广东工业大学

Guangdong University of Technology

数学与统计学院
应用统计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）_____

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数学与统计学院
School of Mathematics and Statistics
应用统计学本科专业人才培养方案
Applied Statistics Undergraduates culitivation scheme

前言

应用统计学专业和统计学专业的定位是不同的，后者侧重对统计理论和统计方法的研究，重视数理逻辑，前者侧重统计与行业的结合。从主干学科的教学内容来看，应用统计是在数学分析、高等代数、解析几何、常微分方程、概率论与数理统计、数理统计、应用多元统计分析和实用回归分析等基础课的基础上，围绕数据挖掘、统计建模以及统计程序语言而开设的专业。

数学与统计学院于 2006 年成功申报"统计学"专业，后根据《统计学类教学质量国家标准》（2012 版）改为应用统计学专业。经过多年的发展，数学与统计学院拥有一支学术水平较高的师资队伍，具有较强的教学科研能力，拥有数学一级学科硕士点，广东省特色重点学科--应用数学。

随着科学技术的发展，尤其是近年来大数据科学和人工智能的迅速推进，我们对人才培养方案做出了相应的调整，其基本原则是：

1. 进行数学类大类招生：与学院信息与计算科学、数学与应用数学两专业一起进行数学类大类招生，在大学第四学期进行专业分流；

2. 夯实数学和专业基础地位：开设数学基础课《数学分析》、《高等代数》、《解析几何》和《常微分方程》和专业基础课《概率论与数理统计》、《数理统计》、《应用多元统计分析》和《实用回归分析》等课程；

3. 强化与大数据和人工智能等行业的联系：开设《最优化算法》、《数据挖掘》、《数学建模》、《时间序列分析》、《Python 语言》、《属性数据分析》、《人工智能》和《贝叶斯分析》增设《统计学习方法》、《统计质量控制》、《模式识别》和《机器学习》等课程，拓宽学生的专业知识面，提升毕业生的专业发展潜力；

4. 加强应用统计学学科建设：广东工业大学地处经济发达的广州，这为专业提供了很好的"生存"和"发展"空间，从海内外引进高层次的专业学科带头人和青年百人，进行专业骨干教师团队建设，争取在五年内形成一支年龄、学位、职称结构合理的高学术水平的教师队伍。

Introduction

The orientation of applied statistics is different from that of statistics. The latter focuses on the research of statistical theory and statistical methods, and pays attention to mathematical logic. The former focuses on the combination of statistics and industry. From the teaching content of the main subjects, applied statistics is a major around data mining, statistical modeling and statistical programming language on the basis of basic courses such as mathematical analysis, advanced algebra, analytical geometry, ordinary differential equations, probability theory and mathematical statistics, mathematical statistics, applied multivariate statistical analysis and practical regression analysis.

The school of mathematics and statistics successfully applied for the specialty of "Statistics" in 2006, and then changed to the specialty of applied statistics according to the national standard for teaching quality of Statistics (2012 Edition). After years of development, the school of mathematics and statistics has a teaching staff with high academic level, strong teaching and scientific research ability, a master's degree in

mathematics and a key discipline with characteristics in Guangdong Province - Applied Mathematics.

With the development of science and technology, especially the rapid advancement of big data science and artificial intelligence in recent years, we have made corresponding adjustments to the talent training scheme. Its basic principles are as follows:

1.Enrollment in Mathematics: enrollment in mathematics with the two majors of information and computing science, mathematics and applied mathematics of the college, and professional diversion in the fourth semester of the University;

2.Consolidate the basic position of mathematics and Specialty: set up basic courses of mathematics such as mathematical analysis, advanced algebra, analytical geometry and ordinary differential equation, and basic courses of specialty such as probability theory and mathematical statistics, mathematical statistics, applied multivariate statistical analysis and practical regression analysis.

3.Strengthen the connection with big data, artificial intelligence and other industries: set up optimization algorithm, data mining, mathematical modeling, time series analysis, python language, attribute data analysis, artificial intelligence and Bayesian analysis, and add statistical learning method, statistical quality control Courses such as pattern recognition and machine learning broaden students' professional knowledge and enhance graduates' professional development potential;

4.Strengthen the discipline construction of Applied Statistics: Guangdong University of technology is located in economically developed Guangzhou, which provides a good "survival" and "development" space for the major. It introduces high-level professional discipline leaders and 100 young people from home and abroad to build a team of professional backbone teachers, and strive to form an age, degree Teachers with reasonable professional title structure and high academic level.

应用统计学

Major: Applied Statistics

专业代码：071202
Code: 071202
学制：四年
Length of schooling: Four years
授予学位：理学学士学位
Degree: Bachelor of Science
制定（修订）时间： 2021 年 12 月
Time of revision: Dec 2021

一. 培养目标

本专业是培养具有良好的数学基础，掌握一整套现代统计理论、先进统计分析方法和统计软件，能熟练利用这些统计分析方法和软件对应用研究领域的数据进行建模、分析和解释，能在企业、事业单位和经济管理部门从事统计调查、统计信息管理、数量分析等开发、应用和管理工作，或在科研、教育部门从事研究和教学工作的专门人才。

I. Educational objectives

This major is to train with good mathematical foundation, master a set of advanced modern statistical theory, statistical analysis method and statistical software, can use these data statistical analysis methods and software of Applied Research in modeling, analysis and interpretation, in the enterprises and institutions and economic management departments engaged in statistical investigation and statistics management, development and application of quantitative analysis and management, or specialized personnel engaged in research and teaching work in scientific research and education department.

二. 毕业要求

本专业学生在培养过程中，强调对学生进行基本理论、基础知识、基本能力（技能）以及健全人格、综合素质和创新精神的培养；致力于为学生参与科技活动、科学研究及社会服务等活动创造条件，提倡学生在参与中发现并培养自己的兴趣和能力，最大限度地发展学生的智力和潜能，鼓励学生敢于面对挑战、不断探索、努力进取、追求卓越；并提供一定的条件，促使学生养成独立工作和团队合作的能力，促使学生养成终身学习和自主学习的习惯。

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：

1.数学知识：具有扎实的数学基础，受到比较严格的数学思维训练，提高数学素养。

2.一门外语：基本掌握一门外语，能应用进行有效地交流，能达到利用其获取专业知识的目的。

3.技能知识：掌握智能科学和技术的专业理论和知识，初步掌握统计应用技能。

4.问题分析：能够应用统计及相关知识识别、表达、并通过研究文献，然后获得统计问题或者数学统计模型，并利用专业知识获得有效的结论。

5.统计科学: 在掌握数学基础理论、计算机程序语言的基础上，能够处理统计科学中的计算问题。

6.研究能力：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展示能力。能够基于科学原理并采用科学方法对复杂的实际现象提炼成数学和统计问题进行研究，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。

7.计算机使用及程序设计：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，包括统计应用方面的工具软件和复杂统计问题的预测与模拟，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。

8.统计与社会：能够基于实际统计问题相关背景知识进行合理的统计分析，评价复杂实际统计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。

9.统计和可持续发展：能够理解和评价针对实际统计问题的实践对环境、社会、人文可持续发展的影响。

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。

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。

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。

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

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。

II. Graduation requirements

During the cultivation process of the students in this major, emphasize the cultivation of basic theory, basic knowledge, basic ability (skills), healthy personality, comprehensive quality and innovation spirit; create conditions for students to fully participate in scientific activities, scientific research and social services etc. activities; advocate students to discover and develop own interest and ability, and maximize the intelligence and potential by participation, encourage students to dare to face challenges, constantly explore, strive for progress, pursue the excellence; provide the conditions to encourage students to develop the ability of work independently and team work, help students form the habit of lifelong learning and autonomous learning.

After four years of systematic study, the graduates in this major should acquire the following knowledge and abilities:

1. Mathematical knowledge: have a solid mathematical foundation, receive relatively strict mathematical thinking training, and improve mathematical literacy.

2. A foreign language: basically master a foreign language, be able to use it for effective communication, and achieve the purpose of using it to obtain professional knowledge.

3. Skills and knowledge: master the professional theory and knowledge of intelligent science and technology, and preliminarily master the statistical application skills.

4. Problem analysis: be able to apply statistics and related knowledge to identify, express, and study literature, then obtain statistical problems or mathematical statistical models, and use professional knowledge to obtain effective conclusions.

5. Statistical Science: on the basis of mastering the basic mathematical theory and computer program language, be able to deal with the calculation problems in statistical science.

6. Research ability: have strong language expression ability, master the basic methods of data query, literature retrieval and using modern information technology to obtain relevant information, and have certain scientific research and display ability. Be able to refine complex practical phenomena into mathematical and statistical problems based on scientific principles and scientific methods, including designing experiments and schemes, collecting and collecting data, modeling, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.

7. Computer use and program design: be able to develop, select and use appropriate computer technologies, resources and tools for complex mathematical problems, including statistical application tool software and prediction and Simulation of complex statistical problems, and understand their limitations. Proficient in computer (including common languages, tools and some special software), with certain algorithm analysis, structure design and strong programming ability.

8. Statistics and society: be able to conduct reasonable statistical analysis based on the relevant background knowledge of practical statistical problems, evaluate the impact of solutions to complex practical statistical problems on society, health, safety, law and culture, and understand the responsibilities.

9. Statistics and sustainable development: be able to understand and evaluate the impact of the practice of practical statistical problems on the sustainable development of environment, society and humanities.

10. Professional norms: master certain basic psychological knowledge, skills and methods, respect life and care for others; Rational, rigorous, optimistic and cheerful.

11. Individual and team: leader in a multi-disciplinary context.

12. Communication: be able to effectively communicate with peers in the industry and the public on complex practical issues, including writing reports and designing manuscripts, making statements, clearly expressing or responding to instructions. And have a certain international vision and be able to communicate and exchange in a cross-cultural context.

13. Project management: understand and master the basic skills and practical methods of mathematical logic reasoning ability, calculation ability and statistical application, and can be applied in a multidisciplinary environment.

14. Lifelong learning: have the ability to adapt to development, have a correct understanding of lifelong learning and strong self-study ability.

三. 专业培养特色

本专业方向以数学理论为基础,注重数理知识、计算机技术、统计技术方法的融合, 以培养学生的自主学习能力、实践能力和创新创业能力为重点, 以强基础, 宽口径, 重能力, 创特色的理念设置课程体系。具体如下:

1. 突显理科学院的特色, 在基础课程设置上, 强化数学基本理论的教学, 使学生具备扎实的数学基础功底, 从而为学生未来各个专业方向的发展上奠定良好的基础。加强行业教学, 尤其是大数据和人工智能行业, 跟上行业发展的前沿。
2. 由于地缘优势, 我们经常邀请相关领域的专家或者企业家到校交流、指导。与专家们接触能使得我们的学生树立正确的学习观进而建立起专业自信。同时, 这种交流和指导也协助我们根据人才市场的需求来动态调整课程设置, 以帮助我们的毕业生拥有更好的就业竞争力和持续的职业发展动力。
3. 由于本专业内涵的宽广性, 加强与我校工科学院交流, 希望建立与这些专业在教学和科研上的资源共享与合作, 促进专业的进一步发展。
4. 积极探索新的建设模式, 包括:专业与企业的合作, 专业与专业的合作 (外校), 派出学生进驻企业或者到外校学习一段时间, 进一步加强与企业和合作, 持续
5. 加强建设联合培养实践教学基地。
6. 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。

III. Features of speciality cultivation

To cultivate students' autonomous learning、practical and innovation abilities，this professional direction is based on mathematical theories，and pay much more attentions on the integration of mathematical know ledges，computer technologies and statistical techniques. Our curriculum system has the following features: solid professional knowledge，broad job prospects，more competence. More details are as following:

1. Highlighting the characteristics of the science academy, and strengthening the teaching of the basic theory of mathematics in the basic curriculum, so that students can have a solid foundation of mathematics, and lay a good foundation for the future development of every professional direction of

students. Strengthen industry teaching, especially big data and artificial intelligence industry, keep up with the frontier of industry development.

2. Because of the geographical advantage, we often invite experts or entrepreneurs from the related fields to exchange and guide them to school. Contact with experts can enable our students to set up a correct view of learning and build up a professional confidence. At the same time, this communication and guidance will help us dynamically adjust curriculum settings according to the demand of talent market, so as to help our graduates have better employment competitiveness and sustained career development power.

3. Due to the broadness of the connotation of this specialty, we should strengthen communication with our school of engineering. We hope to establish resources sharing and cooperation with these majors in teaching and scientific research, and promote further development of our specialty.

4. Actively explore the new mode of construction, including: professional and enterprise cooperation, and professional cooperation (school), sent students into the enterprise or to other school study for a period of time, to further strengthen cooperation with enterprises and cooperation, continued. We should strengthen the construction of joint training and practice teaching base.

5. The tutor is responsible for the students to join the research team and enhance the students' awareness of innovation and entrepreneurship.

四. 专业主干学科
数学、统计学

IV. Key discipline for the specialty
Mathematics、Statistics

五. 专业核心课程
V. Core courses

六. 特色课程（全英课程、双语课程及其他特色教学改革课程）
无

VI. Featured courses (English courses, bilingual courses and other featured reforming courses)
None

七. 毕业学分要求
课内总学分不低于 160 学分，实践教学环节学分不少于 42.5 学分。

VII. Credits required for graduation
At least 160 credits in total, of which practical teaching has at least 42.5 credits.

八. 主要实践教学环节
军训、大学物理实验、Hadoop 实验、Excel 统计软件包、毕业设计(论文)等。

VIII. Main components of practical teaching
Military training, College Physics experiment, Hadoop experiment, Excel statistical package experiment, Graduation Design (Thesis), etc.

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 asIdeological & Political Theories, University Physical Education, College English, AdvancedMathematics, Basic Computer Literary.	43.5	812	27.1%	57.4%
	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.	41.5	664	25.9%	
	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.	7.0	112	4.4%	
	实验实习实训 Experimental and Practical Courses		8.0	128	5.0%	14.4%
	设计（论文） Graduation Design (Thesis)		15.0	240	9.4%	

	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	7.5%	22.5%
	专业基础课 （至少选 12.0 学分） Basic Specialty Courses (A minimum of 12.0 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.	12.0	192	7.5%	
	专业课 （至少选 12.0 学分） Specialty Courses (A minimum of 12 .0 credits required)	指学科方向和跨学科方向的基础理论和知识的课程。 Courses for basic theories and knowledge in the disciplinary emphasis and interdisciplinary emphasis.	12.0	192	7.5%	
	实验实习实训 （至少选 7.0 学分） Experimental and Practical Courses (A minimum of 7.0 credits required)		7.0	112	4.4%	5.7%
	设计（论文） （至少选 2.0 学分） Graduation Design (Thesis) (A minimum of 2.0 credits required)		2.0	32	1.3%	

合计 **Total**	160.00	2676	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 Computers
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 发表论文 Having papers published in nationwide average journals	每篇论文 Per paper	1
	核心刊物发表论文 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 Compulsoy 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	

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
		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	32		8	
		大学物理 A(1) College Physics A(1)	4	64			
		大学物理 A(2) College Physics A(1)	4	64			
		小计 Subtotal	43.5	812			
	专业基础课 Basic Specialty Courses	高等代数(1) Advanced Algebra(1)	4.5	72			
		数学分析(1) Mathematical Analysis(1)	5.5	88			
		解析几何 Analytic Geometry	2.0	32			
		C++面向对象程序设计 C++ Object Oriented Programming	3.0	48			8
		高等代数(2) Advanced Algebra(2)	4.5	72			
		数学分析(2) Mathematical Analysis(2)	6.0	96			
		数学分析(3) Mathematical Analysis(3)	3.5	56			
		常微分方程 Ordinary Differential Equations	3.0	48			
		概率论与数理统计 Probability and Statistics	3.5	56			
		Hadoop 基础 Hadoop basis	2.5	40			
		数理统计 Mathematical Statistics	3.5	56			
		小计 Subtotal	41.5	664			
	专业课 Specialty Courses	信息检索与利用 Information Retrieval and Utilization	1.0	16			8
		应用多元统计分析 Applied Multivariate Statistical Analysis	3.0	48			
		实用回归分析 Practical Regression Analysis	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
			小计 Subtotal	7	112			
	实验实习实训 Experimental and Practical Courses		军训 Military Training	2	32		32	
			大学物理实验 A(1) College Physics Experimen A(1)	1.5	24	24		
			大学物理实验 A(2) College Physics Experimen A(2)	1.5	24	24		
			Hadoop 实验 Hadoop Experiment	1	16	16		
			Excel 统计包实验 Excel Statistical Package Test	2	32	32		
			小计 Subtotal	8	128	96	32	
	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	1	1 周			16
			毕业设计(论文) Graduation Design (Thesis)	14	14 周			224
			小计 Subtotal	15				240

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		自然科学与工程技术类 Natural Sciences and Engineering Technology.	3.0	48			
			人文社科类 Humanities and Social Sciences	9.0	144			
			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		运筹学 Operation Research	2.0	32			
			时间序列分析 Time Series Analysis	2.0	32			
			数学建模 Mathematical Modeling	2.0	32			
			财务管理 Financial Management	2.0	32			
			Python 语言 Python Language	2.0	32			
			R 统计软件 R Statistical Software	2.0	32			
			最优化方法 Optimization Method	2.0	32			
			属性数据分析 Categorical Data Analysis	2.0	32			
			抽样调查 Sampling Survey	2.0	32			

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
		机器学习 Machine Learning	2.0	32			
		保险精算 Insurance Actuarial	3.0	48			
		小计（至少选 12 学分） Subtotal (at least 12 credits)	12	192			
专业课 Specialty Courses		统计预测与决策 Statistical Forecasting and Decision	2.0	32			
		数据挖掘 Data Mining	2.0	32			
		人工智能 Artificial Intelligence	2.0	32			
		随机过程 Random process	2.0	32			
		数理金融学 Mathematical finance	2.0	32			
		统计学习方法 Statistical Learning Analysis	2.0	32			
		模式识别 Pattern Recognition	2.0	32			
		统计质量控制 Statistical Qaulity Control	2.0	32			
		生存分析与可靠性 Survival Analysis and Reliability	2.0	32			
		小波分析 Wavelet Analysis	2.0	32			
		贝叶斯统计 Baysian Statistics	2.0	32			
		试验设计与分析 Experimental Design and Analysis	2.0	32			
		非参数统计 Non-parametric Statistics	2.0	32			
		小计（至少选 12 学分） Subtotal (at least 12 credits)	12	192			
实验实习实训 Experimental and Practical Courses		运筹学实验 Operation Research Experiment	1.0	16			
		时间序列分析实验 Time Series Analysis Experiment	1.0	16			
		数据建模实验 Mathematical Modeling Experiment	1.0	16			
		R 统计软件实验 R Statistical Software Experiment	1.0	16			
		Python 语言实验 Python Language Experiment	2.0	32			
		最优化方法实验 Optimization Method Experiment	1.0	16			
		人工智能实验 Artificial Intelligence Experiment	1.0	16			
		数据挖掘实验 Data Mining Experiment	1.0	16			
		属性数据分析实验 Categorical Data Analysis Experiment	1.0	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
		机器学习实验 Machine Learning Experiment	1.0	16			
		统计学习方法实验 Statistical Learning Analysis Experiment	1.0	16			
		统计质量控制实验 Statistical Qaulity Control Experiment	1.0	16			
		模式识别实验 Pattern Recognition Experiment	1.0	16			
		数学分析选讲 Mathematical Analysis Selected Lectures	4.0	64			
		小计（至少选 7 学分） Subtotal (at least 7 credits)	7	112			
	设计（论文） Graduation Design (Thesis)	高等代数选讲 Advanced Algebra Selected Lectures	2	32			
		毕业实习 Graduation Practice	2	32		32	
		小计（至少选 2 学分） Subtotal (at least 32 credits)	2	32			

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。

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

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 应用统计学专业毕业要求与论证标准的毕业要求

Table 1 Applied Statistics major graduation requirements and Demonstration Standards

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 应用统计学专业毕业要求支撑专业培养目标

Table 2 Graduation requirements for Applied Statistics Major to support the professional training objectives

培养目标 train objective 毕业要求 graduation requirements	统计素养 Statistical literacy	统计应用 Statistical 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. 一门外语 **A foreign language**	L	M	H			M
3. 技能知识 **Skill knowledge**	L	H	L		M	M
4. 问题分析 **Problem analysis**	M	H			M	L
5. 统计科学 **Statistical Science**	H	H	L		H	
6. 研究能力 **Research Ability**	L	H	L		H	
7. 计算机使用及程序设计 **Computer use and programming**	L	M	H			
8. 统计与社会 **Statistics and Society**		M		L		H
9. 统计和可持续发展 **Statistics and sustainable development**	M	H		L		L

10. 职业规范 **Professional norms**	L			H	M
11. 个人和团队 **Individuals and Teams**			H	L	M
12. 沟通 **Communication**	L	M	H	L	
13. 项目管理 **Project management**	L	H	M		L
14. 终身学习 **Life-long learning**			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 应用统计学专业课程体系对毕业要求的支撑
Table 3. Support of Applied Statistics Curriculum System for graduation

课程体系 course system	课程名称 Course Name	1. 数学知识 Mathematical knowledge	2. 一门外语 A foreign language	3. 技能知识 Skill knowledge	4. 问题分析 Problem analysis	5. 统计科学 Statistical Science	6. 研究能力 Research Ability	7. 计算机使用及程序设计 Computer use and programming	8. 统计与社会 Statistics and Society	9. 统计和可持续发展 Statistics 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
自然科学类课程 Natural science courses	大学物理 A(12)+实验 College Physics A(12)+Experiment	√									√				
	自然科学与工程技术公选 Public election of natural science and Engineering Technology	√											√		
专业基础必修课	常微分方程 Ordinary Differential Equations				√					√					
	C++面向对象程序设计 C++ Object Oriented	√		√									√		

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课程体系 course system	课程名称 Course Name	1.数学知识 Mathematical knowledge	2.一门外语 A foreign language	3.技能知识 Skill knowledge	4.问题分析 Problem analysis	5.统计科学 Statistical Science	6.研究能力 Research Ability	7.计算机使用及程序设计 Computer use and programming	8.统计与社会 Statistics and Society	9.统计和可持续发展 Statistics 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
Professional basic compulsory courses	Programming														
	数学分析 Mathematical Analysis	√			√						√				
	高等代数 Advanced Algebra	√			√								√		
	解析几何 Analytic Geometry	√			√								√		
	概率论与数理统计 Probability and Statistics	√	√		√										
	数理统计 Mathematical Statistics	√	√		√			√							
	Hadoop 基础 Hadoop basis	√													√
专业基础课选修课 Basic Elective Courses	运筹学 Operation Research		√		√							√			
	时间序列分析 Time Series Analysis	√											√		
	数学建模 Mathematical Modeling	√			√	√			√						
	财务管理 Financial Management	√		√	√										√
	Python 语言 Python Language	√	√											√	
	R 统计软件 R Statistical Software		√		√										
	最优化方法 Optimization Method	√												√	
	属性数据分析 Categorical Data Analysis	√										√			
	抽样调查 Sampling Survey	√	√		√	√					√				
	机器学习 Machine Learning		√	√	√										
	保险精算 Insurance Actuarial	√	√	√								√			
专业必修	信息检索与利用 Information Retrieval and Utilization		√						√					√	

课程体系 course system	课程名称 Course Name	1.数学知识 Mathematical knowledge	2.一门外语 A foreign language	3.技能知识 Skill knowledge	4.问题分析 Problem analysis	5.统计科学 Statistical Science	6.研究能力 Research Ability	7.计算机使用及程序设计 Computer use and programming	8.统计与社会 Statistics and Society	9.统计和可持续发展 Statistics 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 Professional compulsory courses	应用多元统计分析 Applied Multivariate Statistical Analysis	√	√	√	√	√									√
	实用回归分析 Practical Regression Analysis	√		√										√	
专业选修课 Professional elective courses	数据挖掘 Data Mining	√				√						√			
	统计预测与决策 Statistical Forecasting and Decision	√		√										√	
	人工智能 Artificial Intelligence	√			√	√				√					
	随机过程 Random process	√			√	√									√
	数理金融学 Mathematical finance	√				√		√							
	统计学习方法 Statistical Learning Analysis					√									√
	模式识别 Pattern Recognition	√		√		√								√	
	统计质量控制 Statistical Qaulity Control	√		√									√		
	生存分析与可靠性 Survival Analysis and Reliability	√										√			
	小波分析 Wavelet Analysis			√											
	贝叶斯分析 Baysian Statistics	√		√					√						
	试验设计与分析 Experimental Design and Analysis	√						√							
	非参数统计 Non-parametric Statistics	√						√					√		
人文社会	中国近现代史纲要 Outline of Modern Chinese History							√							

课程体系 course system	课程名称 Course Name	1.数学知识 Mathematical knowledge	2.一门外语 A foreign language	3.技能知识 Skill knowledge	4.问题分析 Problem analysis	5.统计科学 Statistical Science	6.研究能力 Research Ability	7.计算机使用及程序设计 Computer use and programming	8.统计与社会 Statistics and Society	9.统计和可持续发展 Statistics 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
科学类通识教育课程 General education courses of Humanities and Social Sciences	思想道德与法治 Ideological Morality and Rule of Law							√					√		
	马克思主义基本原理 Basic Principles of Marxism							√			√				
	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							√				√			
	形势与政策 Situation and Policy							√							
	大学英语 College English							√							
	军训 Military Training							√							
	自然科学与工程技术类公选课 Public elective courses of natural science and Engineering Technology							√					√		
	人文社科类公选课 Public elective courses in Humanities and Social Sciences							√							
	入学教育 Entrance Education							√				√			
	公益活动 Social Work							√							
	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							√			√				

课程体系 course system	课程名称 Course Name	1. 数学知识 Mathematical knowledge	2. 一门外语 A foreign language	3. 技能知识 Skill knowledge	4. 问题分析 Problem analysis	5. 统计科学 Statistical Science	6. 研究能力 Research Ability	7. 计算机使用及程序设计 Computer use and programming	8. 统计与社会 Statistics and Society	9. 统计和可持续发展 Statistics 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
	体育 Physical Education							√							
	高年级体育锻炼							√							
	军事理论 Military Theory							√							√
	大学生职业规划与创业教育 College Students' Career Planning and Entrepreneurship Education							√			√				
	大学生就业创业指导 Guidance of College Students' Employment and Entrepreneurship							√			√				
	大学生心理健康教育 College Students' Psychological Health Education							√				√			
实验实习实训 Experimental practice and training	大学物理实验 College Physics Experimen	√								√					
	军训 Military Training		√	√	√										√
	Hadoop 实验 Hadoop Experiment		√	√	√						√				
	Excel 统计包实验 Excel Statistical Package Test		√	√					√						
			√	√											
					√			√							
专业知识综合应用实践环节 Practical links of comprehensive	运筹学实验 Operation Research Experiment									√					
	毕业设计（论文） Graduation Design (Thesis)	√	√	√	√			√							√
	最优化方法实验 Optimization Method Experiment	√	√	√										√	
	统计学习方法实验 Statistical Learning Analysis Experiment	√			√						√				
	数学建模实验 Mathematical Modeling Experiment	√	√		√			√							

课程体系 course system	课程名称 Course Name	1. 数学知识 Mathematical knowledge	2. 一门外语 A foreign language	3. 技能知识 Skill knowledge	4. 问题分析 Problem analysis	5. 统计科学 Statistical Science	6. 研究能力 Research Ability	7. 计算机使用及程序设计 Computer use and programming	8. 统计与社会 Statistics and Society	9. 统计和可持续发展 Statistics 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
application of professional knowledge	属性数据分析实验 Categorical Data Analysis Experiment		√	√										√	
	数据挖掘实验 Data Mining Experiment		√	√	√										√
	模式识别实验 Pattern Recognition Experiment		√		√						√				
	时间序列分析实验 Time Series Analysis Experiment		√	√	√	√			√						
	R 统计软件实验 R Statistical Software Experiment		√		√	√									√
	Python 语言实验 Python Language Experiment				√		√	√			√				
	人工智能实验 Artificial Intelligence Experiment	√		√	√										√

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。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。

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 Teaching link weight	备注 remarks
1. **数学知识**：具有扎实的	1.1掌握必要的从事应用统计工作所需的数学分析、高等代数、概率论和	0.6	数学分析 Mathematical Analysis	0.4	

数学基础，受到比较严格的数学思维训练，提高数学素养。 **Mathematical knowledge**: have a solid mathematical foundation, receive relatively strict mathematical thinking training, and improve mathematical literacy.	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 statistical application work and can be applied to mathematical modeling, calculation and analysis.		高等代数 Advanced Algebra	0.2	
			概率论与数理统计 Probability and Mathematical Statistics	0.4	
			解析几何 Analytic Geometry		
	1.2 掌握从事应用统计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 statistical work, which can be used in the analysis and research of mathematics and other applied problems.	0.4	数理统计 Mathematical Statistics	0.1	
			应用多元统计分析 Applied Multivariate Statistical 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	
			实用回归分析 Practical Regression Analysis	0.1	
			时间序列分析 Time Series Analysis	0.1	
			随机过程 Stochastic Process	0.1	
			属性数据分析 Categorical Data Analysis	0.1	
			常微分方程 ODE(ordinary differential equation)	0.05	
2. 一门外语：基本掌握一门外语，能应用进行有效地交流，能达到利用其获取专业知识的目的。 **A foreign language:** basically master a foreign language, be able to use it for effective communication, and achieve the purpose of using it to obtain professional knowledge.	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，懂得应用统计专业各种层面的交流。 Familiar with professional knowledge, know the communication of various levels of applied statistics major.	0.4	大学生心理健康教育 College Students' Psychological Health Education	0.2	
			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，初步掌握统计应用技能。 **Skill knowledge**: master the professional theory and knowledge of intelligent science and technology, and preliminarily master the statistical 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	Hadoop 基础 Hadoop basis	0.2	
			Python 语言 Python language	0.2	
			模式识别 Pattern Recognition	0.1	
			人工智能 Artificial Intelligence	0.1	
	3.2掌握各类统计应用工具软件、技术等。 Master all kinds of statistical application tools, software, technology, etc.	0.5	R 统计软件 R Statistical Software	0.1	
			C++面向对象程序设计 C++object-oriented Programming Course Design	0.1	
			Python 语言 Python Language	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：能够应用统计及相关知识识别、表达、并通过研究文献，然后获得统计问题或者数学统计模型，并利用专业知识获得有效的结论。 **Problem analysis**: be able to apply statistics and related knowledge to identify, express, and study literature, then obtain statistical problems or mathematical statistical models, and use professional knowledge 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统计问题，提炼把握问题关键点和数学表征指标。 More accurately find and identify the statistical 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	
			数据挖掘 Data Mining	0.2	
			设计（论文） Graduation Design (Thesis)	0.2	
			统计学习方法 Statistical Learning Analysis	0.2	
	4.2具有文献检索、资料查询、文献综述能力和分析能力，能够获得统计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 statistical 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	
			数学建模实验 Mathematical Modeling Experiment	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	

	4.3 能够针统计应用中的复杂问题，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 statistics, 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. 统计科学：在掌握数学基础理论、计算机程序语言的基础上，能够处理统计科学中的计算问题。 **Mathematical applications**: on the basis of mastering the basic mathematical theory and computer program language, be able to deal with the calculation problems in statistical science.	5.1 能够对统计应用问题进行分析和提炼，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 statistical 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 and demonstrate the feasibility of solutions to specific application problems, and choose a reasonable scheme for implementation.	0.25	统计预测与决策 Statistical Forecasting and Decision	0.2	
			抽样调查 Sampling Survey	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
	5.3 具有具体实施统计解决方案的能力，设计开发满足应用问题的数学模型、算法、以及系统开发。 Capture the ability to implement specific statistical solutions, to design and develop mathematical models, algorithms, and system development to meet the application problems.	0.2	C++面向对象程序设计课程设计 C++ Object Oriented Programming Course Design	0.2	
			Hadoop 实验 Hadoop Experiment	0.2	
			毕业设计（论文） Graduation Project (Thesis)	0.3	
			设计（论文） Design (Thesis)	0.3	
	5.4 能够对统计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。 Be able to synthesize and evaluate the solutions of statistical application problems, and can reflect the innovation consciousness in the analysis link, and try to improve and optimize.	0.2	竞赛 Contests	0.2	
			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 统计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。 In the process of statistical application, the constraints of economy, environment, law, safety, health and ethics can be considered comprehensively, and the acceptable indicators can be obtained.	0.1	科研 Academic research	0.2	
			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. 研究能力：有较强的语	6.1 能够基于科学原理并采用科学方法对统计应用问题进行分析，设计可	0.4	大学物理 College Physics	0.35	

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展示能力。能够基于科学原理并采用科学方法对复杂的实际现象提炼成数学和统计问题进行研究，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**: have strong language expression ability, master the basic methods of data query, literature retrieval and using modern information technology to obtain relevant information, and have certain scientific research and display ability. Be able to refine complex practical phenomena into mathematical and statistical problems based on scientific principles and scientific methods, including designing experiments and schemes, collecting and collecting data, modeling, analyzing and interpreting data, and obtaining reasonable and effective conclusions through information synthesis.	行的实验研究方案；Be able to analyze statistical application problems based on scientific principles and using scientific methods, and design feasible experimental research schemes		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 能够针对统计应用问题，构建实验方案，设计实验流程；具备实验操作能力，正确操作实验，安全开展实验。Possess the ability to construct experimental scheme and design experimental process for statistical application problems; have experimental operation ability, correct operation experiment and carry out experiment safely.	0.3	大学物理 College Physics	0.3	
			大学物理实验 University Physics Experiment	0.1	
			设计（论文） Design (Thesis)	0.2	
			Hadoop 实验 Hadoop Experiment	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.	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. 计算机使用及程序设计：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，包括统计应用方面的工具软件和复杂统计问题的预测与模拟，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**:	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	
			Hadoop 实验 Hadoop Experiment	0.3	
			信息检索与利用 Information Retrieval and Utilization	0.4	
	7.2 掌握必要统计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 statistical application field.	0.5	Excel 统计包实验 Excel Statistical Package Test	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	

			毕业实习 Graduation Field Work	0.2	
be able to develop, select and use appropriate computer technologies, resources and tools for complex mathematical problems, including statistical application tool software and prediction and Simulation of complex statistical problems, and understand their limitations. Proficient in computer (including common languages, tools and some special software), with certain algorithm analysis, structure design and strong programming ability.					
8. 统计与社会：能够基于实际统计问题相关背景知识进行合理的统计分析，评价复杂实际统计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**: be able to conduct reasonable statistical analysis based on the relevant background knowledge of practical statistical problems, evaluate the impact of solutions to complex practical statistical problems on society, health, safety, law and culture, and understand the responsibilities.	8.1 了解统计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 statistics 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 能够统计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 statistical 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. 统计和可持续发展：能够理解和评价针对实际统计问题的实践对环境、社会、人文可持续发展的影响。 **Mathematics and sustainable development**: be able to understand and evaluate the impact of the practice of practical statistical problems on the sustainable development of environment, society and humanities.	9.1 理解数学和社会可持续发展的内涵与意义，了解统计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 statistics and social sustainable development, and understand the impact that mathematics application may have on the sustainable development of the environment and society.	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	
			数学建模实验 Mathematical Modeling Experiment	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。 **Professional norms**: master certain basic psychological knowledge, skills and methods, respect life and care for others; Rational, rigorous, optimistic and 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	
	10.2 能够在统计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 statistical 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	
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**: leader in a multi-disciplinary context.	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 have the spirit of cooperation.	0.6	数学建模实验 Mathematical Modeling Experiment	0.4	
			体育 Physical Education	0.2	
			军训 Military Training	0.2	
	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。 **Communication**: be able to effectively communicate	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, have good communication 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	

with peers in the industry and the public on complex practical issues, including writing reports and designing manuscripts, making statements, clearly expressing or responding to instructions. And have a certain international vision and be able to communicate and exchange in a cross-cultural context.	12.2 能够就复杂统计应用问题，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 statistical 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：理解并掌握数学逻辑推理能力、计算能力以及统计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**: understand and master the basic skills and practical methods of mathematical logic reasoning ability, calculation ability and statistical application, and can be applied in a multidisciplinary environment.	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，应用统计原理与决策方法。 Be able to apply statistical 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	
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.	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	