

廣東工業大學

Guangdong University of Technology



数学与统计学院  
数学与应用数学专业人才培养方案  
自 2022 级开始执行

执笔：（签字） \_\_\_\_\_ 专业负责人：（签字） \_\_\_\_\_

教学副院长：（签字） \_\_\_\_\_

行政负责人：（签字/学院盖章）： \_\_\_\_\_

# 数学与统计学院

## 数学与应用数学本科专业人才培养方案

School of Mathematics and Statistics

Mathematics and Applied Mathematics Undergraduates Cultivation

Scheme

### 前言（修订说明）

数学与应用数学专业是搭建数学与现实世界的桥梁的专业，为自然科学、工程技术、社会科学等领域相关专业提供新的数学方法和理论，属于基础学科专业。随着社会和科技的迅猛发展，数学与应用数学专业与自然科学、工程技术、社会科学等领域相关专业的联系日益紧密。“与实际结合、问题驱动”是该专业发展的不竭动力和重要特征。本专业既致力于搭建坚实的数学基础，又致力于实现数学知识的广泛应用。本专业对跨专业就业和深造非常友好。本专业将打造“数学基地班”。

我院数学与应用数学 2012 年被评为广东省特色重点学科，目前是省级一流本科专业建设点。本专业面向国家战略，立足于对接粤港澳大湾区创新驱动与转型升级的人才新需求，以数学应用为载体、通过项目驱动构建数学与新工科交叉融合的多学科育人模式和办学特色，着力培养学生的创新和实践能力。本专业具备良好的硬件和软件办学条件，拥有实践教学基地，建有数学应用实验室，师资力量雄厚。本专业近几年发展迅速，且具有非常好的发展前景。

### Introduction

Mathematics and applied mathematics is a major that builds a bridge between mathematics and the real world. It provides new mathematical methods and theories for related majors in the fields of natural science, engineering technology, social science and so on. It belongs to the basic discipline major. With the rapid development of society and science and technology, mathematics and applied mathematics is increasingly closely related to relative majors in the fields of natural science, engineering technology and social science. "Combined with reality, problem-driven" is the inexhaustible driving force and important feature of the development of the specialty. This major is committed to building a solid mathematical foundation, but also to realizing the wide application of mathematical knowledge. This major is very friendly to inter-professional employment and further study. This major will build "mathematics base classes".

In 2012, our mathematics and applied mathematics was awarded as a characteristic key discipline of Guangdong Province. And it is currently the first-class undergraduate major construction point at the provincial level. This major is oriented to the national strategy and focused on the new talent needs of innovation-driven and transformation and upgrading in the Guangdong-Hong Kong-Macao Greater Bay Area. By the mathematical application as the carrier and via project driven, this major aims to build a multi-disciplinary education mode and school-running characteristics of mathematics and new engineering cross-fusion. The ultimate project of this major is to cultivate the innovation and practical application ability of students. This major has good hardware and software conditions. It has a practical teaching base and a mathematical application laboratory. It is also developed by teacher with high abilities. This major has developed rapidly in recent years and has a very good development prospect.

# 数学与应用数学

## Mathematics and Applied Mathematics

专业代码: 070101

Code: 070101

学制: 四年

Length of schooling: 4 years

授予学位: 理学学士

Degree: Bachelor Degree of Science

制定(修订)时间: 2021 年 12 月

Time of revision: December 2021

### 一. 培养目标

#### I. Educational objectives

本专业贯彻党的“十九大”教育方针和广东省创新强校工程精神, 践行广东工业大学坚持“与广东崛起共成长, 为广东发展作贡献”的办学理念, 依托工科大学的背景, 以“周到的管理服务, 深厚的数学熏陶, 良好的专业训练”为宗旨, 培养学生具有良好的道德修养、数学素养、团队创作精神、创新创业意识、服务社会思想, 训练学生掌握数学科学的基本理论和基本方法, 从而达到科学研究的初步训练, 使其具有研究自然科学、人文科学与工程技术中的数学问题的基本能力, 能运用数学知识、建立数学模型、使用计算机解决诸如图形图像及信号处理、信息管理、科学计算和计算机应用等实际问题。培养既有深厚理科底蕴又有较强实际应用能力的高素质应用型人才。经过本专业四年的学习, 使学生毕业后既能够在企业从事运用数学方法和计算机技术解决实际问题的、在教育科研部门从事教学和研究工作, 又能够持续为高等院校和相关研究所输送优质的研究生生源。

The major is to cultivate students with good moral cultivation, mathematical literacy, team spirit, innovation and entrepreneurship awareness, thought of serving society and train students to master the basic theory of mathematics science and basic methods under the principle of the education policy of the 18<sup>th</sup> CCCP and creative spirit of Guangdong, so as to achieve the initial training of scientific research. In this way, students will have the basic ability to study the mathematical problems in natural science, human science and engineering technology and can solve the practical problems such as artificial intelligence, machine learning, graphics and signal processing, information management, scientific computing and computer applications with mathematical knowledge, the establishment of mathematical models and the use of computer. After four years of professional study, students can take the jobs that require practical problems solving with the use of mathematical methods and computer technology, and are able to be engaged in teaching and research work in the education and scientific research departments. Moreover, we can continuously transport excellent postgraduate students for institutions of higher learning and related research institutes.

### 二. 毕业要求

#### II. Graduation requirements

本专业学生在培养过程中, 强调对学生道德修养、数学素养和创新意识的培养; 通过竞赛、讲座、实习、实训等形式的培训, 促使学生具备独立工作、团队合作、创新创业的能力, 从而使学生养成用数学思考生活、从生活提炼数学的习惯, 最终达到能熟练运用数学方法和计算机技术解决实际问题的能力和创新研究能力, 具备继续深造的能力和潜力。

In the training process, we emphasize the cultivation of students' moral cultivation, mathematical literacy and innovation awareness. Through competition, lectures, internships, practical training and other forms of training, students are supposed to have the capacity of independent work, teamwork, innovation and entrepreneurship, develop a habit of thinking with mathematics and refining the habit of mathematics from life, and ultimately master the abilities of practical problem solving with the use of mathematical methods and computer technology as well as the innovative research capabilities. Students are supposed to have the ability and potentiality for further study.

经过四年的系统学习，本专业学生在毕业时应达成以下毕业要求如下：

After four years of systematic study, the students should complete the following graduation requirements.

1. **数学知识：**具有扎实的数学基础，受到比较严格的科学思维训练，初步掌握数学科学的思想方法。

**Mathematical knowledge:** solid mathematical foundation, rigorous scientific thinking training and the initial grasp of the thinking methods of mathematical science.

2. **交流知识：**基本掌握一门外语，能应用其获取知识和进行有效交流。

**Communicating knowledge:** basically master a foreign language and can use it to acquire knowledge and communicate effectively.

3. **技能知识：**掌握与新工科等领域相关的专业理论和知识，初步掌握数学应用技能。

**Skill knowledge:** master the professional theory and knowledge related to such fields as new engineering, and initially master math application skills.

4. **问题分析：**能够应用数学、自然科学、工程科学、社会科学等基本原理，识别、表达并通过文献研究分析数学和应用数学问题，以获得有效结论。

**Problem analysis:** Students can apply the basic principles of mathematics, natural science, engineering science and social science, identify, express and study the problems of mathematics and applied mathematics through literature research in order to obtain effective conclusions.

5. **数学应用：**能够设计针对复杂的自然科学、工程科学、社会科学等问题的数学建模方案，建立满足特定要求的数学模型或算法，并能够在数学建模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。具有应用数学知识去解决实际问题的能力。

**Mathematical applications:** students should have the ability to design mathematical modeling solutions for complex natural sciences, engineering sciences, social sciences, etc., to establish mathematical models or algorithms that meet specific requirements, and to embody innovation awareness in the mathematical modeling process, taking into account social, security, legal, cultural and environmental factors and to apply mathematical knowledge to solve practical problems.

6. **研究：**有较强的语言表达能力，掌握资料查询、文献检索及运用现代信息技术获取相关信息的基本方法，具有一定的科学研究和教学能力。能够基于科学原理并采用科学方法对复杂的实际数学问题和新工科中的问题进行研究，包括设计试验和方案、收集与采集数据、建模分析与解释数据、并通过信息综合得到合理有效的结论。

**Research:** Students are supposed to have strong language skills, master the basic methods of information query, literature retrieval and obtaining relevant information with modern information technology and have a certain degree of scientific research and teaching ability. Besides, students can study complex practical mathematical problems and the problems in new engineering based on scientific principles and scientific methods, including designing experiments and schemes, collecting data, modeling analysis and interpretation data, and obtaining reasonable and effective conclusions through information synthesis.

7. **使用计算机：**能够针对复杂的数学问题，开发、选择与使用恰当的计算机方面的技术、资源、工具，包括数学应用方面的工具软件和复杂数学问题的预测与模拟，并能够理解其局限性。能熟练使用计算机（包括常用语言、工具及一些专用软件），具有一定的算法分析、结构设计和较强

的编程能力。

**The use of computers:** For completed mathematical problems, students have the ability to develop, select and use the appropriate computer technology, resources, tools, including mathematical tools and prediction and simulation of complex mathematical problems, and to understand its limitations. Proficient in computer (including commonly used language, tools and some special software), with a certain degree of algorithm analysis, structural design and strong programming capabilities.

8. **数学与社会:** 能够基于实际数学问题相关背景知识进行合理数学分析, 评价复杂实际数学问题的解决方案对社会、健康、安全、法律以及文化的影响, 并理解应承担的责任。

**Mathematics and Society:** Ability to conduct rational mathematical analysis based on background knowledge related to practical mathematical problems, evaluate the impact of complex practical mathematical problems on society, health, safety, law and culture, and understand the responsibilities that should be borne.

9. **数学和可持续发展:** 能够理解和评价针对实际数学问题的实践对环境、社会、人文可持续发展的影响。

**Mathematics and sustainable development:** the ability to understand and evaluate the impact of practical mathematical problems on the environment, society and humanities sustainable development.

10. **职业规范:** 掌握一定的心理学基础知识、技能和方法, 尊重生命, 关爱他人; 理性、严谨, 乐观、开朗。

**Professional norms:** to master a certain basic knowledge of psychology, skills and methods, respect for life, care for others; rational, rigorous, optimistic, cheerful.

11. **个人和团队:** 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。

**Individuals and Teams:** Ability to take on individual, team members, and responsible roles in a multidisciplinary team.

12. **沟通:** 能够就复杂实际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。并具备一定的国际视野, 能够在跨文化背景下进行沟通和交流。

**Communication:** Communicating effectively with industry peers and the public on complex practical issues, including writing reports and design manuscripts, presenting statements, clearly expressing or responding to directives. And have a certain international perspective, to cross-cultural background to communicate and exchange.

13. **项目管理:** 理解并掌握数学与应用数学逻辑推理能力、计算能力以及数学应用的基本技能与实践方法, 并能在多学科环境中应用。

**Project management:** to understand and master the mathematical and applied mathematical logic reasoning ability, computing power and the basic skills and practical methods of mathematical applications, and can apply them in a multidisciplinary environment.

14. **终身学习:** 具有适应发展的能力以及对终身学习的正确认识和较强的自学能力。

**Life-long learning:** the ability to adapt to development and the correct understanding of life-long learning and strong self-learning ability.

### 三. 专业培养特色

#### III. Features of speciality cultivation

1、本专业突理科学院的特色, 强调数学和应用数学基本理论、基本方法的训练, 进行数学建模、计算机和数学软件方面的基本训练, 使学生具有科学研究的初步能力, 为学生攻读硕士研究生甚至博士研究生打下扎实的基础;

This major highlights the characteristics of the Faculty of Science, emphasizes the basic theory and training of basic methods of mathematics and applied mathematics, and has some basic training in mathematical modeling, computer and mathematical software, so that students could have the initial ability

of scientific research and possess the solid foundation to study for the master's degree or even for the doctoral degree;

2、在专业课程设置上,注重数学专业课程的同时,增大学生在智能科学与技术的课程内容,掌握数学在自然科学、工程技术等领域的运用能力。在实际应用中学习,洞悉与数学发展相关的新工科发展趋势;

In terms of professional curriculum, we not only pay attention to the mathematics courses but also increase curriculum content in intelligent science and technology to help them master the capacity of mathematics applications in such fields of natural science and engineering and technology. Students will learn in the practical application and insight into the development trends of new engineering which are related to the development of mathematics;

3、采用校企联合培养,即以学校实践教学基地为依托,学校和企业联合制定培养模式,通过学校的理论学习和企业的实践活动,使学生了解数学的应用前景;

We adopt school-based joint training method, that is, a cultivating model jointly formulated by schools and enterprises based on the school practice teaching base. through the school's theoretical study and corporate practice, students will understand the prospects of mathematics application;

4、具备再学习和再创造能力,具有很强的数学应用意识和计算机技术解决实际问题的能力,具备较广泛的适应社会需要的可塑性和很强的发展潜力;

Our students have the ability to relearn and re-create, a strong sense of mathematical application and computer technology to solve practical problems and a wider range of the plasticity and strong development potential demanded by society;

5、采用导师负责制,让学生加入研究团队,增强学生创新创业意识。

Mentor responsibility system is adopted. Students are involved in the research team and provided the chances to enhance their awareness of innovation and entrepreneurship.

#### **四. 专业主干学科**

#### **IV. Key discipline for the specialty**

数学

Mathematics

#### **五. 专业核心课程**

#### **V. Core courses**

数学分析、高等代数、解析几何、概率论与数理统计、常微分方程、复变函数、数学建模、数值分析、离散数学

Mathematical Analysis, Advanced Algebra, Analytical Geometry, Probability and Mathematical Statistics, Ordinary Difference Equation, Complex Variable Function, Mathematical Modeling, Numerical Analysis, Discrete Mathematics

#### **六. 特色课程(全英课程、双语课程及其他特色教学改革课程)**

#### **VI. Featured courses (English courses, bilingual courses and other featured reforming courses)**

无。

None.

#### **七. 毕业学分要求**

#### **VII. Credits required for graduation**

总学分不低于 157.5 学分,实践教学环节学分不少于 42 学分。

Total credits should not be fewer than 157.5, with credits for practical teaching being at least 42.

#### **八. 主要实践教学环节**

#### **VIII. Main components of practical teaching**

数值分析实验、数学建模课程设计、C++面向对象程序设计课程设计、数据结构课程设计、毕业设计(论文)

Numerical Analysis Experiment, Mathematical Modeling Course Design, C++object-oriented Programming Course Design, Data Structure Design, Graduation Project (Thesis)

## 九. 课程体系的构成及课程学分分配比例

### IX. Course system structure and course credit proportion

#### 1、课内部分 Intra-curricular sector

课程类别 Course Category		内容说明 Description	总学分 Total Credits	总学时 Total Teaching Hours	占总学分比例 Percentage	小计 Subtotal
必修 Compulsory Courses	公共基础课 Basic Public Courses	含“思想政治理论课”、体育、大学英语、高等数学、大学物理、计算机文化基础等。 Courses such as Ideological & Political Theories, University Physical Education, College English, Advanced Mathematics, Basic Computer Literacy.	43.5	812	27.6%	59.6%
	专业基础课 Basic Specialty Courses	构筑专业基础平台的基本概念、理论和基础知识的课程。 Courses for constructing the basic concepts, theories and knowledge underlying the specialty.	38.5	616	24.4%	
	专业课 Specialty Courses	构筑专业方向的概念、理论和知识的课程。 Courses for constructing concepts, theories and knowledge of the specialty emphasis.	12	208	7.6%	
	实验实习实训 Experimental and Practical Courses		6	96	3.8%	14.6%
	设计(论文) Graduation Design (Thesis)		17	272	10.8%	

课程类别 Course Category		内容说明 Description	总学分 Total Credits	总学时 Total Teaching Hours	占总学分比例 Percentage	小计 Subtotal
选修 Elective Courses	全校性公共课(至少选12.0学分) University Wide Public Courses (A minimum of 12.0 credits required)	指人文社科类、自然科学与工程技术类全校性公选课。 University wide public elective courses in humanities and social sciences, natural sciences, and engineering.	12.0	192	7.6%	22.5%
	专业基础课(至少选10学分) Basic Specialty Courses (A minimum of 10 credits required)	指相关学科和跨学科的基础理论和知识的课程。 Courses for basic theories and knowledge in the main discipline and related disciplines.	10.0	160	6.3%	
	专业课(至少选13.5学分)	指学科方向和跨学科方向的基础理论和知识的课程。	13.5	216	8.6%	

	Specialty Courses (A minimum of 13.5 credits required)	Courses for basic theories and knowledge in the disciplinary emphasis and interdisciplinary emphasis.				
	实验实习实训 (至少选 1 学分) Experimental and Practical Courses (A minimum of credits required)		1.0	16	0.6%	3.1%
	设计 (论文) (至少选 4 学分) Graduation Design (Thesis) (A minimum of credits required)		4.0	64	2.5%	
合计 Total			158.5	2620	100%	100%



## 2、课外部分 Extra-curricular sector

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实 训学时 Teaching Hours for Practice	上机 学时 Teaching Hours with Computer s
必修 Compulsory Part	公共教育类 Public Education	入学教育 Entrance Education	0.5	0.5 周 0.5week			
		公益活动 Social Work	1.0	16			
		社会实践 Social Practice	2.0	32			
		“毛泽东思想和中国特色 社会主义理论体系概论”课 外导读 Extra-curricular guided reading of An Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristics	1.0	16			
		毕业教育 Graduation Education	0.5	0.5 周 0.5week			
	小计 Subtotal		5.0	80			

	课外活动名称 Extra-curricular Activities	课外活动和社会实践的要求 Requirements for Extra-curricular Activity and Social Practice		课外学分 Extra-curricular Credits
选修 Elective Courses	英语及计算机考试 English and Computer Tests	全国大学英语六级考试 National College English Test (CET) 6	考试成绩达到学校要求者 Meeting score requirement of the university	2
		全国计算机等级考试 National Computer Rank Examination (NCRE)	获二级以上证书者 Granted certificate of or above Level 2	2
		全国计算机软件资格、水平考试 National Computer Software Qualification and Proficiency Tests	获程序员证书者 Granted programmer's certificate	2
			获高级程序员证书者 Granted advanced programmer's certificate	3
			获系统分析员证书者 Granted system analyst's certificate	4
	行业资格考试 Professional Qualification Tests	参加全国行业资格统考 Nationwide Uniform Professional Qualification Tests	获行业资格证书者 Granted professional qualification certificate	1
	竞赛 Contests	校级 University Level	获一等奖者 Awarded first prize	2
			获二等奖者 Awarded second prize	1
			获三等奖者 Awarded third prize	0.5
		省级 Provincial Level	获一等奖者 Awarded first prize	3
			获二等奖者 Awarded second prize	2
			获三等奖者 Awarded third prize	1
		全国 National Level	获一等奖者 Awarded first prize	5
			获二等奖者 Awarded second prize	4
			获三等奖者 Awarded third prize	3
	系列讲座 Serial Lectures	参加学校组织的系列讲座 Attending school organization's lecture series	参加累计 4 场次以上 Attending a minimum of 4 lectures	1
	论文 Academic papers	在全国性一般刊物 发表学术论文 Having papers published in nationwide average journals	每篇论文 Per paper	1
		核心刊物发表学术论文 Having papers published in nationwide key journals	每篇论文 Per paper	2
	课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	参与课外科技创新活动 Participating extra-curricular scientific and technological innovation activities	每项 Per event	1
	科研 Academic research	视参与科研项目时间与科研能力 Time and Ability of participating academic research	每项 Per event	1-2

## 十. 课程设置及学时（学分）分配

## X. Program requirements and credit (teaching hours) distribution

## 1、课内部分 Intra-curricular sector

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
必修 Compulsory Courses	公共基础课 Basic Public Courses	中国近现代史纲要 Outline of Modern Chinese History	3.0	48		12	
		思想道德与法治 Ideological Morality and Rule of Law	3.0	48		12	
		马克思主义基本原理 Basic Principles of Marxism	3.0	48		12	
		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 Theoretical System of Socialism with Chinese Characteristics	5.0	80		16	
		形势与政策 Situation and Policy	2.0	64		32	
		体育(1) Physical Education (1)	1.0	36		20	
		体育(2) Physical Education (2)	1.0	36		20	
		体育(3) Physical Education (3)	1.0	36		20	
		体育(4) Physical Education (4)	1.0	36		20	
		大学英语(1) College English (1)	4.0	64		16	
		大学英语(2) College English (2)	4.0	64		16	
		军事理论 Military Theory	2.0	36			
		国家安全教育 National Security Education	1.0	16		10	
		大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education	1.0	16		8	
		大学生就业创业指导 Guidance of College Students' Employment and Entrepreneurship	1.5	24		16	
		大学生心理健康教育 College Students' Psychological Health Education	2.0	36		8	
		大学物理 A(1) College Physics (1)	4.0	64			
		大学物理 A(2) College Physics A(2)	4.0	64			
		小计 Subtotal	43.5	812		238	
	专业基础课	数学分析 (1) *, ** Mathematical Analysis (1)	5.5	88			

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
	Basic Specialty Courses	数学分析(2)*, ** Mathematical Analysis (2)	6.0	96			
		数学分析(3)*, ** Mathematical Analysis (3)	3.5	56			
		高等代数(1)*, ** Advanced Algebra (1)	4.5	72			
		高等代数(2)*, ** Advanced Algebra (2)	4.5	72			
		解析几何*, ** Analytic Geometry	2.0	32			
		概率论与数理统计*, ** Probability and Mathematical Statistics	3.5	56			
		常微分方程*, ** ODE(ordinary differential equation)	3.0	48			
		数据结构 Data Structure	3.0	48			
		C++面向对象程序设计* C++ object-oriented programming	3.0	48			
		小计 Subtotal	38.5	616			
	专业课 Specialty Courses	信息检索与利用 Information Retrieval and Utilization	1.0	16			8
		离散数学** Discrete Mathematics	3.0	48			
		数值分析** Numerical Analysis	3.0	48			
		数学建模** Mathematical Modeling	2.0	32			
		复变函数** Complex Variable Function	3.0	48			
		小计 Subtotal	12.0	208			8
	实验实训 Experimental and Practical Courses	军训 Military Training	2.0	32		32	
		大学物理实验 A(1) University Physics Experiment A(1)	1.5	24	24		
		大学物理实验 A(2) University Physics Experiment A(2)	1.5	24	24		
		数值分析实验 Numerical Analysis Experiment	1.0	16	16		

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
		小计 Subtotal	6.0	96	64	32	
	设计（论文） Design (Thesis)	C++面向对象程序设计课程设计 C++object-oriented Programming Course Design	1.0	16			16
		数学建模课程设计 Mathematical Modeling Course Design	1.0	16			16
		数据结构课程设计 Data Structure Design	1.0	16			16
		毕业设计(论文) Graduation Project (Thesis)	14.0	224		224	
		小计 Subtotal	17.0	272		224	48

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
选修 Optional Courses	校公共选修课 University Wide Public Courses	自然科学与工程类 Natural Sciences and Engineering Technology	9.0	144			
		人文社科类 Humanities and Social Sciences	3.0	48			
		小计（至少选 12.0 学分） Subtotal (at least 12.0 credits)	12.0	192	0	0	0
	专业基础课 Basic Specialty Courses	数据库原理及应用 A Principle and Application of Database A	2.5	40			
		人工智能 Artificial Intelligence	2.0	32			
		算法设计与分析 Design and Analysis of Algorithm	3.0	48			
		操作系统 Operating System	3.0	48			
		Java 语言 Java Language	2.0	32			
		Python 语言 Python Language	2.0	32			
		机器学习 Machine Learning	2.0	32			
		偏微分方程 Partial Differential Equation	3.0	48			

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验学时 Teaching Hours for Experiments	实习实训学时 Teaching Hours for Practice	上机学时 Teaching Hours with Computers
		点集拓扑 Point Set Topology	3.0	48			
		小计 (至少选 10 学分) Subtotal (at least 10 credits)	22.5	360			
	专业课 Specialty Courses	初等数论 Elementary Number Theory	2.0	32			
		抽象代数 Abstract Algebra	3.0	48			
		运筹学 Operations Research	4.0	64			
		实变函数 Functions of Real Variable	3.0	48			
		随机过程 Stochastic Process	2.0	32			
		泛函分析 Functional Analysis	3.0	48			
		模式识别 Pattern Recognition	2.5	40			
		最优化方法 Optimization Method	2.0	32			
		软件工程 Software Engineering	2.5	40			
		信号与图像处理 Signal and Image Processing	2.5	40			
		小计 (至少选 13.5 学分) Subtotal (at least 13.5 credits)	26.5	424			
	实验实习实训 Experimental and Practical Courses	信号与图像处理实验 Signal and Image Processing Experiments	1.0	16	16		
		软件工程实训 Software Engineering Practice	1.0	16		16	
		数学分析(选讲) Mathematical Analysis (Optional)	4.0	64		64	
		高等代数(选讲) Advanced Algebra (Optional)	2.0	32		32	
		毕业实习 Graduation Field Work	2.0	32		32	
		小计 (至少选 1 学分) Subtotal (at least 1 credits)	10	160	16	144	
	设计(论文) Design (Thesis)	人工智能课程设计 Artificial Intelligence Course Design	1.0	16			16
		数据库原理及应用课程设计 Principle and Application of Database Course Design	2.0	32			32
		最优化方法课程设计 Optimal Approaches Course Design	1.0	16			16
		模式识别课程设计 Pattern Recognition Course Design	1.0	16			16
		Java 语言课程设计 Java-language Course Design	1.0	16			16
		Python 语言课程设计 Python Language Course Design	1.0	16			16
		机器学习课程设计 Machine Learning Course Design	1.0	16			16

课程类别 Category		课程名称 Course Name	学分 Credits	总学时 Total Teaching Hours	实验 学时 Teaching Hours for Experiments	实习实训学 时 Teaching Hours for Practice	上机 学时 Teachi ng Hours with Comp uters
		算法设计与分析课程设计 Algorithm Design and Analysis Course Design	1.0	16			16
		操作系统课程设计 Operating System Course Design	1.0	16			16
		小计（至少选 4.0 学分） Subtotal (at least 4.0 credits)	10	160			160

说明:

\*标注该符号为大类平台课程

\*\*标注该符号为专业核心课程

BL 标注该符号为双语课程

#标注该符号为开放课程

CE 创新创业教育融入课程

## 附录

## Appendix

## ① 毕业要求对培养目标的支撑关系

## ① The supporting relationship between graduation requirements and its objectives

本专业毕业要求对培养目标的支撑关系，可用矩阵图或其他适当形式说明。

The supporting relationship of the graduation requirements for this major to the training objectives can be explained by matrix diagram or other appropriate forms.

本专业的毕业要求完全覆盖了《工程教育认证标准（2015）》通用标准的毕业要求，具体见矩阵表 1；专业的毕业要求支撑了培养目标的实现，具体见矩阵表 2。

The graduation requirements of the major fully cover the graduation requirements of the general standard of 《Engineering Education Certification Standard (2015)》，see matrix Table 1 for details; the graduation requirements of the major support the realization of the training objectives, see matrix Table 2 for details.

表 1 数学与应用数学专业毕业要求与论证标准的毕业要求

**Table 1 Mathematics and Applied Mathematics major graduation requirements and Demonstration Standards graduation requirements**

通用标准毕业要求项 General standard graduation requirements	1	2	3	4	5	6	7	8	9	10	11	12	13	14
本专业目标相应支撑项 Corresponding support items for the objectives of this major	1	2	3	4	5	6	7	8	9	10	11	12	13	14

表 2 数学与应用数学专业毕业要求支撑专业培养目标

**Table 2 Graduation requirements for Mathematics and Applied Mathematics Major to support the professional training objectives**

培养目标 train objective 毕业要求 graduation requirements	数学素养 Mathematical literacy	数学应用 Mathematical applications	合作交流 Cooperation and communication	道德修养 moral cultivation	学习创新 learning innovation	服务社会 Service society
1. 数学知识 Mathematical knowledge	H	H				L



2. 交流知识 <b>Communicating knowledge</b>	L	M	H			M
3. 技能知识 <b>Skill knowledge</b>	L	H	L		M	M
4. 问题分析 <b>Problem analysis</b>	M	H			M	L
5. 数学应用 <b>Mathematical applications</b>	H	H	L		H	
6. 研究 <b>Research</b>	L	H	L		H	
7. 使用计算机 <b>The use of computers</b>	L	M	H			
8. 数学与社会 <b>Mathematics and Society</b>		M		L		H
9. 数学和可持续发展 <b>Mathematics and sustainable development</b>	M	H		L		L
10. 职业规范 <b>Professional norms</b>	L			H		M
11. 个人和团队 <b>Individuals and Teams</b>			H		L	M
12. 沟通 <b>Communication</b>	L	M	H		L	
13. 项目管理 <b>Project management</b>	L	H	M			L
14. 终身学习 <b>Life-long learning</b>			H		M	L

备注：支撑度类别：H:强支撑，M:一般支撑，L:弱支撑

## ②课程体系对毕业要求的支撑关系

## ② The supporting relationship between course system and its graduation requirements

表 3 数学与应用数学专业课程体系对毕业要求的支撑

Table 3. Support of Mathematics and Applied Mathematics Curriculum System for graduation requirements

课程体系 course system		1. 数学知识 Mathematical knowledge	2. 交流知识 Communication knowledge	3. 技能知识 Skill knowledge	4. 问题分析 Problem analysis	5. 数学应用 Mathematical applications	6. 研究 Research	7. 使用计算机 The use of computers	8. 数学与社会 Mathematics and Society	9. 数学和可持续发展 Mathematics and sustainable development	10. 职业规范 Professional norms	11. 个人和团队 Individuals and Teams	12. 沟通 Communication	13. 项目管理 Project management	14. 终身学习 Life-long learning
课程名称 Course Name															
课内必修 Intra-curricular Compulsory Courses	公共基础课 Basic Public Courses	中国近现代史纲要 Outline of Modern Chinese History	√						√						
		大学英语(1) College English (1)	√												√
		大学生心理健康教育 College Students' Psychological Health Education									√		√		
		体育(1) Physical Education (1)					√				√				√
		大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education								√		√		√	√
		思想道德与法治 Ideological Morality and Rule of Law							√		√				

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		大学英语(2) College English (2)		√										√
		大学物理 A(1) College Physics (1)							√					
		体育(2) Physical Education (2)					√			√				√
		马克思主义基本原理 Basic Principles of Marxism		√					√					√
		大学物理 A(2) College Physics A(2)							√	√				
		体育(3) Physical Education (3)					√			√				√
		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 Theoretical System of Socialism with Chinese Characteristics		√					√					
		体育(4) Physical Education (4)					√			√				√
		形势与政策 Situation and Policy							√	√				
		大学生就业创业指导 Guidance of College Students' Employment and Entrepreneurship		√						√		√		√
		军事理论 Military Theory		√					√					√
		国家安全教育 National Security Education		√					√					√
专业基 础课 Basic Specialty Courses		C++面向对象程序设计 * C++ object-oriented programming			√			√						
		数学分析*, ** Mathematical Analysis	√			√								
		解析几何*, ** Analytic Geometry	√			√								
		常微分方程*, ** ODE(ordinary differential equation)	√			√								

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	概率论与数理统计*, ** Probability and Mathematical Statistics	√		√	√									
	高等代数*, ** Advanced Algebra	√		√										
	数据结构 Data Structure		√			√								
专业课 Specialty Courses	信息检索与利用 Information Retrieval and Utilization		√			√								
	离散数学** Discrete Mathematics	√		√										
	数值分析** Numerical Analysis	√		√	√									
	复变函数** Complex Variable Function	√												
	数学建模** Mathematical Modeling	√			√		√	√						
实 验 实 习 实 训 Experimental and Practical Courses	军训 Military Training								√	√				
	大学物理实验 A University Physics Experiment A		√	√	√									
	数值分析实验 Numerical Analysis Experiment		√	√	√	√								
设计 (论 文) Graduation Design (Thesis)	C++面向对象程序设计 课程设计 C++object-oriented Programming Course Design		√			√								
	数学建模课程设计 Mathematical Modeling Course Design		√	√	√					√				
	数据结构课程设计 Data Structure Design		√	√	√	√								
	毕业设计(论文) Graduation Project (Thesis)		√			√								

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课 内 选 修 课  Intr a-cu rric ular Opti onal Cou rses	校公共 选修课 University Wide Public Courses	自然科学与工程类 Natural Sciences and Engineering Technology		√		√									√
		人文社科类 Humanities and Social Sciences		√					√				√		√
	专业基 础课 Basic Courses	数据库原理及应用 A Principle and Application of Database A			√			√							
		人工智能 Artificial Intelligence				√	√	√							
		算法设计与分析 Design and Analysis of Algorithm			√	√		√	√						
		操作系统 Operating System			√			√							
		Java 语言 Java Language			√			√							
		Python 语言 Python Language			√			√							
		机器学习 Machine Learning			√	√	√	√		√		√		√	√
		偏微分方程 Partial Differential Equation	√												
		点集拓扑 Point Set Topology	√												
	专 业 课 Specialty Courses	初等数论 Elementary Number Theory	√												
		抽象代数 Abstract Algebra	√												
		运筹学 Operations Research	√			√	√	√	√						√
		实变函数 Functions of Real Variable	√												
		随机过程 Stochastic Process	√			√									
		泛函分析 Functional Analysis	√												
		模式识别 Pattern Recognition			√		√								
		最优化方法 Optimization Method			√	√				√					

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课 外 必 修	公共教育类 Public Education	软件工程 Software Engineering			√	√		√	√						√	
		信号与图像处理 Signal and Image Processing			√		√									
	实验实训 Experiment Practice	信号与图像处理实验 Signal and Image Processing Experiments			√			√				√				
		软件工程实训 Software Engineering Practice			√			√				√				
		数学分析(选讲) Mathematical Analysis (Optional)	√					√								√
		高等代数(选讲) Advanced Algebra (Optional)	√					√								√
		毕业实习 Graduation Field Work		√	√	√	√	√	√	√	√	√	√	√		√
	设计(论文) Graduation Design (Thesis)	人工智能课程设计 Artificial Intelligence Course Design			√	√		√	√							
		数据库原理及应用课程设计 Principle and Application of Database Course Design			√	√		√	√			√				
		最优化方法课程设计 Optimal Approaches Course Design			√			√				√				
		模式识别课程设计 Pattern Recognition Course Design			√	√			√			√				
		Java 语言课程设计 Java-language Course Design			√	√			√			√				
		Python 语言课程设计 Python Language Course Design			√	√			√			√				
		机器学习课程设计 Machine Learning Course Design			√	√		√	√							
		算法设计与分析课程设计 Algorithm Design and Analysis Course Design			√	√		√	√			√				
		操作系统课程设计 Operating System Course Design			√	√		√	√			√				
	公共教育类 Public Education	入学教育 Entrance Education		√							√					
		公益活动 Social Work		√							√					

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		社会实践 Social Practice		√							√		√		√
		“毛泽东思想和中国特色社会主义理论体系概论”课外导读 Extra-curricular guided reading of An Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristics			√		√								√
		毕业教育 Graduation Education		√							√				
课 外 选 修  Ext ra- cur ric ula r Ele ctiv e Cou rses	课 外 活 动 Extra-c urricula r Activiti es	英语及计算机考试 English and Computer Tests			√						√				
		行业资格考试 Professional Qualification Tests			√						√				
		竞赛 Contests			√						√				
		系列讲座 Serial Lectures									√	√			
		论文 Academic papers					√				√				
		课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities			√		√		√		√	√		√	
		科研 Academic research			√		√				√	√		√	√

### ③毕业要求达成度评价

#### ③Achievement evaluation of graduation requirements

本专业毕业要求达成度评价的机制，包括评价方法、数据来源、评价机构、评价周期、结果反馈等，并任选 1-2 项毕业要求项举例说明评价实施情况。

The evaluation mechanism of graduation requirements of this major includes evaluation method, data source, evaluation institution, evaluation cycle, result feedback, etc.. Choose 1-2 graduation requirements to

illustrate the implementation of evaluation.

### 3.1 毕业要求达成度评价机制

#### 3.1 Evaluation mechanism of graduation requirements

本专业根据课程体系对毕业要求的支撑, 综合考虑理论课程、实验实训、毕业设计等实践课程对各项毕业要求及其指标点达成的关联程度, 同时将每项毕业要求(或指标点)归一化, 制定以下权重系数设定规则(权重系数请各专业根据本专业情况自行设定):

According to the support of the curriculum system to the graduation requirements, considering the correlation degree of the theory course, experimental training, practice courses such as graduation design to the graduation requirements and index points reached, and normalizing each graduation requirement (or index), this major makes the following weight coefficient set rules (weight coefficient please set according to the professional situation):

1) 理论课程的权重系数: 学分数\*1;

Weight coefficient of the theoretical course: learning score \* 1;

2) 实验课程的权重系数: 学分数\*1.5;

Weight coefficient of the experimental course: learning score \* 1.5;

3) 课程设计及实训课的权重系数: 学分\*1.5; 其中采用 PBL 模式的权重系数: 学分\*2;

Weight coefficient of course design and practical training course: credit \* 1.5; the weight coefficient of PBL mode is adopted: credit \* 2;

4) 毕业设计的权重系数: 学分\*2。

Weight coefficient of graduation design: credit \* 2.

根据以上规则, 我们制定了各门课程支撑各项毕业要求实现的权重系数表, 具体参见矩阵表 4。

According to the above rules, we have developed the weight coefficient table supporting the implementation of various graduation requirements for each course, and refer to matrix Table 4 for details.

表 4 课程支撑毕业要求实现的权重系数表

Table 4 Weight coefficient supporting the implementation of graduation requirements

指标点 index point	指标点 权重 Index point weight	主要教学环节 Main teaching links	教学环 节权重 Teachi ng link weight	备注 rema rks
--------------------	---------------------------------------	-------------------------------	--	-------------------



1. 数学知识：具有扎实的数学基础，受到比较严格的科学思维训练，初步掌握数学科学的思想方法 <b>Mathematical knowledge:</b> solid mathematical foundation, rigorous scientific thinking training and the initial grasp of the thinking methods of mathematical science.	1.1 掌握必要的从事数学应用工作所需的数学分析、高等代数、概率论和数理统计等数学基本知识，能应用于数学建模、计算和分析。 Master the necessary basic mathematical knowledge of Mathematical Analysis, Advanced Algebra, Probability and Mathematical Statistics, etc., which is required for mathematical application work and can be applied to mathematical modeling, calculation and analysis.	0.6	数学分析 Mathematical Analysis	0.4	
			高等代数 Advanced Algebra	0.2	
			概率论与数理统计 Probability and Mathematical Statistics	0.4	
	1.2 掌握从事应用数学工作所需的与各领域高度相关的数学知识，能用于数学及其他应用问题的分析与研究。 Master the highly relevant mathematics knowledge of various fields required for the applied mathematics work, which can be used in the analysis and research of mathematics and other applied problems.	0.4	离散数学 Discrete Mathematics	0.1	
			数值分析 Numerical Analysis	0.1	
			最优化方法 Optimization Method	0.1	
			数学建模 Mathematical Modeling	0.1	
			运筹学 Operations Research	0.1	
			复变函数 Complex Variable Function	0.1	
			泛函分析 Functional Analysis	0.1	
			随机过程 Stochastic Process	0.1	
			点集拓扑 Point Set Topology	0.1	
			常微分方程 ODE(ordinary differential equation)	0.05	
2. 交流知识：基本掌握一门外语，能应用其获取知识和进行有效交流。 <b>Communicating knowledge:</b> basically master a foreign language and can use it to acquire knowledge and communicate effectively.	2.1 达到必要的外语水平以期获取知识，以便检索各类文献、了解各类知识背景。 Reach the necessary foreign language level in order to acquire knowledge, so as to search all kinds of literature, understand all kinds of knowledge background.	0.6	大学英语 College English	0.4	
			信息检索与利用 Information Retrieval and Utilization	0.3	
			形势与政策 Situation and Policy	0.1	
			大学物理 College Physics	0.2	
	2.2 熟悉专业知识，懂得数学专业各种层面的交流。	0.4	大学生心理健康教育 College Students' Psychological	0.2	

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	Familiar with professional knowledge, know the communication of various levels of mathematics major.		Health Education		
			大学生就业创业指导 Guidance of College Students' Employment and Entrepreneurship	0.1	
			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 Theoretical System of Socialism with Chinese Characteristics	0.2	
			马克思主义基本原理 Basic Principles of Marxism	0.2	
3. 技能知识: 掌握智能科学和技术的专业理论和知识, 初步掌握数学应用技能 <b>Skill knowledge:</b> master the professional theory and knowledge related to such fields as new engineering, and initially master math application skills.	3.1 掌握各种智能科学和技术的专业理论和知识。 Master the professional theories and knowledge of various intelligent science and technology.	0.5	数据库原理及应用 A Principle and Application of Database A	0.2	
			软件工程 Software Engineering	0.2	
			模式识别 Pattern Recognition	0.1	
			人工智能 Artificial Intelligence	0.1	
	3.2 掌握各类数学应用工具软件、技术等。 Master all kinds of mathematical application tools, software, technology, etc.	0.5	Java 语言 Java Language	0.1	
			C++面向对象程序设计 C++object-oriented Programming Course Design	0.1	
			Python 程序设计 Python Language Course Design	0.1	
			英语及计算机考试 English and Computer Tests	0.1	
			行业资格考试 Professional Qualification Tests	0.1	
			竞赛 Contests	0.05	
			系列讲座 Serial Lectures	0.05	
			课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.05	
			科研 Academic research	0.05	
			公益活动 Social Work	0.05	
			社会实践 social practice	0.05	

4. 问题分析：能够应用数学、自然科学、工程科学、社会科学等基本原理，识别、表达、并通过文献研究分析数学和应用数学问题，以获得有效结论 <b>Problem analysis:</b> Students can apply the basic principles of mathematics, natural science, engineering science and social science, identify, express and study the problems of mathematics and applied mathematics through literature research in order to obtain effective conclusions.	4.1 能够针对实际应用问题，较为准确发现、识别应用问题中存在的数学问题，提炼把握问题关键点和数学表征指标。 More accurately find and identify the mathematical problems existing in the application problems for the practical application problems, and refine and grasp the key points of the problems and the mathematical characterization indicators.	0.3	数学建模 Mathematical Modeling	0.2	
			信号与图像处理 Signal and Image Processing Experiments	0.2	
			设计（论文） Graduation Design (Thesis)	0.2	
5. 数学应用：能够设计针对复杂的自然科学、工程科学、社会科学等问题的数学建模方案，建立满足特定要求的数学模型或算法，并能够在数学建模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。具有应用数学知识去解决实际问题的能力。 <b>Mathematical</b>	4.2 具有文献检索、资料查询、文献综述能力和分析能力，能够获得数学应用复杂问题的相关信息，并能予以提炼、分析和评价。 Possess the ability of literature retrieval, data query, literature review and analysis; Be able to obtain the relevant information of complex problems of mathematical application, and can refine, analyze and evaluate them.	0.4	信息检索与利用 Information Retrieval and Utilization	0.15	
			数学建模 Mathematical Modeling	0.15	
			数学建模课程设计 Mathematical Modeling Course Design	0.15	
			课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.15	
			毕业设计（论文） Graduation Project (Thesis)	0.4	
5.1 能够对数学应用问题进行分析 and 提炼，确定明确的建模目标或研究目标，设计解决方案。 Be able to analyze and refine mathematical application problems, determine clear modeling goals or research goals, and design solutions.	4.3 能够针数学应用中的复杂问题，明确问题目标或研究目标，获得有效结论。 Be able to solve the complex problems in the application of needle mathematics, clarify the problem goals or research goals, and obtain effective conclusions.	0.4	毕业实习 Graduation Field Work	0.3	
			机器学习 Machine Learning	0.3	
5.2 能够对特定应用问题解决方案的可行性进行初步分析与论证，选择合理方案予以实施。 Be able to preliminarily analyze	5.1 能够对数学应用问题进行分析 and 提炼，确定明确的建模目标或研究目标，设计解决方案。 Be able to analyze and refine mathematical application problems, determine clear modeling goals or research goals, and design solutions.	0.25	数学建模 Mathematical Modeling	0.2	
			设计（论文） Design (Thesis)	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.4	
	5.2 能够对特定应用问题解决方案的可行性进行初步分析与论证，选择合理方案予以实施。 Be able to preliminarily analyze	0.25	软件工程实训 Software Engineering Practice	0.2	
			信息与图像处理实验 Signal and Image Processing	0.2	

<b>applications:</b> students should have the ability to design mathematical modeling solutions for complex natural sciences, engineering sciences, social sciences, etc., to establish mathematical models or algorithms that meet specific requirements, and to embody innovation awareness in the mathematical modeling process, taking into account social, security, legal, cultural and environmental factors and to apply mathematical knowledge to solve practical problems.	and demonstrate the feasibility of solutions to specific application problems, and choose a reasonable scheme for implementation.		Experiments		
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
	5.3 具有具体实施数学解决方案的能力，设计开发满足应用问题的数学模型、算法、以及系统开发。	0.2	数据库原理及应用课程设计 Principle and Application of Database Course Design	0.2	
	Capture the ability to implement specific mathematical solutions, to design and develop mathematical models, algorithms, and system development to meet the application problems.		软件工程实训 Software Engineering Practice	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
	5.4 能够对数学应用问题的解决方案进行综合和评价，并能够在分析环节中体现创新意识，并尝试进行改进和优化。	0.2	竞赛 Contests	0.2	
	Be able to synthesize and evaluate the solutions of mathematical application problems, and can reflect the innovation consciousness in the analysis link, and try to improve and optimize.		课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.2	
			社会实践 Social Practice	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
	5.5 数学应用过程中能够综合考虑经济、环境、法律、安全、健康、伦理等制约因素，并得出可接受的指标。	0.1	科研 Academic research	0.2	
	In the process of mathematical application, the constraints of economy, environment, law, safety, health and ethics can be considered comprehensively, and the acceptable indicators can be obtained.		系列讲座 Serial Lectures	0.2	
			课外论文 Extra-curricular papers	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
6. 研究：有较强的语言表达能力，掌握资料查询、文献检索及运用现代信息技术获取相关信息的基本方法，具有一定的科学研究和教学能力。能够基于科学原理并采用科学方法对复杂的实际数学问题进行研究，包括设计试验和方案、收集与采集数据、建模分析与解释数据、并	6.1 能够基于科学原理并采用科学方法对数学应用问题进行分析，设计可行的实验研究方案； Be able to analyze mathematical application problems based on scientific principles and using scientific methods, and design feasible experimental research schemes	0.4	大学物理 College Physics	0.35	
			大学物理实验 A University Physics Experiment A	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.45	
	6.2 能够针对数学应用问题，构建实验方案，设计实验流程；具备实验操	0.3	大学物理 College Physics	0.3	

通过信息综合得到合理有效的结论。 <b>Research:</b> Students are supposed to have strong language skills, master the basic methods of information query, literature retrieval and obtaining relevant information with modern information technology and have a certain degree of scientific research and teaching ability. Besides, students can study complex practical mathematical problems and the problems in new engineering based on scientific principles and scientific methods, including designing experiments and schemes, collecting data, modeling analysis and interpretation data, and obtaining reasonable and effective conclusions through information synthesis.	作能力, 正确操作实验, 安全开展实验。		大学物理实验 University Physics Experiment	0.1	
	Possess the ability to construct experimental scheme and design experimental process for mathematical application problems; have experimental operation ability, correct operation experiment and carry out experiment safely.		设计 (论文) Design (Thesis)	0.2	
			软件工程实训 Software Engineering Practice	0.1	
			毕业设计 (论文) Graduation Project (Thesis)	0.3	
6.3 能够正确采集、整理实验数据、能够对实验结果进行分析和解释, 并通过信息综合判断得到合理有效的结论。 Be able to correctly collect and sort out the experimental data, analyze and interpret the experimental results, and obtain the reasonable and effective conclusions through the comprehensive information judgment.	6.3 能够正确采集、整理实验数据、能够对实验结果进行分析和解释, 并通过信息综合判断得到合理有效的结论。 Be able to correctly collect and sort out the experimental data, analyze and interpret the experimental results, and obtain the reasonable and effective conclusions through the comprehensive information judgment.	0.3	机器学习 Machine Learning	0.3	
			社会实践 Social Practice	0.2	
			设计 (论文) Design (Thesis)	0.2	
			毕业设计 (论文) Graduation Project (Thesis)	0.3	
7. 使用计算机: 能够针对复杂的数学问题, 开发、选择与使用恰当的计算机方面的技术、资源、工具, 包括数学应用方面的工具软件和复杂数学问题的预测与模拟, 并能够理解其局限性。能熟练使用计算机 (包括常用语言、工具及一些专用软件), 具有一定的算法分析、结构设计和较强的编程能力。 <b>The use of computers:</b> For completed mathematical problems, students have the ability to develop, select	7.1 掌握必要的办公、数据处理与计算、公共数据库和网络等公共资源和通用工具。 Master the necessary public resources and general tools for office, data processing and computing, public databases and networks.	0.5	Python 程序设计 Python Language Course Design	0.3	
			Java 语言课程设计 Java-language Course Design	0.3	
			信息检索与利用 Information Retrieval and Utilization	0.4	
		7.2 掌握必要数学应用领域所需的手册、专业技术资源和专用工具。 Master the manuals, professional and technical resources, and special tools required for the necessary mathematical application field.	0.5	信号与图像处理实验 Signal and Image Processing Experiments	0.2
	大学物理实验 University Physics Experiment	0.3			
	公益活动 Social Work	0.3			
	社会实践 Social Practice	0.2			

and use the appropriate computer technology, resources, tools, including mathematical tools and prediction and simulation of complex mathematical problems, and to understand its limitations. Proficient in computer (including commonly used language, tools and some special software), with a certain degree of algorithm analysis, structural design and strong programming capabilities.			毕业实习 Graduation Field Work	0.2	
8. 数学与社会: 能够基于实际数学问题相关背景知识进行合理数学分析, 评价复杂实际数学问题的解决方案对社会、健康、安全、法律以及文化的影响, 并理解应承担的责任。 <b>Mathematics and Society:</b> Ability to conduct rational mathematical analysis based on background knowledge related to practical mathematical problems, evaluate the impact of complex practical mathematical problems on society, health, safety, law and culture, and understand the responsibilities that should be borne.	8.1 了解数学应用的历史和文化背景、应用标准、知识产权、产业政策和法律法规等知识。通过基地实习和社会实践, 了解数学与客观世界的相互关系和相互影响。 Understand the history and cultural background of mathematics application, application standards, intellectual property rights, industrial policy, and laws and regulations. Through the base practice and social practice, understand the mutual relationship and mutual influence of mathematics and the objective world.	0.5	入学教育 Entrance Education	0.1	
			设计 (论文) Design (Thesis)	0.15	
			毕业设计 (论文) Graduation Project (Thesis)	0.2	
			思想道德与法治 Ideological Morality and Rule of Law	0.1	
			公益活动 Social Work	0.1	
			社会实践 Social Practice	0.1	
			形势与政策 Situation and Policy	0.1	
	8.2 能够数学应用实践活动对社会、健康、安全、法律以及文化的影响, 并理解应承担的责任。 Be able to apply the impact of mathematical practical activities on society, health, safety, law and culture, and understand the responsibilities.	0.5	入学教育 Entrance Education	0.2	
			设计 (论文) Design (Thesis)	0.1	
			社会实践 Social Practice	0.3	
			形势与政策 Situation and Policy	0.1	
9. 数学和可持续发展: 能够理解和评价针对实际数学问题的实践对环境、社会、人文可持续发展的影响 <b>Mathematics and</b>	9.1 理解数学和社会可持续发展的内涵与意义, 了解数学应用可能对环境和社会可持续发展的影响情况。 Understand the connotation and significance of mathematics and social sustainable development,	0.4	形势与政策 Situation and Policy	0.2	
			社会实践 Social Practice	0.3	
			毕业设计 (论文) Graduation Project (Thesis)	0.5	

<b>sustainable development:</b> the ability to understand and evaluate the impact of practical mathematical problems on the environment, society and humanities sustainable development.	and understand the impact that mathematics application may have on the sustainable development of the environment and society.		数学建模课程设计 Mathematical Modeling Course Design	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			毕业教育 Graduation Education	0.3	
10. 职业规范：掌握一定的心理学基础知识、技能和方法，尊重生命，关爱他人；理性、严谨，乐观、开朗。 <b>Professional norms:</b> to master a certain basic knowledge of psychology, skills and methods, respect for life, care for others; rational, rigorous, optimistic, cheerful.	10.1 具有人文社会科学素养，了解国情，具有社会责任感；理解社会人及专业的责任。 Have humanities and social sciences, understand national conditions, social responsibility; understand social people and professional responsibilities.	0.7	中国近现代史纲要 Outline of Modern Chinese History	0.1	
			思想道德与法治 Ideological Morality and Rule of Law	0.1	
			马克思主义基本原理 Basic Principles of Marxism	0.1	
			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 Theoretical System of Socialism with Chinese Characteristics	0.1	
			“毛泽东思想和中国特色社会主义理论体系概论”课外导读 Extra-curricular guidance for “Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristics”	0.1	
			形势与政策 Situation and Policy	0.2	
			军训 Military Training	0.2	
11. 个人和团队：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。 <b>Individuals and Teams:</b> Ability to take on individual, team members, and responsible roles in a multidisciplinary team.	10.2 能够在数学应用实践中理解并遵守职业道德和规范，履行责任。 Be able to understand and abide by professional ethics and norms, and fulfill their responsibilities in mathematical application practice.	0.3	思想道德与法治 Ideological Morality and Rule of Law	0.3	
			形势与政策 Situation and Policy	0.4	
			数学建模课程设计 Mathematical Modeling Course Design	0.4	
			体育 Physical Education	0.2	
	11.1 理解多学科、大团队背景下的数学应用实践中个体的作用，理解个人与团队关系，具有合作意识，具备合作精神。 Understand the role of individuals in mathematical application practice under the background of multidisciplinary and large team, understand the relationship between individuals and the team, have a sense of cooperation, and	0.6	军训 Military Training	0.2	

	have the spirit of cooperation.				
	11.2 具备合作能力, 能够胜任成员、或负责人的角色与责任。 Possess the ability to cooperate in the roles and responsibilities of members, or principals.	0.4	军训 Military Training	0.3	
			设计 (论文) Design (Thesis)	0.7	
12. 沟通: 能够就复杂实际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。并具备一定的国际视野, 能够在跨文化背景下进行沟通和交流。 <b>Communication:</b> Communicating effectively with industry peers and the public on complex practical issues, including writing reports and design manuscripts, presenting statements, clearly expressing or responding to directives. And have a certain international perspective, to cross-cultural background to communicate and exchange.	12.1 掌握中文、外语及相关的专业语言知识, 具备一定的口头和文字语言表达能力, 具备较好的沟通技巧, 能够在本文化或跨文化背景下进行沟通和交流。 Master Chinese, foreign language and related professional language knowledge, have certain oral and written language expression skills, and be able to communicate in the cultural or cross-cultural background.	0.6	大学英语 College English	0.2	
			课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.25	
			讲座 Lectures	0.25	
	12.2 能够就复杂数学应用问题, 与业界同行进行深入技术交流, 与社会公众进行社会经济、环境发展等层面沟通。 Be able to conduct in-depth technical exchanges with industry peers on complex mathematical applications, and communicate with the public on social, economic and environmental development.	0.4	形势与政策 Situation and Policy	0.3	
			毕业实习 Graduation Field Work	0.3	
			社会实践 Social Practice	0.4	
13. 项目管理: 理解并掌握数学与应用数学逻辑推理能力、计算能力以及数学应用的基本技能与实践方法, 并能在多学科环境中应用。 <b>Project management:</b> to understand and master the mathematical and applied mathematical logic reasoning ability, computing power and the basic skills and practical methods of mathematical applications, and can apply	13.1 理解并掌握项目管理原理与经济决策方法。 Understand and master the project management principles and economic decision-making methods.	0.5	课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.5	
			社会实践 Social Practice	0.5	
	13.2 能在多学科环境中, 应用数学原理与决策方法。 Be able to apply mathematical principles and decision-making methods in a multidisciplinary environment.	0.5	课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.5	
			毕业设计 (论文) Graduation Project (Thesis)	0.5	



them in a multidisciplinary environment.					
14. 终身学习：具有适应发展的能力以及对终身学习的正确认识和较强的自学能力。 <b>Life-long learning:</b> the ability to adapt to development and the correct understanding of life-long learning and strong self-learning ability.	14.1 具有自主学习的能力，能够自主查阅各种文献获取解决问题的知识和方法。 Have the ability of independent learning, can independently consult a variety of literature to obtain the knowledge and methods to solve problems.	0.4	毕业设计（论文） Graduation Project (Thesis)	0.4	
			社会实践 Social Practice	0.2	
			科研 Academic research	0.4	
	14.2 能够意识到社会和科学技术的快速发展及知识更新素质提高的重要性，自主学习和终身学习，以适应未来发展的需求。 Be able to be aware of the rapid development of society and science and technology and the importance of knowledge renewal quality improvement, independent learning and lifelong learning, to meet the needs of future development.	0.6	入学教育 Entrance Education	0.1	
			大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education	0.1	
			大学生就业创业指导 Guidance of College Students' Employment and Entrepreneurship	0.1	
			毕业教育 Graduation Education	0.1	
			课外科技创新活动 Extra-curricular Scientific and Technological Innovation Activities	0.2	
			基地实习 Base Practice	0.15	
			毕业设计（论文） Graduation Project (Thesis)	0.15	