数理学院

School of Science

数学与应用数学专业培养方案

一、专业培养目标

本专业培养掌握数学科学的基本理论和基本方法，接受科学研究的基本训练，具备良好的科学文化素养，具有运用数学知识与使用计算机解决实际问题的能力，毕业后能在科技、教育、经济和金融等部门从事研究和教学工作，或在生产、经营及管理部门从事实际应用、开发研究和管理工作，“德、智、体、美、劳”全面发展的具有一定创新能力的数学与应用数学方面的高级人才。

二、毕业要求

本专业学生主要学习数学与应用数学的基础理论、基本方法，受到数学模型、计算机和数学软件方面的基本训练，在数学理论和应用两方面都受到良好的教育，具有较高的科学素养和较强的创新意识，具备科学研究、教学、解决实际问题及软件开发等方面的基本能力和较强的更新知识的能力。

毕业生应获得以下几个方面的知识和能力：

（1）具有较扎实的数学基础，接受系统的数学思维训练，掌握数学科学的思想方法；

（2）具备数学研究或运用数学知识解决实际问题的初步能力；

（3）了解数学的历史概况和广泛运用，以及当代数学的某些新发展和应用前景；

（4）能熟练使用计算机（包括常用语言、工具及一些数学软件），具有编写简单程序的能力；

（5）具有较强的语言表达能力，掌握资料的查询、文献检索以及运用现代技术获取相关信息的基本方法，并掌握一门外语；

（6）具备体育运动的一般知识，达到国家规定的大学生体育锻炼合格标准，具有健康的体魄和良好的心理素质。

三、主干学科

数学。

四、学制与学位

学制四年。学生修满所规定的最低毕业总学分，达到规定的毕业要求后，授予理学学士学位。

五、核心课程

学科基础课：数学分析、高等代数、空间解析几何、数学与应用数学专业导论、大学物理、常微分方程、概率论。

专业核心课：数理统计、数学建模、实变函数、复变函数、泛函分析、偏微分方程、数值分析、偏微分方程数值解、近世代数、拓扑学、微分几何、组合数学、金融数学。

专业拓展课：矩阵论、多元统计分析、时间序列分析、案例实务选讲、数学与应用数学前沿课、数学专业外语等。

课程实践：MATLAB 基础与应用、数学建模实验、统计分析软件、毕业设计（论文）等。

Undergraduate Program in Mathematics and Applied Mathematics

1. Academic Objectives

This major cultivates students to master the basic theories and methods of mathematical science. The students will be trained in scientific research and has good scientific and cultural literacy. They also will have the ability to use mathematical knowledge and use computers to solve practical problems. After graduation, they can engage in research and teaching in science and technology, education, economy and finance departments, or engage in practical application, development research and management in production, operation and management departments. They will become "Moral, intellectual, physical, aesthetic, labor" comprehensive development of mathematics and applied mathematics senior talents with certain innovation ability.

2. Graduation Requirements

Students in this major mainly study the basic theories and methods of mathematics and applied mathematics, receive basic training in mathematics models, computers and mathematics software, receive good education in both mathematical theory and application. They will have high scientific literacy and comparative skills, strong sense of innovation, basic ability in scientific research, teaching, solving practical problems and software development, and strong ability to update knowledge.

Graduates should acquire knowledge and abilities in the following areas:

(1) Have a solid mathematical foundation, accept systematic mathematical thinking training, and master mathematical scientific thinking methods;

(2) Possess the preliminary ability of mathematical research or applying mathematical knowledge to solve practical problems;

(3) Understand the historical overview and extensive application of mathematics, as well as some new developments and application prospects of contemporary mathematics;

(4) Be able to use computers proficiently (including common languages, tools and some mathematical software), and have the ability to write simple programs;

(5) Have a strong language expression ability, master the basic methods of data query, document retrieval and use modern technology to obtain relevant information, and master a foreign language;

(6) Possess general knowledge of sports, meet the national standards for college students' physical exercise qualifications, and have a healthy body and good psychological quality.

3. Main disciplines

Mathematics.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Science when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Basic Courses: Mathematical Analysis, Advanced Algebra, Analytic Geometry of Space, Introduction to Mathematics and Applied Mathematics, College Physics, Ordinary Differential Equations, Probability Theory.

Professional Core Courses: Mathematical Statistics, Mathematical Modeling, Real Variable Functions, Complex Variable Functions, Functional Analysis, Partial Differential Equations, Numerical Analysis, Numerical Solution of Partial Differential Equations, Modern Algebra, Topology, Differential Geometry, Combinatorial Mathematics, Financial Mathematics.

Professional Development Courses: Matrix Theory, Multivariate Statistical Analysis, Time

Series Analysis, Selected Cases, Frontier Courses of Mathematics and Applied Mathematics, English for Mathematics, etc.

Course Practice: MATLAB Foundation and Application, Mathematics Modeling Experiment, Statistical Analysis Software, Graduation Design (Thesis), etc.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester										
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25	1	4.25	5.25		3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	672	42	14	13		12	3						
	专业核心课程 Specialized Fundamental Courses	640	40				3	12		12	10		3	
	专业拓展课程 Specialized Development	64	4											
实践教育 Practical Education	课程实践 Course Practice	26 周 +80 学时	23		1	7	1		4			4		6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				146										
选修课总学分 Elective course credits				22										
最低毕业总学分 Total Credits				168										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	48	3	48			考试 Exam	5	
GR181013	形 势 与 政 策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形 势 与 政 策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形 势 与 政 策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形 势 与 政 策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形 势 与 政 策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形 势 与 政 策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形 势 与 政 策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形 势 与 政 策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303006	大学生心理素质教育（2） Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	3	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English (2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	41	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5、6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、**学科基础课程** (Disciplinary Fundamental Courses)：672 **学时**（672 Hours)，42 **学分** (42 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191019	数学分析（1） Mathematical Analysis (1)	96	6	96			考试 Exam	1	
DR191020	数学分析（2） Mathematical Analysis (2)	96	6	96			考试 Exam	2	
DR192021	数学分析（3） Mathematical Analysis (3)	96	6	96			考试 Exam	3	
DR191022	高等代数（1） Advanced Algebra (1)	64	4	64			考试 Exam	1	
DR191023	高等代数（2） Advanced Algebra (2)	64	4	64			考试 Exam	2	
DR191024	空间解析几何 Analytic Geometry of Space	48	3	48			考试 Exam	1	
DR190038	数学与应用数学专业导论 Introduction to Mathematics and Applied Mathematics	16	1	16			考查 Term Paper	1	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
SR192031	常微分方程 Ordinary Differential Equations	48	3	48			考试 Exam	3	
DR192025	概率论 Probability Theory	48	3	48			考试 Exam	4	
总计 Total		672	42	672					

4、**专业核心课程** (Core Professional Courses)：640 学时 (640 hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR194029	近世代数 Modern Algebra	48	3	48			考试 Exam	3	
DR192100	拓扑学 Topology	48	3	48			考试 Exam	4	
DR192026	实变函数 Real Variable Functions	48	3	48			考试 Exam	4	
SR192103	复变函数 Complex Variable Functions	48	3	48			考试 Exam	4	
SR192060	数学建模 Mathematical Modeling	48	3	48			考查 Term Paper	4	
DR193028	泛函分析 Functional Analysis	48	3	48			考试 Exam	5	
SR193033	数理统计 Mathematical Statistics	48	3	48			考试 Exam	5	
SR193104	数值分析 Numerical Analysis	48	3	48			考试 Exam	5	
SR193105	偏微分方程 Partial Differential Equations	48	3	48			考试 Exam	5	
SR193035	偏微分方程数值解 Numerical Solution of Partial Differential Equations	48	3	48			考试 Exam	6	
SR193036	组合数学 Combinatorial Mathematics	64	4	64			考试 Exam	6	
SR193106	微分几何 Differential Geometry	48	3	48			考试 Exam	6	
SR193037	金融数学 Financial Mathematics	48	3	48			考试 Exam	7	
总计 Total		640	40	640					

5、**专业拓展课程** (Specialized Development Courses)：64 **学时** (64 hours)，4 **学分** (4 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS193107	矩阵论 Matrix Theory	48	3	48			考试 Exam	6	
SR193108	多元统计分析 Multivariate Statistical Analysis	48	3	48			考试 Exam	6	
SR194109	时间序列分析 Time Series Analysis	48	3	48			考试 Exam	7	
SR194110	案例实务选讲 Selected Cases	32	2	32			考试 Exam	7	
SS194111	数学与应用数学前沿课 Frontier Courses of Mathematics and Applied Mathematics	16	1	16			考查 Term Paper	7	
SR194038	数学专业外语 English for Mathematics	32	2	32			考试 Exam	7	
总计 Total		224	14	224					

6、**课程实践** (Practice Course)：26 **周** +80 **学时** (26 weeks and 80 hours)，23 **学分** (23 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	1	考查 Term Paper	3	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191045	实验物理（1） Physics Experiments (1)	24 学时	1	考试 Exam	2	
PR192046	实验物理（2） Physics Experiments (2)	24 学时	1	考试 Exam	3	
PR191041	MATLAB 基础与应用 Fundamentals and Applications of MATLAB	4 周	4	考查 Term Paper	1 夏	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR192042	数学建模实验 Mathematics Modeling Experiment	4 周	4	考查 Term Paper	2 夏	
PR193043	统计分析软件 Statistical Analysis Software	4 周	4	考查 Term Paper	3 夏	
PR194044	毕业设计（论文） Graduation Design (Thesis)	12 周	6	考查 Term Paper	8	
总计 Total		26 周 +80 学时	23			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

数据计算及应用专业培养方案

一、专业培养目标

本专业面向新兴行业对多学科交叉融合的复合型人才需求，培养掌握数学、信息科学和统计学的基本理论、方法，具备一定的数学建模、大数据分析以及程序设计能力，具备解决实际问题和初步从事科学研究的能力，具有良好的科学素养、创新精神和全球视野，毕业后可在资源勘查、互联网、金融、医疗等领域从事大数据的采集、分析与处理等方面工作的德、智、体、美、劳全面发展的创新人才。

二、毕业要求

本专业学生主要学习现代数学、统计学和计算机科学的基础理论，系统地掌握科学计算和数据处理的技术和方法，能够对应用中的各类数据问题建立数学模型，并熟练地运用科学计算和数据处理技术解决这些实际问题。毕业生应获得以下几个方面的知识和能力：

（1）具有良好的数学、统计学、计算机科学基础思维与方法，掌握数据科学理论和应用领域的基础知识，系统地进行数据思维训练，掌握数据科学的思想方法；

（2）具有运用计算机和数据相关软件解决数据问题的初步能力；

（3）熟悉数据应用领域（如地质资源、经济金融、生物医疗等），具有分析、解决应用领域实际问题的初步能力，以及开发典型案例的工程实践能力；

（4）具有终身学习意识，能运用现代信息技术手段获取相关信息和新技术、新知识，持续提高创新能力；

（5）具有较好英语应用能力，能阅读专业英文材料，具有宽广的国际视野和跨文化交流、竞争与合作能力；

（6）掌握文件检索、资料查询的基本方法，有较强的自学能力和独立思考能力，具有一定的科学研究和实际工作能力；

（7）具有良好的体魄和健康的身心以及一定的军事基本知识和国防意识，养成良好的体育锻炼和卫生习惯，达到国家规定的大学生体育和军事训练合格标准。具有良好的思想品德、社会公德和职业道德。

三、主干学科

数学、统计学、计算机科学。

四、学制与学位

学制四年，学生修满所规定的最低毕业学分，达到规定的毕业要求后，授予理学学士学位。

五、核心课程

学科基础课：数学分析、高等代数、空间解析几何、数据计算及应用专业导论、常微分方程、概率论。

专业核心课：数理统计、数据科学概论、数据结构与算法、数据库系统原理及应用、离散数学、矩阵计算、算法设计与分析、数值分析、最优化方法、数据挖掘、时间序列分析、多元统计分析、数据建模、案例实务选讲。

专业拓展课：Python 程序设计、金融数学、机器学习、数据计算及应用专业前沿等。

课程实践：MATLAB 基础与应用、大数据技术综合应用创新实践、数据结构实践、数据库设计实践、智能算法、统计分析软件、毕业设计（论文）等。

Undergraduate Program in Data Calculation and Application

1. Academic Objectives

This major is geared to the needs of interdisciplinary and interdisciplinary talents in emerging industries. It cultivates innovative talents with all-round development in morality, intelligence, physical, aesthetic and labor, who grasping the basic theories and methods of mathematics, information science and statistics, having certain abilities of mathematical modeling analysis and big data analysis and program design, having the ability to solve practical problems and preliminary engage in scientific research, having good scientific literacy, innovative spirit and global vision. After graduation, they can be engaged in the collection, analysis and processing of big data in the fields of resource exploration, Internet, finance and medical treatment.

2. Graduation Requirements

Students in this major mainly study the basic theory of modern mathematics, statistics and computer science, systematically master the scientific computing and data processing techniques and methods. They are cultivated to build mathematical model for all kinds of data problem in the application, and expertly use scientific computing and data processing technology to solve the practical problems. Graduates should acquire knowledge and abilities in the following aspects:

(1) Have good basic thought and methods of mathematics, statistics and computer science, master the basic knowledge of data science theory and application fields, conduct data thinking training systematically, and master the thinking and methods of data science;

(2) Initial ability to solve data problems with computers and data-related software;

(3) Familiar with data application fields (such as geological resources, economics and finance, biomedicine, etc.), have the preliminary ability to analyze and solve practical problems in application fields, and the engineering practice ability to develop typical cases;

(4) Have the consciousness of lifelong learning, can use modern information technology means to obtain relevant information and new technology, new knowledge, and continuously improve the innovation ability;

(5) Have good English application ability, be able to read professional English literature, have a broad international vision and cross-cultural communication, competition and cooperation ability;

(6) Master the basic methods of document retrieval and data inquiry, have strong self-learning ability and independent thinking ability, and have certain scientific research and practical work ability.

(7) Good physique, healthy body and mind as well as certain basic military knowledge and national defense consciousness, form good physical exercise and hygiene habits, to meet the national regulations of college students' physical education and military training qualified standards. Have a good ideological and moral character, social ethics and professional ethics.

3. Main disciplines

Mathematics, Statistics, Computer Science.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Science when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Basic Courses: Mathematical Analysis, Advanced Algebra, Analytic Geometry of Space, Introduction to Data Calculation and Application, Ordinary Differential Equations, Probability Theory.

Professional Core Courses: Mathematical Statistics, Introduction to Data Science, Data Structure and Algorithm, Database System Principle and Applications, Discrete Mathematics, Matrix Computation, Algorithm Design and Analysis, Numerical Analysis, Method of Optimization, Data Mining, Time Series Analysis, Multivariate Statistical Analysis, Mathematical Modeling, Selected Cases.

Professional Development Courses: Python Programming, Financial Mathematics, Machine Learning, Frontier Courses of Data Calculation and Application, etc.

Course Practice: MATLAB Foundation and Application, Innovative Practice of Comprehensive Application of Big Data Technology, Practice of Data Structure, Practice of Database Design, Intelligent Algorithm, Statistical Analysis Software, Graduation Design (Thesis), etc.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester											
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25	1	4.25	5.25		3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	576	36	13	11		9	3						
	专业核心课程 Specialized Fundamental Courses	640	40				6	6		15	8		5	
	专业拓展课程 Specialized Development	160	10		3								7	
实践教育 Practical Education	课程实践 Course Practice	26 周 +144 学时	28			7	2	2	4		3	4		6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				144										
选修课总学分 Elective course credits				28										
最低毕业总学分 Total Credits				166										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	48	3	48			考试 Exam	5	
GR181013	形 势 与 政 策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形 势 与 政 策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形 势 与 政 策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形 势 与 政 策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形 势 与 政 策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形 势 与 政 策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形 势 与 政 策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形 势 与 政 策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303006	大学生心理素质教育（2） Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	3	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English (2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5、6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-4	
总计 Total			12			

3、**学科基础课程** (Disciplinary Fundamental Courses)：576 **学时**（576 Hours)，36 **学分** (36 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191019	数学分析（1） Mathematical Analysis (1)	96	6	96			考查 Term Paper	1	
DR191020	数学分析（2） Mathematical Analysis (2)	96	6	96			考试 Exam	2	
DR192021	数学分析（3） Mathematical Analysis (3)	96	6	96			考试 Exam	3	
DR191022	高等代数（1） Advanced Algebra (1)	64	4	64			考试 Exam	1	
DR191023	高等代数（2） Advanced Algebra (2)	64	4	64			考试 Exam	2	
DR191024	空间解析几何 Analytic Geometry of Space	48	3	48			考试 Exam	1	
DR190037	数据计算及应用专业导论 Introduction to Data Calculation and Application	16	1	16			考试 Exam	1	
DR192025	概率论 Probability Theory	48	3	48			考试 Exam	4	
SR192031	常微分方程 Ordinary Differential Equations	48	3	48			考试 Exam	3	
总计 Total		576	36	576					

4、**专业核心课程** (Core Professional Courses)：640 学时 (640 hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SR192113	数据建模 Data Modeling	48	3	48			考查 Term Paper	4	
SR193033	数理统计 Mathematical Statistics	48	3	48			考试 Exam	5	
SR193104	数值分析 Numerical Analysis	48	3	48			考试 Exam	5	
SR193114	数据科学概论 Introduction to Data Science	48	3	48			考试 Exam	6	
DR042282	数据结构与算法 Data Structure and Algorithm	48	3	40		8	考试 Exam	3	信工
SR192115	离散数学 Discrete Mathematics	48	3	48			考试 Exam	3	
DR042055	数据库系统原理及应用 Database System Principles and Application	48	3	24		24	考试 Exam	4	信工
DR043009	算法设计与分析 Algorithm Design and Analysis	48	3	32		16	考试 Exam	5	信工
SR043266	数据挖掘 Data Mining	48	3	32		16	考试 Exam	5	信工
SR193117	矩阵计算 Matrix Computations	32	2	32			考试 Exam	6	
SR193108	多元统计分析 Multivariate Statistical Analysis	48	3	48			考试 Exam	6	
SR194109	时间序列分析 Time Series Analysis	48	3	48			考试 Exam	7	
SR193118	最优化方法 Methods of Optimization	48	3	48			考试 Exam	5	
SR194110	案例实务选讲 Selected Cases	32	2	32			考查 Term Paper	7	
总计 Total		640	40	576		64			

5、**专业拓展课程** (Specialized Development Courses)：64 **学时** (64 hours)，4 **学分** (4 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
SS194119	Python 程序设计 Python Programming	48	3	32		16	考查 Term Paper	7	
SR193037	金融数学 Financial Mathematics	48	3	48			考试 Exam	7	
SS194120	机器学习 Machine Learning	48	3	48			考查 Term Paper	7	
SS194121	数据计算及应用前沿课 Frontier Courses of Data Calculation and Application	16	1	16			考查 Term Paper	7	
总计 Total		160	10	144		16			

6、**课程实践** (Practice Course)：26 **周** +144 **学时** (26 weeks and 144 hours)，28 **学分** (28 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	1	考查 Term Paper	3	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
PR191041	MATLAB 基础与应用 Fundamentals and Applications of MATLAB	4 周	4	考查 Term Paper	1 夏	
PR192122	大数据技术综合应用创新实践 Innovative Practice of Comprehensive Application of Big Data Technology	4 周	4	考查 Term Paper	2 夏	
PR042263	数据结构实践 Practice of Data Structure	32 学时	2	考查 Term Paper	3	
PR042261	数据库设计实践 Practice of Database Design	32 学时	2	考查 Term Paper	4	
PR193043	统计分析软件 Statistical Analysis Software	4 周	4	考查 Term Paper	3 夏	
PR193123	智能算法 Intelligence Algorithm	48 学时	3	考试 Exam	6	

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR194044	毕业设计（论文） Graduation Design (Thesis)	12	6	考查 Term Paper	8	
总计 Total		26 周 +144 学时	28			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.

创新实验班培养方案

一、专业培养目标

创新实验班深入贯彻立德树人根本任务，遵循 “加强基础、拓宽专业、因材施教、重点培养”的原则，突出学科交叉融合，以培养“品德优良、基础厚实、知识广博、专业精深”的拔尖创新人才为目标。加强数理化和计算机基础教育，注重学生个性化发展，创新教学方式和培养模式，旨在培养我校优势专业和学科领域的杰出领军人才。

二、毕业要求

创新实验班 2 年级教学计划单列，重要基础课单独开班，实行研究型教学模式，任课教师全部通过精选或聘请校外名师授课，同时要选修人文素质类课程，培养形象思维能力。3-4 年级完成规定学分，培养方案由导师与学生共同确定，专业课程选修完全体现个性化要求。学生可在导师指导下自由选课和选择学习方式，也可以在国内外名校选修相关课程，学校资助学生赴国外名校短期学习 6-12 个月，选修 4-8 门课程。只要求 3-4 年级选修的总学分不低于 60 学分（含教学实习、毕业论文、思想政治课等学分）。

本科毕业时应具备以下的知识和能力：

（1）具有扎实的数理化、计算机基础知识及较高的人文素养。

（2）掌握系统的所学专业的基础理论、基础知识和基本技能，了解所学学科的发展前沿，具有较强的实践技能和初步的科学研究能力。

（3）具有强的自主学习能力和创新意识，较强的中英文沟通、表达与写作能力。

三、主干学科

土木工程、城市地下空间工程、安全工程、材料科学与工程、计算机科学与技术、地理信息科学、水文与水资源工程、环境工程、石油工程、新能源科学与工程、测绘工程、遥感科学与技术、地球物理学、海洋科学和数学与应用数学。

四、学制与学位

学制四年。学生修满规定的最低毕业学分，达到毕业要求后，授予理学或工学学士学位。

五、核心课程

专业核心课程：由导师与学生共同确定修读课程，共 35 学分。

实践课程：综合物理实验、专业实习、毕业论文。

Undergraduate Program for Innovation Class

1. Academic Objectives

Innovation Class thoroughly implements the fundamental task of Building Morality and cultivating people, follows the principle of "Enhancing Foundation, Broadening Specialty, Individualized Teaching, Focal Training" highlight mult-disciplinary, and aims to cultivate top-notch innovative talents with "Unblemished Character, Solid Grasp of Basics, Broad Knowledge, and Profound Expertise". The class strengthens the basic education of mathematics, chemistry and computer, pays attention to the personalized development of students, innovates teaching methods and training modes, and aims to cultivate outstanding leading talents in advantageous majors and subject fields of our university.

2. Graduation Requirements

The first and second-year Innovation Class implement a separate teaching plan, which stresses mathematics, physics, chemistry. Students are settled in separate classes for important basic courses and follow a research-oriented teaching model. All teachers are carefully-chosen professors from this university or famous professors from other universities. At the same time, to train the imaginative thinking ability, humanity courses are provided as optional courses. The third and fourth-year students are required to earn necessary credits. The training programs would be jointly formulated by each supervisor and his student(s). The optional specialty courses fully reflect individual requirements. Students are free to choose courses under the guidance of instructors. Also, students are free to choose to study in prestigious universities, or abroad. This university can subsidize students to study 4-8 elective courses in an overseas prestigious university for 6-12 months. The minimum credits required for third and fourth-year students is no less than 60 credits.

Graduates should possess the following knowledge and abilities:

(1) To have solid basic knowledge of mathematics, physics and chemistry and higher cultural literacy.

(2) To grasp basic theories, knowledge and skills of the major, know the forefront developments, be familiar with methods for field work of geosciences, gain practical skills and initial capacity of scientific research.

(3) To gain a strong ability for autonomous learning and innovative consciousness and be fluent in English for communications, expression and writing.

3. Main disciplines

Civil engineering, urban underground space engineering, safety engineering, materials science and engineering, computer science and technology, geographic information science, hydrology and water resources engineering, environmental engineering, petroleum engineering, new energy science and engineering, surveying and mapping engineering, remote sensing science and technology, geophysics, marine science and mathematics and applied mathematics.

4. Length of Schooling and Degree

The length of schooling is four years of full-time study. Students will be awarded the Bachelor Degree of Science or Engineering when they have completed the required minimum credits and have met all other requirements.

5. Core Courses

Specialized Core Courses: Formulated by the instructor and students (35 credits).

Practice Courses: Comprehensive Physics Experiments, Professional Practice, Graduation Thesis.

六、最低毕业总学分要求及学分分配 (Minimum Required Credits and Distribution)

课程模块 Course module	课程类别 Course Classification	学时数 Hours	学分 Credits	学 期 Semester											
				1	2	1 夏	3	4	2 夏	5	6	3 夏	7	8
通识教育 Liberal Education	通识教育必修课程 Required Courses of General Education	730	40	11.25	13.25	1	4.25	5.25		3.25	1.25		0.25	0.25
	通识教育选修课程 Selective Courses of General Education	192	12											
专业教育 Professional Education	学科基础课程 Disciplinary Fundamental Courses	936	58.5	6	9		23.5	20						
	专业核心课程 Specialized Fundamental Courses	560	35											
	专业拓展课程 Specialized Development	32	2					2						
实践教育 Practical Education	课程实践 Course Practice	20 周 +64 学时	18			4	2					6		6
	课外实践 Extracurricular practice		6											
必修课总学分 Required course credits				153.5										
选修课总学分 Elective course credits				18										
最低毕业总学分 Total Credits				171.5										

七、课程设置 (Curriculum)

1、通识教育必修课程 (Required Courses of General Education)：730 学时 (730 Hours)，40 学分 (40 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR181009	思想道德与法治 Ideological Morality and Rule of Law	48	3	40	8		考试 Exam	1	
GR181008	中国近现代史纲要 Essentials of Modern Chinese History	48	3	40	8		考试 Exam	2	
GR182014	马克思主义基本原理 Fundamental Principles of Marxism	48	3	40	8		考试 Exam	3	
GR182024	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Zedong Thoughts and Theoretical System of the Chinese Characteristic Socialism	32	2	32			考试 Exam	4	
GR182022	习近平新时代中国特色社会主义思想概论 Introduction to Xi Jinping Thoughts on Socialism with Chinese Characteristics in the New Era	48	3	48			考试 Exam	5	
GR181013	形 势 与 政 策 (1) Situation and Policy(1)	4	0.25	4			考查 Term Paper	1	
GR181014	形 势 与 政 策 (2) Situation and Policy(2)	4	0.25	4			考查 Term Paper	2	
GR181015	形 势 与 政 策 (3) Situation and Policy(3)	4	0.25	4			考查 Term Paper	3	
GR181016	形 势 与 政 策 (4) Situation and Policy(4)	4	0.25	4			考查 Term Paper	4	
GR181017	形 势 与 政 策 (5) Situation and Policy(5)	4	0.25	4			考查 Term Paper	5	
GR181018	形 势 与 政 策 (6) Situation and Policy(6)	4	0.25	4			考查 Term Paper	6	
GR181019	形 势 与 政 策 (7) Situation and Policy(7)	4	0.25	4			考查 Term Paper	7	
GR181020	形 势 与 政 策 (8) Situation and Policy(8)	4	0.25	4			考查 Term Paper	8	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
GR301004	大学生职业生涯规划与就业指导（1） Career Planning and Employment Guidance for University Students (1)	20	1	16	4		考试 Exam	2	
GR303005	大学生职业生涯规划与就业指导（2） Career Planning and Employment Guidance for University Students (2)	18	1	12	6		考试 Exam	6	
GR301005	大学生心理素质教育（1） Mental Health (1)	16	1	16			考查 Term Paper	1	
GR303006	大学生心理素质教育（2） Mental Health (2)	16	1	16			考查 Term Paper	5	
GR302008	军事理论 Military Theory	36	1	36			考试 Exam	3	
GR081071	大学英语（1） College English (1)	64	4	64			考试 Exam	1	
GR081072	大学英语（2） College English (2)	32	2	32			考试 Exam	2	
GR081067	大学英语素质拓展课 Competence-oriented Education for College English	32	2	32			考试 Exam	2	
GR141005	体育（1）（系列课程） Physical Education (1)	32	1		32		考试 Exam	1	
GR141006	体育（2）（系列课程） Physical Education(2)	32	1		32		考试 Exam	2	
GR142007	体育（3）（系列课程） Physical Education(3)	32	1		32		考试 Exam	3	
GR142008	体育（4）（系列课程） Physical Education (4)	32	1		32		考试 Exam	4	
GR041001	大学计算机 College Computer	32	2	16	16		考试 Exam	1	
GR041003	程序设计基础 A Fundamentals of Programming A	64	4	24	24	16	考试 Exam	2	
总计 Total		730	40	492	222	16			

2、**通识教育选修** (Selective Courses of General Education)：192 **学时** (192Hours)，12 **学分** (12 Credits)

序号 No.	课程类别 Courses Classification	课程名称 Courses Name	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
1	人文社科类（含在线课程） Humanities and Social Sciences Courses (Inc. Online courses)	见附件 1	7	考查 Term Paper	2-8	4 个类别中选修 7 个学分，其中，《大学生安全教育》（1 学分）必选。
2	自然科学类（含在线课程） Natural Science Courses (Inc. Online Courses)	见附件 2		考查 Term Paper	2-8	
3	自然文化类 Natural Culture Courses	见附件 3		考查 Term Paper	2-8	
4	体育与健康类 Sports and Health Courses	见附件 4		考查 Term Paper	5-8	
5	创新创业教育类（含在线课程） Innovation and Entrepreneurship Courses (Inc. Online Courses)	见附件 5、6	3	考查 Term Paper	2-8	选修 3 个学分，其中《新生研讨课》（1 学分）必选。
6	审美与艺术类 Aesthetics and Art Courses	见附件 7	2	考查 Term Paper	2-8	
总计 Total			12			

3、**学科基础课程** (Disciplinary Fundamental Courses)：936 **学时** (936 Hours)，58.5 **学分** (58.5 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR191001	高等数学 A (1) Advanced Mathematics A (1)	96	6	96			考试 Exam	1	
DR191002	高等数学 A (2) Advanced Mathematics A (2)	96	6	96			考试 Exam	2	
DR191008	大学物理（1） College Physics (1)	48	3	48			考试 Exam	2	
DR192009	大学物理（2） College Physics (2)	48	3	48			考试 Exam	3	
DR192056	线性代数 Linear Algebra	40	2.5	40			考试 Exam	3	
DR192006	概率论与数理统计 Probability and Mathematics Statistic	48	3	48			考试 Exam	4	
DR022360	工程力学 Engineering Mechanics	48	3	48			考试 Exam	4	
DR042247	数据结构与算法 Data Structure and Algorithm	48	3	36	12		考试 Exam	3	
DR042280	人工智能原理 Principles of Artificial Intelligence	48	3	36	12		考试 Exam	4	

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR042300	Python 语言 Python language	32	2	24	8		考试 Exam	3	
DR192130	数学建模 Mathematical Modeling	48	3	32	16		考试 Exam	4	
DR192132	量子力学导论 Introduction to quantum mechanics	32	2	32			考试 Exam	4	
DR192133	运筹与控制 Operations and control	48	3	48			考试 Exam	4	
DR192135	光电器件及应用 Optoelectronic devices and Applications	48	3	38	10		考试 Exam	4	
DR192136	数学物理方法 Mathematical physics method	64	4	64			考试 Exam	3	
DR192198	数理纵横谈 Introduction of Mathematics	32	2	32			考查 Term Paper	3	
DR192199	化学通论 General theory of Chemistry	64	4	64			考试 Exam	3	
GR083059	英语听说 English Listening and Speaking	48	3	48			考试 Exam	3	
总计 Total		936	58.5	878	58				

4、**专业核心课程** (Core Professional Courses)：560 学时 (560 hours)，35 学分 (35 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
总计 Total			35						

注：创新班的专业核心课程由导师和学生共同确定，不少于 35 学分。

5、**专业拓展课程** (Specialized Development Courses)：32 **学时** (32 hours)，2 **学分** (2 Credits)

课程代码 Course Code	课程名称 Course Name	总学时 Hours	学分 Credits	讲课学时 Lecture	实验学时 Experiment	线上学时 Online	考核方式 Assessment	开课学期 Semester	备注 Notes
DR192131	学科前沿课 Frontier Courses	32	2	32			考查 Term Paper	4	
总计 Total		32	2	32					

6、**课程实践** (Practice Course)：20 **周** +64 **学时** (20 weeks and 64 hours)，18 **学分** (18 Credits)

课程代码 Course Code	课程名称 Course Name	周数（学时） Week(hour)	学分 Credits	考核方式 Assessment	开课学期 Semester	备注 Notes
PR311003	军事技能训练 Military Theory and Practice	2 周	2	考查 Term Paper	3	
PR181010	思想政治社会实践 Political Social Practice	32 学时	2	考查 Term Paper	1 夏	
DR192197	综合物理实验 Comprehensive Physics Experiment	32 学时	2	考试 Exam	3	
PR193052	专业实习 Field Production Practice	6 周	6	考查 Term Paper	3 夏	
PR193053	毕业论文 Graduation Thesis	12 周	6	考查 Term Paper	8	
总计 Total		20 周 + 64 学时	18			

7、**课外实践** (Extracurricular practice)：6 **学分** (6 Credits)

包括主题教育活动、社会实践、志愿服务、勤工助学、学科竞赛、文体活动、创新创业活动、劳动实践等，其学分的认定按照教务处相关规定执行。

Extracurricular practice include Theme Education, Social Practice, Volunteer Service, Work-study Program, Discipline Competition, Cultural and Sports Activities, Innovative and Entrepreneurial Activities, Labor Practice and so on. The recognition of the credits for extracurricular practice shall be implemented according to the regulations of Academic Affairs Office.