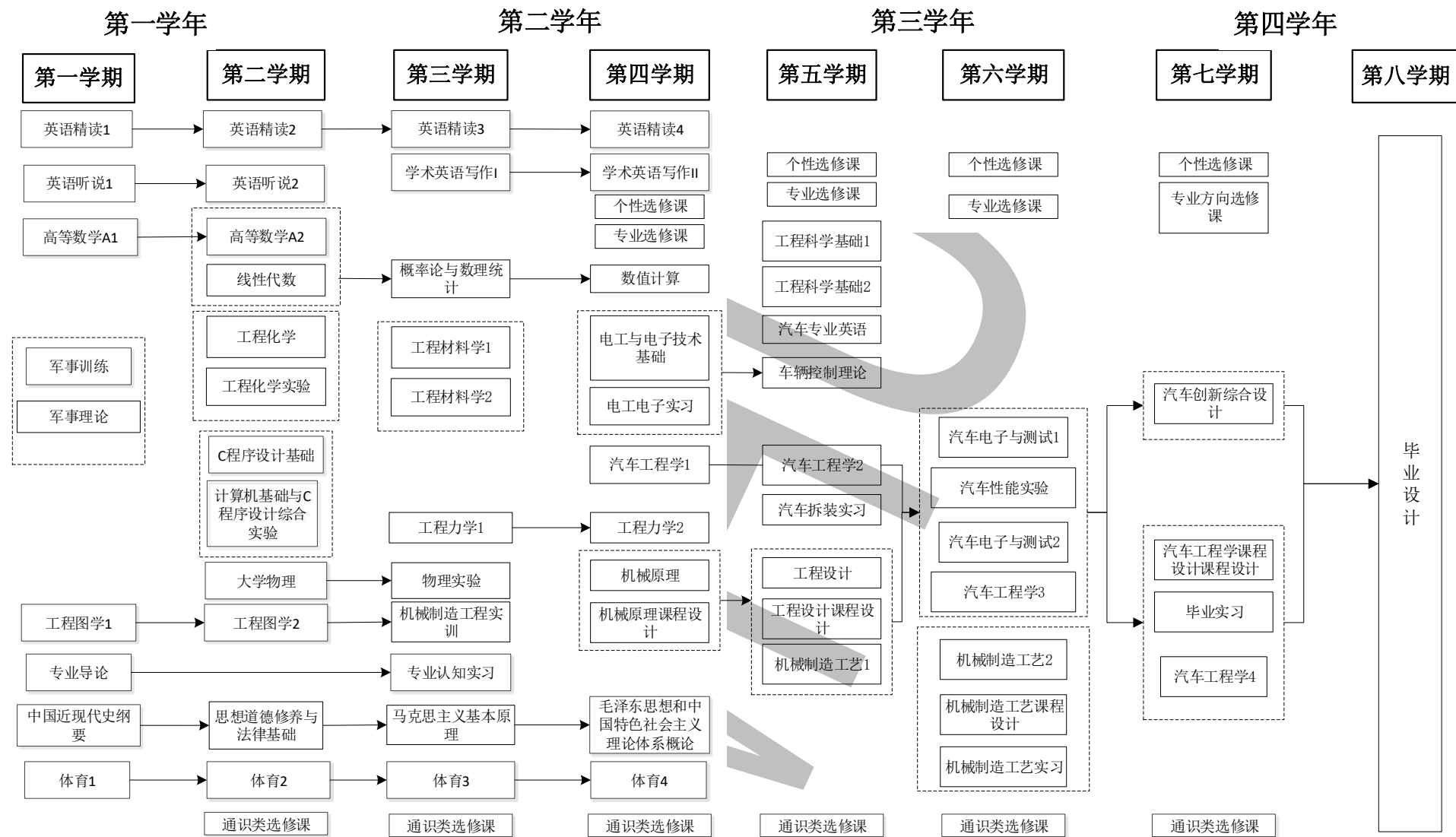
专业 核心 课程	专业 特色 课程	课程名称	车辆工程专业毕业要求													
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)		
	√	算法导论		√												
		轨道车辆概论		√	√					√			√		√	
		工程科学基础 2		√	√			√	√							
		MATLAB 及应用		√					√			√	√			
		赛车设计与制造					√	√	√	√	√					
		电机学基础		√												
	√	智能汽车概论		√	√					√	√					
		汽车电子与测试 2		√	√	√										
	√	整车开发与项目管理				√			√	√					√	
		汽车自动变速技术		√			√				√					
		计算机辅助工程分析		√	√				√					√		
	√	新能源汽车结构与原理		√	√	√			√	√						
	√	电动汽车电驱动理论与控制		√	√	√			√	√						
		汽车车身艺术设计		√				√	√	√						
	√	智能汽车环境感知技术	√		√					√	√					
	√	智能汽车决策规划与控制	√		√	√			√							
	√	人工智能概论		√	√					√	√					
		无人驾驶智能视觉系统原理与实践		√												
	√	汽车新技术概论		√	√					√	√					
		汽车专业英语			√	√								√		
		学术英语写作												√		
		军事训练	√													
		车辆工程专业认知实习								√	√					
		机械制造工程实训								√	√					
		机械原理课程设计		√	√											
		电工电子实习		√				√								
		工程设计课程设计		√	√											
		汽车拆装实习						√				√				

专业 核心 课程	专业 特色 课程	课程名称	车辆工程专业毕业要求											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		机械制造工艺实习									√			
		机械制造工艺课程设计			√	√								
		汽车工程学课程设计			√	√								
		汽车创新综合设计				√				√	√	√	√	√
		毕业实习	√							√	√	√		√
		毕业设计(论文)						√	√	√		√	√	√
		形势与政策	√							√				
		心理健康教育	√											√



三、课程教学进程图

III Teaching Process Map



车辆工程专业国际班2020版本本科培养方案

Undergraduate Education Plan for Specialty in Automotive Engineering International Class(2020)

四、 理论教学建议进程表

IV Theory Course Schedule

(一) 通识教育必修课程 General Education Required Courses									
课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议 修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4220001110	思想道德修养与法律基础 Morals, Ethics and Fundamentals of Law	3	48			8		2	
4220002110	中国近现代史纲要 Outline of Contemporary and Modern Chinese History	2	32					1	
4220003110	毛泽东思想和中国特色社会主义理论 体系概论 Introduction to Mao Zedong Thought and Socialism with Chinese Characteristics	4	96			32		4	
4220005110	马克思主义基本原理 Marxism Philosophy	3	48			8		3	
1060003130	军事理论 Military Theory	1	32			16		1	
4210001110	体育1 Physical Education I	1	32					1	
4210002110	体育2 Physical Education II	1	32					2	
4210003110	体育3 Physical Education III	1	32					3	
4210004110	体育4 Physical Education IV	1	32					4	
4030387170	英语精读1 College English I	3	64				16	1	
4030388170	英语精读2 College English II	3	64				16	2	英语精读1
	英语听说1 English Listening and Speaking I	2	32					1	
	英语听说2 English Listening and Speaking II	2	32					2	英语听说1
4120335170	C程序设计基础 Fundamentals of Computer Program Design(C)	2	32					1	

课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议 修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4120336170	计算机基础与C程序设计综合实验 Comprehensive Experiment of Computer Basic and Program Design(C)	1	32	32				1	
小 计 Subtotal		30	640	32	0	64	32		
(二) 通识教育选修课程 General Education Elective Courses									
创新创业类 Innovation and Entrepreneurship Courses		要求至少取得9个学分，且必须选修艺术体育类课程中的艺术类相关课程并取得至少2个学分，在创新创业类课程中至少选修一门课程，在人文社科类和经济管理类课程中分别至少选修一门。							
人文社科类 Arts and Social Science Courses									
经济管理类 Economy and Management Courses									
科学技术类 Science and Technology Courses									
艺术体育类 Art and Physical Education Courses									
(三) 专业教育必修课程 Basic Disciplinary Required Courses									
4090339170	车辆工程专业导论 Introduction to Automotive Engineering	1	16			2		1	
4050063110	高等数学A上 Advanced Mathematics I	5	80					1	
4050064110	高等数学A下 Advanced Mathematics II	5	80					2	高等数学上
4080371170	工程图学A上 Engineering Graphics I	3	56				8	1	
4080372170	工程图学A下 Engineering Graphics II	2.5	56				16	2	工程图学上
4050229110	线性代数 Linear Algebra	2.5	40					2	
4050463130	大学物理B Physics	5	80					2	
4200374170	工程化学 Engineering Chemistry	1.5	24					2	
4200375170	工程化学实验 Experiment of Engineering Chemistry	0.5	16	16				2	
4050224110	物理实验B Physics Experiment	1	32	32				3	
4090338170	工程材料学1 Engineering Materials I	2	32	2				3	
4050058110	概率论与数理统计B Probability and Mathematical Statistics	3	48					3	
4050071110	工程力学1 Engineering Mechanics I	4	64					3	
	工程力学2 Engineering Mechanics II	4	64	4				4	工程力学1
4050671170	数值计算A Numerical Calculation	2	32					4	
4080062110	机械原理 Mechanisms and Machines	3.5	56	4				4	

课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议 修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
4110265170	电工电子工程 Electrical and Electronic Engineering	4	64	10				4	
4090348170	工程材料学2 Engineering Materials II	2	32	2				3	工程材料学1
	汽车工程学1 Automotive Engineering I	3	48			4		4	
4090340170	工程科学基础1 Engineering Science Foundation I	3	48	4				5	
4080472170	工程设计 Engineering Design	3.5	56	4				5	
4080474170	机械制造工艺1 Manufacturing Technology I	2	32	4				5	
	汽车工程学2 Automotive Engineering II	3	48					5	
4090225170	车辆控制理论B Vehicle Control Theory Basic B	1.5	24					5	
4090355170	汽车工程学3 Automotive Engineering III	2.5	40					6	
4090053110	汽车性能实验 Automobile Performance Test	1	32	32				6	
4090345170	汽车电子与测试1 Automobile Electronics and Testing I	2	32					6	
4090347170	机械制造工艺2 Manufacturing Technology II	2	32					6	
4090141130	汽车工程学4 Automotive Engineering IV	2	32					7	
	小计 Subtotal	77	1296	114	0	6	24		

课程编号 Course Number	课程名称 Course Title	学分 Crts	学时分配 Including					建议 修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
(四) 专业教育选修课程 Specialized Elective Courses									
4090232170	汽车CAD/CAE (B) Computer Aided Design and Engineering of Automobile	1.5	24		8			4	
4090361170	算法导论 Introduction to Algorithms	1.5	24					4	
4090233170	轨道车辆概论B Introduction to Railway Vehicle	1.5	24					4	
4090341170	工程科学基础2 Engineering Science Foundation II	1.5	24					5	
4090236170	MATLAB及应用B MATLAB & Application	1.5	24		6			4	
4090349170	赛车设计与制造 Racing Car Design and Manufacture	1	16					5	
4090235170	电机学基础B Fundamentals of Electrical Machinery	1.5	24	2				5	
4090263170	智能汽车概论 Introduction to Intelligent Automobile	1	16					6	
4090346170	汽车电子与测试2 Automobile Electronics and Testing II	4	64	12				6	
4090224170	整车开发与项目管理 Vehicle Development and Project Management	1.5	24			8		7	
4090239170	汽车自动变速技术C Technology of Automobile Automatic Transmission	1.5	24	4		2		7	
4090350170	计算机辅助工程分析 Computer Aided Engineering Analysis	1.5	24		10			7	
4090242170	新能源汽车结构与原理C Structures and Theory of New Energy Automobile	1.5	24			2		7	
4090294170	电动汽车电驱动理论与控制B Electric Drive Theory and Control of Electric Vehicle	1.5	24					7	
4090249170	汽车车身艺术设计C Automobile Body Art Design	1.5	24		4			7	
	智能汽车环境感知技术 Intelligent Vehicle Environment Awareness Technology	1.5	24					7	
	智能汽车决策规划与控制 Decision Planning and Control of Intelligent Vehicle	1.5	24					7	
	人工智能概论 Introduction to Artificial Intelligence	1.5	24		8			7	
	无人驾驶智能视觉系统原理与实践 Principle and Practice of Unmanned Intelligent Vision System	1.5	24	4				7	
4090261170	汽车新技术概论B Automobile New Technology Introduction	1	16					7	
小计 Subtotal		31	472	22	28	12	0		
修读说明: 要求至少选修18.5学分。 NOTE: Minimum subtotal credits:18.5.									
(五) 个性课程 Personalized Elective Courses									
	英语精读3 College English III	3	64				16	3	

课程编号 Course Number	课程名称 Course Title	学分 Crs	学时分配 Including					建议 修读学期 Suggested Term	先修课程 Prerequisite Course
			总学时 Tot hrs.	实验 Exp.	上机 Ope- ration	实践 Prac- tice	课外 Extra- cur		
	英语精读4 College English IV	3	64				16	4	
	汽车专业英语 Automobile New Technology Introduction	2	32					5	
	学术英语写作I Academic English Writing I	2	32					3	
	学术英语写作II Academic English Writing II	2	32					4	
小 计 Subtotal		12	224	0	0	0	32		

五、集中性实践教学环节

V Practice Schedule

课程编号 Course Number	实践环节名称 Practice Courses Name	学分 Crs	周数 Weeks	建议修读学期 Suggested Term
1060002110	军事训练 Military Training	1.5	3	1
4090266170	车辆工程专业认知实习 Professional Cognition Practice	1	1	3
4080150110	机械制造工程实训B Training on Mechanical Manufacturing Engineering	4	4	3
4080149110	机械原理课程设计 Course Design of Mechanisms and Machines	1.5	1.5	4
4100069110	电工电子实习B Electrical and Electronic Engineering Pratices	1	1	4
4080473170	工程设计课程设计 Course Design of Engineering Design	2	2	5
4090084110	汽车拆装实习 Automobile Construction Practice	2	2	5 (分散)
4090351170	机械制造工艺实习 Manufacturing Technology Pratices	1	1	6
4090352170	机械制造工艺课程设计 Course Design of Manufacturing Technology	2	2	6
4090353170	汽车工程学课程设计 Course Design of Automotive Engineering	2	2	7
4090269170	汽车创新综合设计 Automotive Innovation Integrated Design	2	2	7
4090081110	毕业实习 Practice for Graduation	2	2	7
4090270170	毕业设计(论文) Graduation Thesis(Design)	8.5	17	8
小 计 Subtotal		30.5	40.5	

六、其它要求

VI Recommendations on Course Studies

《形势与政策》和《心理健康教育》课程为课外必修课程，分别计2个和1个课外学分。

Situation & Policy (2 credits) and Mental Health Education (1 credit) are the required extracurricular courses.

学院教学责任人：侯献军
专业培养方案责任人：余晨光