数据科学与大数据技术

Data Science and Big Data Technology

专业代码：080910T　　学　制：4 年

Program Code: 080910T　　Duration：4 years

培养目标（Educational Objectives）：

本专业面向国家大数据发展规划,依托国家数字经济高质量发展和粤港澳大湾区大数据产业发展需求，培养德智体美劳全面发展，具有扎实的数据科学与大数据技术专业知识及综合能力、家国情怀和全球视野兼备、“三力”（学习力、思想力、行动力）卓越、胜任国际化合作与竞争的“三创型”（创新、创造、创业）数据科学与大数据技术领军人才，具体包括以下四个目标：

培养目标 1：践行社会主义核心价值观，具有良好的人文科学素养、社会责任感和环境保护意识，理解并能正确评价所从事的大数据工程实践活动对文化、健康、安全、环境和社会可持续发展带来的影响，熟悉所从事行业领域的法律法规，坚守职业道德规范。（道德素养）

培养目标 2：具备数据科学与大数据技术领域的基础知识、基本技能和科学研究的基本素质，具有应用大数据理论和方法以学科交叉方式解决行业关键技术问题的综合能力,具有源头创新和引领行业技术发展的潜质。（专业素养）

培养目标 3：具有团队合作精神，能够在专业实践和多学科背景下的团队中展现独立工作、团结协作和组织领导能力；能够针对大数据领域的复杂技术应用问题与业界同行及社会公众进行有效沟通和交流。（沟通协作能力）

培养目标 4：具有国际视野，不断拓展、提升大数据相关的专业素养与专业应用能力，能够跟踪大数据领域发展动态，获取知识和更新知识，具有终身学习的能力。（终身学习能力）

通过四年的学业，毕业生能够在企业、科研部门、高等院校、事业单位等从事大数据研究、设计、开发及管理等工作，推动大数据技术在互联网、健康、金融、教育、交通、能源等相关行业的创新应用。毕业五年左右成为大数据相关领域的创新技术引领者、重要工程管理者和专业市场开拓者。

Overview of educational objectives

This program is oriented to the national big data development plan, relying on the high-quality development of the national digital economy and the development needs of the big data industry in the Guangdong-Hong Kong-Macao Greater Bay Area, which aims to cultivate the all-round development of morality, intelligence, physique and "Three creative" (innovation, creation and entrepreneurship) outstanding data science and big data technology leading talents with solid professional knowledge and comprehensive ability of data science and big data technology, national feelings and global vision, excellent "three strengths" (learning ability, thinking ability and action power), and competent for international cooperation and competition, including the following four goals:

Educational Objective 1.Practice socialist core values, have good humanities literacy, social responsibility and environmental protection awareness, understand and correctly evaluate the

impact of the big data engineering practice activities on culture, health, safety, environment and social sustainable development, be familiar with the laws and regulations of the industry, and adhere to the professional ethics. (Moral quality)

Educational Objective 2.Have the basic knowledge, basic skills and basic quality of scientific research in the field of data science and big data technology, have the comprehensive ability to apply big data theory and methods to solve key technical problems in the industry in an interdisciplinary way, and have the potential of source innovation and leading the development of industry technology. (Professional quality)

Educational Objective 3.Be a team player, able to demonstrate independent work, teamwork and organizational leadership in professional practice and multidisciplinary teams; Able to effectively communicate and exchange with industry peers and the public on complex technology application problems in the field of big data. (Communication and collaboration skills)

Educational Objective 4.Have an international perspective, constantly expand and improve the professional quality and professional application ability related to big data, able to track the development of big data field, acquire and update knowledge, and have the ability of lifelong learning. (Lifelong learning ability)

After four years of study, graduates can engage in big data research, design, development and management in enterprises, scientific research departments, universities and institutions, and promote the innovative application of big data technology in Internet, health, finance, education, transportation, energy and other related industries. Within five years after graduation, he will become an innovative technology leader, important engineering manager and professional market pioneer in the field of big data.

毕业要求（Student Outcomes）：

№1.工程知识：运用数学、自然科学、计算和工程基础知识以及数据科学与大数据技术等专业知识，制定针对大数据领域复杂工程问题的解决方案。

№1.1 能够应用数学、自然科学、工程基础和专业知识表述大数据领域工程问题，并建立具体对象的数学模型；

№1.2 能够应用数学、自然科学、工程基础和专业知识解释模型的物理含义，对模型进行正确的推理和解答；

№1.3 能够将数学、自然科学、工程基础和专业知识用于大数据领域工程问题的分析、计算和设计。

№1.4 能够将数学、自然科学、工程基础和专业知识用于大数据领域工程问题的解决方案的比较与综合。

№2.问题分析：利用数学、自然科学和工程科学的第一原理，识别、制定、研究并分析大数据领域复杂的工程问题，得出有根据的结论，对可持续发展进行整体考虑。

№2.1 对大数据相关工程问题，能分析其需求，给出任务目标的需求描述，并识别其面临的各种制约条件。

№2.2 对大数据相关工程问题，能根据需求描述，建立解决问题的抽象模型。

№2.3 对大数据相关工程问题，能根据所建立的抽象模型，通过文献检索与资料查询等方式获取知识和方法，对问题进行分析，并得出有效结论。

№3.设计/开发解决方案：为大数据领域复杂的工程问题设计创造性的解决方案，并设计系统、部件或流程，以满足确定的需求，同时适当考虑公共健康和安全、整个生命周期的成本、净零碳以及资源、文化、社会和环境因素。

№3.1 针对特定需求，能对大数据领域中的相关工程问题进行分解和细化，能够进行模块的设计与开发。

№3.2 了解大数据领域技术发展的现状与趋势，能够在方案设计中体现创新意识。

№3.3 结合社会、健康、安全、法律、文化及环境等因素，综合考虑复杂工程问题的应用背景、系统特性、设计流程等因素，分析对比候选方案的可行性和性能，确定解决方案。

№4.研究：使用研究方法对大数据领域复杂的工程问题和系统进行研究，包括基于研究的知识、设计实验、分析和解释数据，以及综合信息以提供有效结论。

№4.1 能够基于科学原理并采用科学方法进行大数据领域的相关复杂工程问题的系统分析和建模。

№4.2 能够针对复杂工程系统进行实验方案设计、实验平台搭建、实验数据获取。

№4.3 能够对实验数据进行信息综合分析，并得到合理有效的结论，反馈到工程设计实践中。

№5.工具的使用：创造、选择、应用适当的技术、资源以及现代工程和信息技术工具，包括预测和建模，认识其局限性，以解决大数据领域复杂的工程问题。

№5.1 能恰当使用计算机软件技术及算法仿真工具，完成大数据系统中的复杂工程问题的模拟与仿真分析，能理解其局限性。

№5.2 能熟练使用仪器工具观察分析大数据系统性能，能运用图表、公式等手段表 达和解决大数据的设计问题，能理解其局限性。

№6.工程师与世界：分析和评估可持续发展的成果，社会、经济、可持续性和健康与安全、法律和环境在解决大数据领域复杂工程问题中的影响。

№6.1 具备社会、健康、法律、安全以及文化的基本知识和素养。

№6.2 能够合理评价大数据领域相关工程实践和复杂工程问题解决方案对社会、健康、安全、法律以及文化的影响，并理解应承担的责任。

№7.品德修养与伦理：理解并掌握科学的世界观和方法论，具备良好的思想品德和社会公德，具有家国情怀和社会责任感；运用伦理原则，致力于大数据领域职业伦理工程实践和规范；并遵守相关的国家和国际法律。表现出理解多元化和包容性的必要性。

№7.1 具有良好的思想品德和社会公德，具有家国情怀与社会责任感，能够践行社会主义核心价值观。

№7.2 通过应用伦理原则，理解并能遵循大数据领域的伦理准则、道德原则和工程实践规范。

№7.3 能够在大数据领域相关研究、开发和生产过程中遵守相关的国家和国际法律，尊重和包容不同的价值观、文化差异和个体差异，以确保合法性、合规性和公正性。

№8.个人和协作的团队工作：在多元化和包容性的团队中，以及多学科、远程和分布式的环境中，作为个人、成员或领导有效地发挥作用。

№8.1 能够在大数据领域相关研究、开发和生产的团队中承担个体和成员角色，具有团队合作精神或意识；

№8.2 能够在多学科背景下充分理解和消化其他学科的知识和方法，掌握团队合作 的组织管理方式，具有团队负责人意识。

№9.沟通：在复杂的大数据工程活动中与工程界和整个社会进行有效和包容的沟通，包括撰

写和理解有效的报告和设计文件，并进行有效的介绍；考虑到文化、 语言和学习差异。

№9.1 具有良好的表达能力，能够就大数据领域复杂工程问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令。

№9.2 具备运用外语的能力和一定的国际视野，能够在跨文化背景下进行沟通和交流。

№10.项目管理和财务：应用对大数据领域工程管理原则和经济决策的知识和理解，并将其应用于自己的工作，作为团队的成员和领导者，管理项目和多学科环境。

№10.1 理解并掌握工程管理原理与经济决策方法，能够识别大数据领域相关工程项目管理与经济决策中的关键因素。

№10.2 能够将工程管理原理和经济决策方法运用于跨学科的复杂工程项目中。

№11.持续的终身学习：认识到需要并有准备和能力从事：i)独立和终身学习 ii) 适应新技术和新兴技术，以及 iii) 在最广泛的技术变革背景下进行批判性思考。

№11.1 理解不断探索和学习的必要性，具有自主学习的方法，了解拓展知识和能力的途径。

№11.2 具有自主学习意识和终身学习的意识，能够根据社会环境和个人角色变化有不断学习和适应发展的能力。

№1. Engineering knowledge: Use basic knowledge of mathematics, natural science, computing and engineering as well as professional knowledge of data science and big data technology to formulate solutions to complex engineering problems in the field of big data.

№1.1 Being able to apply knowledge in mathematics, natural sciences,engineering fundamentals and Big Data to describe Big Data-related engineering problems, and to establish mathematical models of related subjects.

№1.2 Being able to explain the physical meaning of said models using knowledge in mathematics, natural sciences, engineering fundamentals and Big Data, and to make proper reasoning and explanation to the models.

№1.3 Being able to analyze, compute and design Big Data -related problems using knowledge in mathematics, natural sciences, engineering fundamentals and Big Data.

№1.4 Being able to compare and combine solutions using knowledge in mathematics, natural sciences, engineering fundamentals and Big Data.

№2. Problem Analysis: An ability to use the first principle of mathematics, natural science and engineering science to identify, formulate, study and analyze complex engineering problems in the field of big data, draw valid conclusions and consider sustainable development as a whole.

№2.1 Being able to analyze what is required to solve a particular Big Data -related engineering problem, describe detailed requirements and identify potential constrains before reaching target outcomes.

№2.2 Being able to build abstract models according to the descriptions of detailed requirements of a particular Big Data-related engineering problem.

№2.3 Being able acquire knowledge and methodology through literature retrieval and material searching, analyze problems and reach effective conclusions according to the abstract model established to solve a particular Big Data -related engineering problem.

№3.Design/Development of Solutions: An ability to design creative solutions for complex engineering problems in the field of big data, and design systems, components or processes to meet identified needs, taking due account of public health and safety, the cost of the entire life cycle, net zero carbon, and resource, cultural, social and environmental factors.

№3.1 Being able to design and develop software modules after careful disintegration and division

of Big Data-related engineering problems according to specific needs.

№3.2 Being able to catch up with the current status and trends in Big Data-related technological development and to demonstrate innovation in the solution design.

№3.3 Being able to compare the feasibility and performance of different solutions and choose the better ones taking into consideration the background of said complex engineering problems, systematic characters used and procedures of designing etc. with an overall assessment on social, health, safety, legal, cultural and environmental concerns.

№4. Research: An ability to use research methods to study complex engineering problems and systems in the field of big data, including research based knowledge, design experiments, analysis and interpretation of data, and synthesis of information to provide effective conclusions.

№4.1 Being able to perform systematic analysis and build models on Big Data -related complex engineering problems based on scientific principles and using scientific methods.

№4.2 Being able to design experiments, build experimental platforms, and acquire data for complex engineering systems.

№4.3 Being able to conduct comprehensive information analysis on the data acquired, and to reach reasonable and effective conclusion that in turn guides solution design.

№5. Use of Tools: An ability to create, select, and apply appropriate technologies, resources, and modern engineering and information technology tools, including prediction and modeling, and recognize their limitations to solve complex engineering problems in the field of big data.

№5.1 Being able to develop, choose and use proper technology, resources, modern engineering and information technology tools to predict and simulate complex Big Data-related engineering problems and understand its constrains.

№5.2 Being able to use instruments well to observe and analyze the performance of Big Data systems, and to use diagrams, formulas and others to express and solve Big Data design problems with awareness of its limitations.

№6. Engineers and The World: An ability to analyze and evaluate the results of sustainable development, and the impact of society, economy, sustainability, health and safety, law and environment in solving complex engineering problems in the field of big data.

№6.1 Being well-equipped with basic knowledge of society, health, law, safety and culture.

№6.2 Being able to give a reasonable evaluation on the impact of Big Data -related engineering practices and complex engineering problem solutions on society, health, safety, law, and culture, with an understanding of duties that needs to be undertaken.

№7. Moral cultivation and ethics: understand and master the scientific world outlook and methodology, have good ideological morality and social ethics, and have national feelings and social responsibility; Apply ethical principles to the practice and norms of professional ethics engineering in the field of big data; And comply with relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion.

№7.1 With good ideological morality and social ethics, with feelings of family and social responsibility, can practice socialist core values.

№7.2 Understand and follow the ethics, ethical principles and engineering practices in the field of big data through the application of ethical principles.

№7.3 Be able to comply with relevant national and international laws in the research, development and production process in the field of big data, respect and accommodate different values, cultural differences and individual differences to ensure legality, compliance and impartiality.

№8. Individual and Collaborative Team Work: An ability to Effectively play a role as an

individual, member or leader in a diverse and inclusive team, as well as in a multidisciplinary, remote and distributed environment.

№8.1 Being able to work well with team members in Big Data-related research, development and production projects.

№8.2 Being able to understand and learn knowledge and methods of other disciplines in a multi-disciplinary team, to engage in the management of the team and act with good leadership skills.

№9. Communication: An ability to effective and inclusive communication with the engineering community and the whole society in complex engineering activities in the field of big data, including writing and understanding effective reports and design documents, and effective introduction; Consider cultural, language and learning differences.

№9.1 Being able to express oneself well and conduct effective communication with peers and the public on complex engineering problems in the field of big data by ways of report-writing, designing, public speech, instruction responding etc.

№9.2 Having a good command of foreign languages and global outlook, and being able to communicate in a cross-cultural context.

№10. Project Management and Finance: An ability to apply the knowledge and understanding of engineering management principles and economic decisions in the field of big data, and apply them to their own work. As a team member and leader, manage projects and multidisciplinary environments.

№10.1 Being able to understand and master management fundamental in engineering and economic decision-making methods, and to identify key factors in the managing and economic decision-making of Big Data related projects.

№10.2 Being able to apply knowledge in engineering management and economics in complex interdisciplinary engineering projects.

№11. Continuous Lifelong Learning: An ability to recognizing the need and being prepared and able to engage in: i) independent and lifelong learning, ii) adapting to new and emerging technologies, and iii) critical thinking in the broadest context of technological change.

№11.1 Understanding the need of continuous study, being able to study independently and knowing ways to expand knowledge and improve oneself.

№11.2 Having a good sense of independent learning and lifelong learning, and being able to learn continuously and adapt to the surroundings.

培养目标与毕业要求关系矩阵：

培养目标 / 毕业要求	培养目标 1	培养目标 2	培养目标 3	培养目标 4
毕业要求 1.1		●		●
毕业要求 1.2		●	●	●
毕业要求 1.3		●		●
毕业要求 1.4		●	●	●
毕业要求 2.1		●		●
毕业要求 2.2		●		●
毕业要求 2.3		●		●

培养目标 毕业要求	培养目标 1	培养目标 2	培养目标 3	培养目标 4
毕业要求 3.1		●	●	
毕业要求 3.2		●	●	●
毕业要求 3.3		●	●	●
毕业要求 4.1		●		●
毕业要求 4.2		●		
毕业要求 4.3		●		●
毕业要求 5.1		●		●
毕业要求 5.2		●	●	●
毕业要求 6.1	●		●	●
毕业要求 6.2	●		●	●
毕业要求 7.1	●		●	
毕业要求 7.2	●		●	
毕业要求 7.3	●		●	●
毕业要求 8.1	●		●	
毕业要求 8.2	●	●	●	
毕业要求 9.1	●	●	●	●
毕业要求 9.2	●		●	
毕业要求 10.1		●		●
毕业要求 10.2		●	●	●
毕业要求 11.1	●			●
毕业要求 11.2	●			●

Relationship Matrix between Educational Objectives and Student Outcomes:

Educational Objectives Student Outcomes	Educational Objective 1	Educational Objective 2	Educational Objective 3	Educational Objective 4
Student Outcome 1.1		●		●
Student Outcome 1.2		●	●	●
Student Outcome 1.3		●		●
Student Outcome 1.4		●	●	●
Student Outcome 2.1		●		●
Student Outcome 2.2		●		●
Student Outcome 2.3		●		●
Student Outcome 3.1		●	●	
Student Outcome 3.2		●	●	●

Educational Objectives / Student Outcomes	Educational Objective 1	Educational Objective 2	Educational Objective 3	Educational Objective 4
Student Outcome 3.3		●	●	●
Student Outcome 4.1		●		●
Student Outcome 4.2		●		
Student Outcome 4.3		●		●
Student Outcome 5.1		●		●
Student Outcome 5.2		●	●	●
Student Outcome 6.1	●		●	●
Student Outcome 6.2	●		●	●
Student Outcome 7.1	●		●	
Student Outcome 7.2	●		●	
Student Outcome 7.3	●		●	●
Student Outcome 8.1	●		●	
Student Outcome 8.2	●	●	●	
Student Outcome 9.1	●	●	●	●
Student Outcome 9.2	●		●	
Student Outcome 10.1		●		●
Student Outcome 10.2		●	●	●
Student Outcome 11.1	●			●
Student Outcome 11.2	●			●

专业简介（Program Profile）：

数据科学与大数据技术专业依托粤港澳大湾区大数据产业优势，紧密围绕产业需求，突出大数据行业前沿发展，深入推进学科交叉，培养具有国际视野的高水平国际化大数据精英人才。本专业注重实践环节和创新能力培养，突出理论课与实训课相结合的培养特色，强化工程训练，实现国际接轨，造就基础扎实、工程能力强、英语和协作能力好的复合型大数据研究与工程领军人才。

本专业涉及包括数学、自然科学、计算机科学和工程的大量理论知识与技术方法，聚焦行业需求，注重前沿交叉，深耕产学合作，注重国际交流与校企合作。学生毕业后可以继续攻读相关领域的硕士博士，也可以在国家机关和企事业单位从事大数据研究、分析、应用、决策等工作。

The program of data science and big Data Technology relies on the advantages of the big data industry in the Guangdong-Hong Kong-Macao Greater Bay Area, closely focuses on the industrial demand, highlights the cutting-edge development of the big data industry, further promotes the interdisciplinary, and cultivates high-level international elite talents of big data with international vision. This program focuses on the cultivation of practical links and innovation ability, highlights the training characteristics of the combination of theoretical courses and practical training courses,

strengthens engineering training, realizes international standards, and cultivates compound big data research and engineering leading talents with solid foundation, strong engineering ability, good English and cooperation ability.

This program involves a large number of theoretical knowledge and technical methods including mathematics, natural science, computer science and engineering. It focuses on the needs of the industry, pays attention to the intersection of frontiers, deeply cultivates industry-university cooperation, pays attention to international exchanges and school-enterprise cooperation. After graduation, students can continue to study for master's and doctoral degrees in related fields, or engage in big data research, analysis, application, and decision-making in state organs, enterprises and public institutions.

专业特色（Program Features）：

本专业协同优势跨学科师资、国际师资及产业师资，依托湾区大数据产业基础，开设在数据科学、大数据、人工智能等领域的国际化前沿课程及产学跨系统融合课程，培养学生在数据科学与大数据技术领域的创新研究和工程实践能力。

This program has synergistic advantages of interdisciplinary teachers, international teachers and industrial resources. Relying on the foundation of big data industry in the Bay Area, it offers international frontier courses and industry-learning cross-system integration courses in the fields of data science, big data, artificial intelligence, etc., to cultivate students' innovative research and engineering practice ability in the field of data science and big data technology.

授予学位（Degree Conferred）：

工学学士学位 Bachelor of Engineering

核心课程（Core Courses）：

人工智能III：大数据导论、离散数学、数据结构、计算机网络、计算机组成与体系结构、操作系统、数据库系统、计算机与软件工程概论、云计算与大数据平台、机器学习、数据挖掘

Artificial IntelligenceIII： Introduction to Big Data,Discrete Mathematics， Data Structures,Computer Network, Computer Organization and Architecture,Operating System, Database System,Introduction to Computer and Software Engineering , Cloud Computing and Big Data Platform, Machine Learning, Data Mining

大学分专业核心课 Integrated Core Courses:人工智能 I：大学计算机基础、人工智能 II：C++编程基础、人工智能III：大数据导论

Integrated Core Courses: Artificial IntelligenceI： Fundamentals of Compute, Artificial IntelligenceII: Fundamentals of C++ Programming , Artificial IntelligenceIII: Introduction to Big Data

特色课程（Featured Courses）：

新生研讨课：工程导论 I

基于项目（设计、案例）的课程：工程导论实践 I

国际化特色课程：大数据导论、人工智能应用专题

专题研讨课：工程导论 I

学科前沿课：云计算与大数据平台

跨学科交叉课程：设计思维创新与实践、大数据管理与决策

本研贯通课：数值计算原理与方法

本研共享课：大数据平台构架与技术

校企合作课：3D 视觉智能技术、元宇宙导论与实践、大语言模型与人工智能工程设计

创新实践课：设计思维创新与实践（“三个一”课程）

创业教育课：设计思维创新与实践（“三个一”课程）

工作坊：设计思维创新与实践

专题设计课：大数据应用案例与实践、工程导论 I

竞教结合课：算法设计与分析、数据结构、工程导论 I、3D 视觉智能技术

劳动教育课：工程创新训练II、毕业实习、工程导论实践、3D 视觉智能技术

Freshmen Seminars: Introduction to Engineering I

Project-based Courses:Practice of Introduction to Engineering I

Global Education Courses: Introduction to Big Data, Special Topic for Artificial Intelligence Application

Special Topic:Introduction to Engineering I

Subject Frontiers Courses:Cloud Computing and Big Data Platform

Interdisciplinary Courses:Design Thinking Innovation and Practice,Big Data Management and Decision Making

Baccalaureate-Master’s Integrated Courses:Principle and Method of Numerical Calculation 8.Baccalaureate-Master’s Sharing Courses: Architecture and Technology of Big Data Platform

Cooperative Courses with Enterprises:3D Vision Intelligence, Metaverse Introduction and Practice, Large Language Model and Artificial Intelligence Engineering Design

Innovation Practice: Design Thinking Innovation and Practice ("Three ones" Courses)

Entrepreneurship Courses: Design Thinking Innovation and Practice ("Three ones" Courses)

Workshops:Design Thinking Innovation and Practice

Special Designs:Big Data Application Case and Practice, Introduction to Engineering I

Contest-Teaching Integrated Courses:Algorithm Design and Analysis, Data Structures,Introduction to Engineering I, 3D Vision Intelligence

Education on The Hard-Working Spirit:Engineering Innovation Training II, Graduation Practice, Practice of Introduction to Engineering I ,3D Vision Intelligence

修读指引（Study Guidance）：

本专业设有四个选修课程模块，包括程序设计、数据系统与平台、智能计算课程模块、大数据实践应用。学生可根据自身需要选修四个模块中的任意课程以达到最低的选修学分需求。建议学生在每个所选修的课程模块中至少选修完成 5 学分，从而在特定领域建立更完整的知识体系。

The program offers four elective course modules, including Programming, Data System and Platform, Intelligent Computing, Data Application. Students can choose any courses from the four modules according to their needs to fulfill the minimum elective credit requirements. It is recommended that students complete at least 5 credits in each selected course module to establish a more comprehensive knowledge system in a specific field.

一、各类课程学分登记表（Registration Form of Curriculum Credits）

1.学分统计表（Credits Registration Form）

课程类别 Course Category	课程要求 Requirement	学分 Credits	学时 Academic Hours	备注 Remarks
公共基础课 General Basic Courses	必修 Compulsory	58.5	1124	
	通识 General Education	10	160	
专业基础课 Specialty Basic Courses	必修 Compulsory	37.5	670	
选修课 Elective Courses	选修 Elective	15	320	
合　计 Total		121	2274	
集中实践教学环节 Practice Training	必修 Compulsory	38	41 周 41Weeks	
毕业学分要求 Credits Required for Graduation	121+38 =159			

建议每学期修读学分 Suggested Credits for Each Semester	1	2	3	4	5	6	7	8
	26	28.5	27	19.5	18	18	10	12

备注：学生毕业时须修满专业教学计划规定学分，并取得第二课堂 5 个人文素质教育学分和 4 个创新能力培养学分。

2.类别统计表（Category Registration Form）

学时 Academic Hours					学分 Credits						
总学时数 Total	其中 Include		其中 Include		总学分数 Total	其中 Include		其中 Include			其中 Include
	必修学时 Compulsory	选修学时 Elective	理论教学学时 Theory Course	实验教学学时 Lab		必修学分 Compulsory	选修学分 Elective	集中实践教学环节学分 Practice	理论教学学分 Theory Course	实验教学学分 Lab	创新创业教育学分 Innovation and Entrepreneurship Education
2274	1794	480	1670	604	159	134	25	38	102	19	4

备注：1.通识课计入选修一项中；

2.实验教学包括“专业教学计划表”中的实验、实习和其它；

3.创新创业教育学分：培养计划中的课程，由各院系教学指导委员会认定，包括竞教结合课程、创新实践课程、创业教育课程等学分；

4.必修学时＋选修学时=总学时数；理论教学学时＋实验教学学时=总学时数；必修学分＋选修学分=总学分数；集中实践教学环节学分＋理论教学学分＋实验教学学分=总学分数。

二、课程设置表（Courses Schedule）

类别 Course Category	课 程 代 码 Course No.	课程名称 Course Title	是否必修 C/E	学 时 数 Total Curriculum Hours					学分数 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
公共基础课 General Basic Courses	031101761	习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	必/C	48	36			12	3.0	1
	031101661	思想道德与法治 Ethics and Rule of Law		40	36			4	2.5	2
	031101371	中国近现代史纲要 Skeleton of Chinese Modern History		40	36			4	2.5	3
	031101424	毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao Ze Dong and Theory of Socialism with Chinese Characteristics		40	36			4	2.5	4
	031101522	马克思主义基本原理 Analysis of the Situation & Policy		40	36			4	2.5	4
	031101331	形势与政策 Analysis of the Situation & Policy		64	64				2.0	1-8
	EMP040100011	工程数学：微积分 II (一) Engineering Math: Calculus (1)		80	80				5.0	1
	EMP040100021	工程数学：线性代数与解析几何 Engineering Math:Linear Algebra & Analytic Geometry		48	48				3.0	1
	EMP040100012	工程数学：微积分 II (二) Engineering Math：Calculus (2)		80	80				5.0	2
	EMP040100031	工程数学：概率论与数理统计 Engineering Math ： Probability & Mathematical Statistics		48	48				3.0	2
	040101731	复变函数I Complex VariableI		32	32				2.0	3
	AIP045100011	人工智能 I：大学计算机基础 Artificial IntelligenceI：Fundamentals of Compute		32				32	0	1
	AIP045100021	人工智能 II：C++编程基础 Artificial IntelligenceII ： Fundamentals of C++ Programming		48	32			16	2.5	1
	044104182	学术英语与科技交流（一） EAP and Technical Communication (1)		32	32				2.0	1
	044104192	学术英语与科技交流（二） EAP and Technical Communication (2)		32	32				2.0	2
	052100332	体育（一）		36				36	1.0	1

		Physical Education (1)								
	052100012	体育（二） Physical Education (2)		36				36	1.0	2
	052100842	体育（三） Physical Education (3)		36				36	1.0	3
	052100062	体育（四） Physical Education (4)		36				36	1.0	4
	006100112	军事理论 Military Principle		36	18			18	2.0	2
	074102992	工程制图 Engineering Drawing		48	48				3.0	1
	041101155	大学物理III（一） General Physics III (1)		64	64				4.0	2
	041100671	大学物理实验（一） Physics Experiment (1)		32		32			1.0	2
	041100344	大学物理III (二) General Physics III (2)		64	64				4.0	3
	041101051	大学物理实验(二) General Physics (2)		32		32			1.0	3
		人文科学、社会科学领域 Humanities, Social Science	通识/E	128	128				8.0	
		科学技术领域 Science and Technology		32	32				2.0	
	合　计 **Total**			1284	982	64		238	68.5	

备注：学时中其它可以为上机和实践学时。
通识课要求：
1.开设党史、新中国史、改革开放史、社会主义发展史等“四史”通识课程，全校本科生从“四史”中选择一门必修；
2.学生不能修读本学院开设的通识课程（除在本学院跨学科修读外）；
3.除艺术类的学生外，每位学生须修满 2 学分的公共艺术通识课程，其中美学和艺术史论类、艺术鉴赏和评论类课程至少取得 1 个学分。

二、课程设置表（续）（Courses Schedule）

类别 Course Category	课程代码 Course No.	课程名称 Course Title	是否必修 C/E	学时数 Total Curriculum Hours					学分数 Credits	开课学期 Semester
				总学时 Class Hours	理论 Theoretical class hours	实验 Lab Hours	实习 Practice Hours	其它 Other Hours		
专业基础课 Specialty Basic Courses	084100101	工程导论 I Introduction to Engineering I	必/C	16	16				1.0	1
	084100011	Python 语言程序设计 Introduction to Programming Using Python		32	16	16			1.5	1
	AIS084100021	人工智能III：大数据导论 Artificial IntelligenceIII：Introduction to Big Data		32	32				2.0	2
	084100142	高级语言程序设计 Advanced Language Programming		38	32			6	2.0	2
	084100132	数据结构 Data Structures		56	56				3.5	3

	084100544	离散数学 Discrete Mathematics		48	48				3.0	3
	084100631	计算机组成与体系结构 Computer Organization and Architecture		64	48	16			3.5	3
	084100111	机器学习 Machine Learning		48	32	16			2.5	3
	084100641	数据库系统 Database System		64	48	16			3.5	4
	084100671	计算机网络 Computer Network		64	48	16			3.5	4
	084100461	深度学习与计算机视觉 Deep Learning and Computer Vision		48	32	16			2.5	4
	084100611	云计算与大数据平台 Cloud Computing and Big Data Platform		48	32	16			2.5	5
	084100651	计算机与软件工程概论 Introduction to Computer and Software Engineering		48	48				3.0	5
	084100661	操作系统 Operating System		64	48	16			3.5	5
	合 计 Total		必/C	670	536	128		6	37.5	
选修课 Elective Courses	**程序设计课程模块 Programming Module**									
	084100681	Java 程序设计 Java Programming	选/E	48	32	16			2.5	3、5、7
	084100761	并行程序设计与分布式计算 Parallel Programming and Distributed Computing	选/E	48	48				3.0	4、6
	数据系统与平台课程模块 Data System and Platform Module									
	084100691	计算机安全与数据安全 Computer Security and Data Security	选/E	48	32	16			2.5	4、6
	084100771	数据挖掘 Data Mining	选/E	48	32	16			2.5	6
	084100811	大数据平台构架与技术 Architecture and Technology of Big Data Platform	选/E	48	40	8			2.5	7
	智能计算课程模块 Intelligent Computing Module									
	084100531	统计学 Statistics	选/E	32	32				2.0	3、5、7
	084100791	算法设计与分析 Algorithm Design and Analysis	选/E	48	32	16			2.5	4、6
	084101011	3D 视觉智能技术 3D Vision Intelligence	选/E	40	24	16			2.0	4、6
	084101021	人工智能应用专题 Special Topic for Artificial Intelligence Application	选/E	48	32	16			2.5	4、6

	084100971	大语言模型与人工智能工程设计 Large Language Model and Artificial Intelligence Engineering Design	选/E	32	16	16			1.5	5、7
	084100551	优化方法 Optimization Method	选/E	32	32				2.0	5、7
	084100721	数值计算原理与方法 Principle and Method of Numerical Calculation	选/E	48	32	16			2.5	6
	084100491	自然语言处理 Natural language Processing	选/E	32	32				2.0	7
	大数据实践应用课程模块 Data Application Module									
	084100982	设计思维创新与实践 Design Thinking Innovation and Practice	选/E	32	32				2.0	5、7
	084100991	元宇宙导论与实践 Metaverse Introduction and Practice	选/E	48	32	16			2.5	5、7
	084100731	大数据应用案例与实践 Big Data Application Case and Practice	选/E	32	16	16			1.5	6
	084101031	大数据管理与决策 Big Data Management and Decision Making	选/E	32	32				2.0	6
	084100781	数字孪生技术 Digital Twin Technology	选/E	48	48				3.0	7
	创新创业学分认定 Innovation and Entrepreneurial Practice									
	020100051	创新研究训练 Innovation Research Training	选/E	32	32				2.0	7
	020100041	创新研究实践 I Innovation Research Practice I	选/E	32	32				2.0	7
	020100031	创新研究实践 II Innovation Research Practice II	选/E	32	32				2.0	7
	020100061	创业实践 Entrepreneurial Practice	选/E	32	32				2.0	7
	084100571	IT 商业模式与创业 IT Business Model and Entrepreneurship	选/E	16	16				1.0	7
	跨学院选修课 Interdisciplinary Elective Courses									
	084101041	跨学院选修课 I Interdisciplinary Elective Course I	选/E	32	32				2.0	
	084101051	跨学院选修课 II Interdisciplinary Elective Course II	选/E	32	32				2.0	

	跨专业选修课 Cross-program Elective Courses									
	084101081	跨专业选修课 I Cross-program Elective Course I	选/E	32	32				2.0	
	084101091	跨专业选修课 II Cross-program Elective Course II	选/E	32	32				2.0	
	合 计 Total		选/E	选修课修读最低要求 15.0 学分 Minimum elective course credits required:15.0						

备注：学时中其它可以为上机和实践学时。

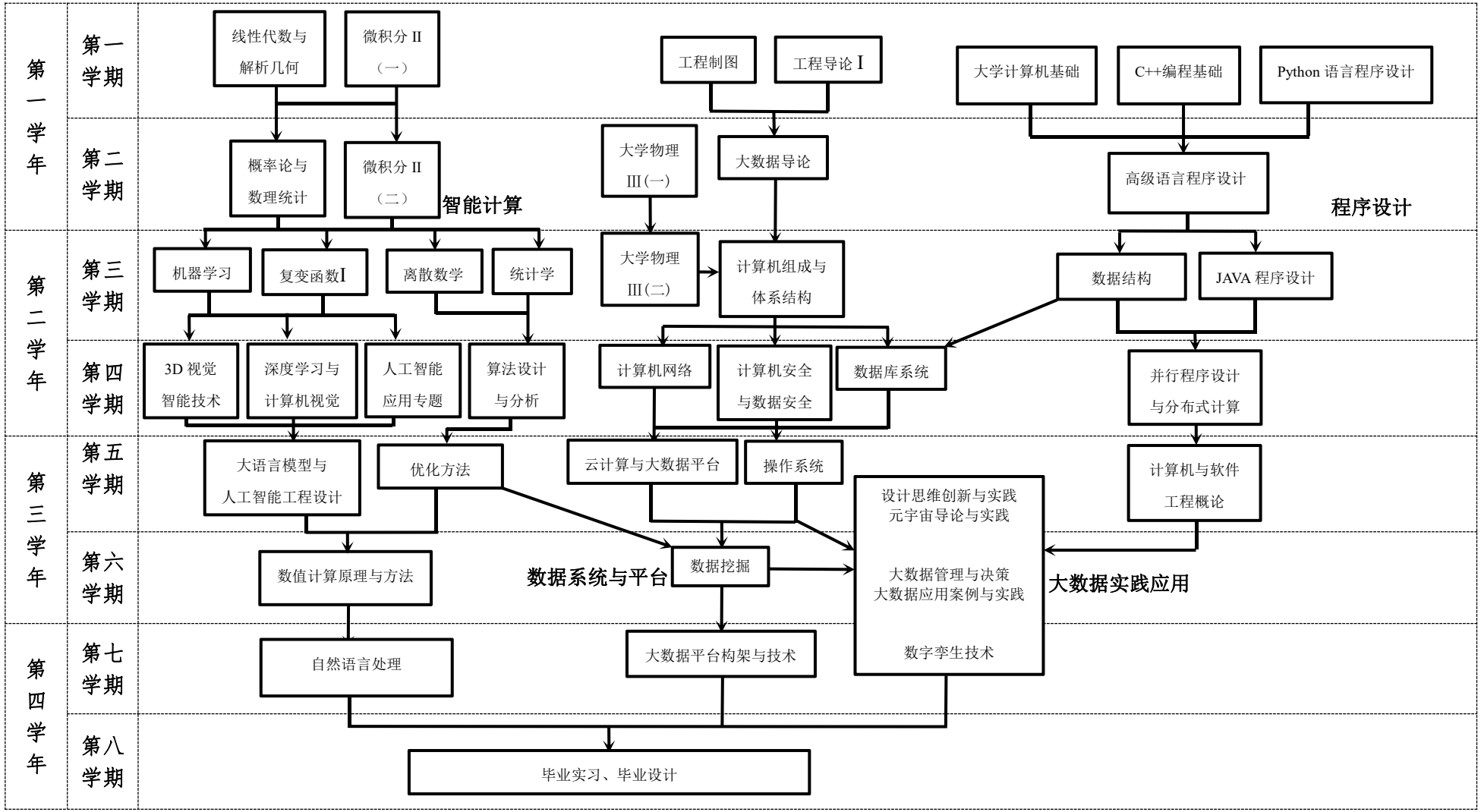
学生根据自己开展科研训练项目、学科竞赛、发表论文、获得专利和自主创业等情况申请折算为一定的专业选修课学分（创新研究训练、创新研究实践 I、创新研究实践 II、创业实践等创新创业课程）。每个学生累计申请为专业选修课总学分不超过 4 个学分。经学校批准认定为选修课学分的项目、竞赛等不再获得对应第二课堂的创新学分。

学生修读其他学院或本院跨专业开设的课程，已修读课程学分等于或高于 2 学分的，可以折算为一定的专业选修课学分。

三、集中实践教学环节（Practice-concentrated Training）

课 程 代 码 Course No.	课 程 名 称 Course Title	是否必修 C/E	学 时 数 Total Curriculum Hours		学分数 Credits	开课学期 Semester
			实践 Practice weeks	授课 Lecture Hours		
006100151	军事技能 Military Training	必/C	2 周 2 weeks		2.0	1
084100341	工程导论实践 I Practice of Introduction to Engineering I		2 周 2 weeks		2.0	1
084100821	大数据导论课程设计 Course Design of Introduction to Big Data		2 周 2 weeks		2.0	2
084100241	高级语言程序设计实训 Advanced Language Programming Training		2 周 2 weeks		2.0	2
031101551	马克思主义理论与实践 Marxism Theory and Practice		2 周 2 weeks		2.0	3
067101781	工程创新训练II Engineering Innovation Training II		2 周 2 weeks		2.0	3
084100841	数据结构课程实训 Data Structure Course Training		2 周 2 weeks		2.0	4
084100881	数据库课程实训 Database Course Training		2 周 2 weeks		2.0	4
084100851	操作系统课程实训 Practice of Operating System Course		2 周 2 weeks		2.0	5
084100861	毕业实习 Graduation Practice		8 周 8 weeks		8.0	7
084100871	毕业设计 Graduation Project		15 周 15 weeks		12.0	8
合 计		必/C	41 周 41 weeks		38.0	

四、课程地图（Curriculum Mapping）



五、课程体系与毕业要求关系矩阵（Relation Matrix between Curriculum System and Student Outcomes）

课程名 Course Title	数据科学与大数据技术专业毕业要求 Data Science and Big Data Technology Major Student Outcomes																											
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7.1	7.2	7.3	8.1	8.2	9.1	9.2	10.1	10.2	11.1	11.2
习近平新时代中国特色社会主义思想概论 The Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	•		•		•		•											•										
思想道德与法治 Ethics and Rule of Law										•							•	•	•	•								
中国近现代史纲要 Skeleton of Chinese Modern History																		•	•	•			•					
毛泽东思想和中国特色社会主义理论体系概论 Thought of Mao ZeDong and Theory of Socialism with Chinese Characteristics	•		•		•		•											•										
马克思主义基本原理 Analysis of the Situation & Policy																			•	•			•	•				
形势与政策 Analysis of the Situation & Policy																			•	•			•	•				•
工程数学：微积分 II (一) Engineering Math: Calculus (1)	•	•	•			•	•				•																	
工程数学：线性代数与解析几何 Engineering Math:Linear Algebra & Analytic Geometry	•	•	•			•	•				•																	
工程数学：微积分 II (二) Engineering Math:Calculus (2)	•	•	•			•	•				•																	
工程数学：概率论与数理统计 Engineering Math：Probability & Mathematical Statistics	•	•	•		•	•	•						•															
复变函数I Complex VariableI	•	•			•	•																						

人工智能 I：大学计算机基础 Artificial IntelligenceI：Fundamentals of Compute														•	•													
人工智能 II：C++编程基础 Artificial IntelligenceII：Fundamentals of C++ Programming			•	•	•	•								•														
学术英语与科技交流（一） EAP and Technical Communication (1)																						•	•			•		
学术英语与科技交流（二） EAP and Technical Communication (2)																		•				•	•				•	
体育（一） Physical Education (1)																•										•	•	
体育（二） Physical Education (2)																•										•	•	
体育（三） Physical Education (3)																•										•	•	
体育（四） Physical Education (4)																•										•	•	
军事理论 Military Principle																•										•	•	
工程制图 Engineering Drawing	•	•													•			•	•									
大学物理III（一） General Physics III (1)		•			•	•																						
大学物理实验（一） Physics Experiment (1)		•		•	•	•					•	•	•		•													
大学物理III (二) General Physics III (2)		•			•	•																						
大学物理实验(二) General Physics (2)		•		•	•	•					•	•	•		•													
工程导论 I Introduction to Engineering I						•			•								•						•			•		
Python 语言程序设计 Introduction to Programming Using Python		•												•														
人工智能III：大数据导论 Artificial IntelligenceIII：Introduction to Big Data						•		•	•	•							•	•					•	•			•	

高级语言程序设计 Advanced Language Programming		•											•														
数据结构 Data Structures		•											•														
离散数学 Discrete Mathematics	•				•																						
计算机组成与体系结构 Computer Organization and Architecture							•		•			•	•														
机器学习 Machine Learning			•	•			•																				
数据库系统 Database System									•				•	•	•												
计算机网络 Computer Network									•			•	•	•													
深度学习与计算机视觉 Deep Learning and Computer Vision			•	•			•																				
云计算与大数据平台 Cloud Computing and Big Data Platform									•			•	•	•													
计算机与软件工程概论 Introduction to Computer and Software Engineering						•			•											•		•			•			
操作系统 Operating System									•		•	•		•													
军事技能 Military Training																•							•				•	•
工程导论实践 I Practice of Introduction to Engineering I								•	•												•	•			•	•	•	

大数据导论课程设计 Course Design of Introduction to Big Data								•	•	•							•				•				•	•		
高级语言程序设计实训 Advanced Language Programming Training									•												•				•	•		
马克思主义理论与实践 Marxism Theory and Practice																	•	•					•	•				
工程创新训练II Engineering Innovation Training II									•												•	•			•		•	•
数据结构课程实训 Data Structure Course Training									•					•								•						
数据库课程实训 Database Course Training								•						•								•						
操作系统课程实训 Practice of Operating System Course									•					•											•			
毕业实习 Graduation Practice										•				•		•											•	•
毕业设计 Graduation Project				•		•		•	•	•					•		•			•			•			•	•	•

六、第二课堂

第二课堂由人文素质教育和创新能力培养两部分组成。

1.人文素质教育基本要求

学生在取得专业教学计划规定学分的同时，还应结合自己的兴趣适当参加课外人文素质教育活动，参加活动的学分累计不少于 5 个学分。其中，大学体育教学团队开设课外体育课程，高年级本科生必修，72 学时，1 学分，纳入第二课堂人文素质教育学分。大学生心理健康教育，2 学分，虚拟第三学期开设，纳入第二课堂人文素质教育学分。

2.创新能力培养基本要求

学生在取得本专业教学计划规定学分的同时，还必须参加国家创新创业训练计划、广东省创新创业训练计划、SRP（学生研究计划）、百步梯攀登计划或各类课外创新能力培养活动（如学科竞赛等）。学生参加上述活动及创新能力培养相关学术讲座所获学分累计不少于 4 个学分。

6.“Second Classroom” Activities

“Second Classroom” Activities are comprised of two parts, Humanities Quality Education and Innovative Ability Cultivation.

(1)Basic Requirements of Humanities Quality Education

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in extracurricular activities of Humanities Quality Education based on one’s interest, acquiring no less than five credits. The advanced undergraduates must complete one of courses of Humanities Quality Education which has seventy two class hours (it's equivalent to one credit which belongs to Humanities Quality Education Credit of Extracurricular Class) offered by the College Physical Education Teaching Group.Mental Health Education for College Students(2 credits) is opened in virtual third semester which belongs to Humanities Quality Education Credit of Extracurricular Class.

(2)Basic Requirements of Innovative Ability Cultivation

Besides gaining course credits listed in one’s subject teaching curriculum, a student is required to participate in any one of the following activities: National Undergraduate Training Programs for Innovation and Entrepreneurship, Guangdong Undergraduate Training Programs for Innovation and Entrepreneurship, Student Research Program (SRP), One-hundred-steps Innovative Program, or any other extracurricular activities of Innovative Ability Cultivation that last a certain period of time (e.g. subject contests, academic lectures), acquiring no less than four credits.