

浙江科技学院数据科学与大数据技术 (中法班) 专业培养方案

一、培养目标

本项目通过引进法国赛尔齐·蓬多瓦兹大学(UCP)优质教育资源和先进的教学及管理模式,培养具有国际化视野及交流能力,具有良好的数学基础和数学思维能力,掌握数据科学与计算机科学的基础理论、方法与技能,受到科学研究的训练,能解决数据科学和数据工程中实际问题的高素质应用型国际化人才。

二、毕业要求

1、知识要求:具有良好的数理自然科学基础,扎实的信息科学基础;具有较好的人文社会科学、管理科学知识;熟练掌握大数据科学与技术核心专业知识和应用技术,主要包括多元统计分析、数值计算方法、最优化理论、数据获取技术、大数据分布式处理、数据挖掘技术、分布式数据库、数据可视化等。

2、能力要求:具备从事行业大数据分析、应用系统设计与实现的能力,特别在数据仓库设计、数据特征工程、数据挖掘算法设计、大数据分布式处理等方面,受到系统而严格的工程训练。同时,具备良好的工程项目交流、表达、组织、管理、协调与沟通的能力。

3、素质要求:有良好的道德修养,尊重生命、遵纪守法、诚信友善、乐于奉献;有高尚的民族精神,积极弘扬传统文化,热爱祖国,崇尚集体主义精神;有坚定的理想信念,拥护中国特色社会主义,贯彻科学发展观、和谐社会理论和“四个全面”思想。

4、了解数据科学的发展动态,掌握相关文献检索方法,具有基本的专业资料分析与综合的能力,良好的文档与科学论文撰写能力。

5、具有阅读外文文献和交流沟通的能力,具有一定的文学、哲学、历史、经济等人文社科知识及自然科学知识;具有良好的法语沟通能力;具备良好的国际视野,能够在跨文化背景下进行沟通和交流。

6、具有较强的创新创业精神和创新意识,具有自主学习和终身学习的意识,有不断学习和适应发展的能力。

7、具有一定的组织能力和良好的表达能力、较强的人际交往能力和团队合作能力。

三、毕业要求达成矩阵

毕业要求	指标点	相关教学活动	学生考核方式
毕业要求 1	1.1 具有良好的人文素养、社会责任感和爱国敬业精神；具有诚信意识，注重职业道德，自觉遵纪守法。	大学始业教育、中国近现代史纲要、思想道德修养与法律基础、马克思主义基本原理概论、毛泽东思想和中国特色社会主义理论体系概论、形势与政策、思政社会实践等	课程平时考核及期末考试
	1.2 具有求真务实精神和严谨的科学素养。	各门专业课程的教学	课程平时考核及期末考试
	1.3 具有良好的身体素质，健康的心理素质及良好的行为习惯。	军事理论及训练、体育健康训练、大学生心理健康教育等	课程平时考核及期末考试
毕业要求 2	2.1 具有良好的数学及计算机基础，掌握数学软件（MATLAB 等）、数学建模和数值计算方法等基本知识。	数学分析、线性代数与解析几何、常微分方程、概率论、数理统计、程序设计与算法语言、命题逻辑与谓词逻辑、最优化方法、数值计算方法等	课程平时考核及期末考试
	2.2 掌握数据管理、统计学、数据分析与数据挖掘、机器学习的基本技能。	数据仓库、数据库、数据挖掘、数据挖掘技术、回归分析与应用，机器学习等	课程平时考核及期末考试
	2.3 应具有软件开发、数据处理等专业知识及技能。	程序设计与算法、计算机体系结构、Web 程序设计、操作系统、软件工程、系统编程、计算机网络等	课程平时考核及期末考试
毕业要求 3	3.1 具有较强的分析、归纳、抽象、演绎推理、空间想象、科学计算等能力，并具有综合运用所学知识解决实际问题的能力。	2.1 中的课程、各项实践、第二课堂、技术实习、毕业设计（论文）等	课程平时考核、期末考试及答辩
	3.2 具有一定的数据处理、数据统计分析、挖掘数据等能力。	2.2 中课程、大数据分析与实践、统计实践、数据挖掘实践、第二课堂、技术实习、毕业设计（论文）等	课程平时考核、期末考试及答辩
	3.3 学生应具有一定的程序设计、软件开发、数据处理等能力。	2.3 中课程、机器学习算法专项实验、Linux 系统实践、大数据处理实验、第二课堂、技术实习、毕业设计（论文）等	课程平时考核、期末考试及答辩
毕业要求 4	具有文献检索、资料查询及运用现代信息技术获取相关信息的能力。	文献检索讲座、课程论文、第二课堂、技术实习、毕业设计（论文）等	答辩

毕业要求 5	5.1 具有阅读外文文献和用外语进行交流的能力。	法语课程、法语等级考试、技术实习、毕业设计（论文）等	课程平时考核、期末考核及答辩
	5.2 具有一定的文学、哲学、历史、经济等人文社科知识及自然科学知识。	大学语文、自然科学拓展、人文素质拓展、经济与管理、艺术与美学、大学物理 C、大学物理实验 B 等	课程平时考核、期末考核
毕业要求 6	6.1 具有较强的创新创业精神和创新意识。	创业基础、大学生职业发展与就业指导及实践、各类学术创新论坛与讲座、创新性开放实验、学科竞赛、课外科技活动、创新创业实践、技术实习、毕业设计（论文）等	课程平时考核、期末考核及答辩
	6.2 具有自主学习和终身学习的意识,有不断学习和适应发展的能力。	大学始业教育及各课程的学习指导等	
毕业要求 7	具有一定的组织能力和良好的表达能力、较强的人际交往能力和团队合作能力	学科竞赛、课外科技活动、思政社会实践、学生社团、班级管理、志愿者活动等	

四、主干学科

数学、计算机科学与技术、统计学

五、核心课程

数据库、最优化方法、多元统计分析、回归分析与应用、机器学习、计算机体系结构、数据仓库、数据挖掘、程序设计与算法

六、主要实践环节

认识实习、课程设计、机器学习算法专项设计、技术实习、毕业设计（论文）

七、学制、学位及毕业学分要求

1、学制：实行弹性学制，本科基本学制为 4 年，可提前 1 年毕业，最长不超过 8 年。

2、授予学位：本项目中，完成培养方案规定的课程，经考核成绩合格，可获得浙江科技学院颁发的普通高等学校本科毕业证书（数据科学与大数据技术专业）；符合学位授予条件的，授予数据科学与大数据技术专业理学学士学位。完成本项目培养方案规定的课程，经考核成绩合格，符合法方学位授予条件的，授予法方计算机专业学士学位。

3、毕业要求：最低学分 216 分，其中法语 60 学分。

八、教学情况说明

本项目共引进 21 门课程，均为重要的基础课和专业课程，由 UCP 授课的 15 门课程全部为专业核心课程；这 15 门课程采用法语授课（含课堂教学、教材、作业、考试），其余 6 门由我校承担并采用中文授课。

课程设置及修读类型			学分及占比	
			学分	学分比例
理论教学环节 (含内实验)	通识教育课	必修	81	37.50%
		选修	0	0%
	学科专业类基础课	必修	19	8.80%
	专业核心课（必修）		82	37.96%
	拓展复合课（选修）		0	0%
	小计		182	84.26%
实践教学环节	必修		34	15.74%
合计			216	100%

Undergraduate Program in Data Science and Big Data Technology (Sino-Franco Class)

1. Project objectives

The objectives of this joint project is to introduce advanced education resources of University of Cergy--Pontoise (UCP), teaching and management concepts, to develop high-level career-focused professionals with international mindset who are equipped with international and cross-cultural communication competency, mastery of the fundamental theory and skills in Mathematics, Data Science and Computer Science, enabling them to solve practical problems in Data Science as well as problems in Big Data processing and High Performance Computing. The purpose of the project is to prepare students for employments in professional fields, such as Education, Information Industry, Finance, which require data analysis and a flexible, broad understanding of Data Science.

2. Graduate Requirements

(1) To have a good humanities and social responsibility and patriotic spirit; to obtain integrity awareness, the occupation morality, consciously abide by the law; to achieve the pragmatic spirit and scientific literacy; to have good physical quality, psychological quality and good behavior habit.

(2) To have the good foundation of mathematics and computer, mathematics software (MATLAB), the basic knowledge of mathematical modeling and numerical calculation method, to master the fundamental skills of data management, data analysis and data mining. For the students from Application software and data processing module, they should have the software development, data processing and other professional knowledge and skills.

(3) To have strong analysis, induction, abstraction, deductive reasoning, spatial imagination and scientific computing ability, and to have the ability to use the knowledge to solve practical problems. The students

should have the ability of programming, software development, data processing.

(4) To have the ability of literature search, data query and the use of modern information technology to obtain relevant information.

(5) To have the ability to read foreign literature and communicate in a foreign language, to have certain knowledge of literature, philosophy, history, economy, etc., and to have the ability to communicate in French.

(6) To have a strong sense of innovation and entrepreneurship and innovation, to have independent learning and lifelong learning awareness, to have the ability to learn and adapt to the developing environment.

(7) To have certain organization ability and good communication ability, good interpersonal skills and team cooperation ability.

3. A matrix of the achievable graduation requirements

Graduation Requirements	Indicators of Graduation Requirements	Related teaching activities	Assessment
Graduation Requirements 1	1.1 Having a good humanistic quality, social responsibility and patriotic professionalism; with a sense of integrity, pay attention to professional ethics, and consciously abide by the law	Induction of university life, Outline of Contemporary Chinese History, Fundamentals of Morality and Law, Introduction to Fundamental Principles of Marxism, Introduction to Mao Zedong's Thought and Theoretical System of Socialism with Chinese Characteristics, Situation and Policy, Ideological Social Practice, etc.	Course assessment and final assessment
	1.2 Having a realistic and pragmatic spirit and rigorous scientific literacy	The teaching of various professional courses	
	1.3 Having good physical fitness, healthy psychological quality and good behavior	Military Theory and Training, Health Training, Mental Health Education for University Students, etc.	Course assessment and final assessment
Graduation Requirements 2	2.1 Having a good mathematical and computer foundation, master basic knowledge of mathematical software (MATLAB etc.), mathematical modeling and numerical calculation methods	Mathematic Analysis I, Mathematic Analysis II, Linear Algebra and Geometry, Ordinary Differential Equations, Theory of Probability, Mathematical Statistics, Propositional Logic and Predicate Logic, Optimization Methods, Numerical Computation Methods, etc.	Course assessment and final assessment
	2.2 Mastering the basic skills of data management, data analysis and data mining	Data Warehouse, Data Mining, Database, Data Mining Project, Statistical Analysis Methods in Data Science, Languages and Automata, etc.	Course assessment and final assessment

	2.3 Having software development, data processing and other professional knowledge and skills	Programming and Algorithm I, Programming and Algorithm II, Programming and Algorithm III, Web Programming, Operating System, Software Engineering, Machine Learning, Computer Networks, etc.	Course assessment and final assessment
Graduation Requirements 3	3.1 Having a strong ability of analysis, induction, abstraction, deductive reasoning, spatial imagination, scientific calculations, etc., and has the ability to comprehensively apply the learned knowledge to solve practical problems	Courses in 2.1, projects, Extracurricular Teaching, Technology Practice, Undergraduate Thesis, etc.	Course assessment, final assessment, and thesis oral defense
	3.2 Data Analysis Module Students, should have certain data management, data statistical analysis, and the ability to tap useful information in big data	Courses in 2.2, Special Experiments on Machine Learning Algorithms, projects, Extracurricular Teaching, Technology Practice, Undergraduate Thesis, etc.	Course assessment, final assessment, and thesis oral defense
	3.3 Application Software and Data Processing Module students, should have certain programming, software development, and data processing capabilities	Courses in 2.3, courses in 2.3, Mobile Application Software Design, Practice of Linux System, Comprehensive Training in Application Software Project, Big Data Processing Experiment, Extracurricular Teaching, Technology Practice, Undergraduate Thesis, etc..	Course assessment, final assessment, and thesis oral defense
Graduation Requirements 4	Having the ability of document retrieval, data query and the use of modern information technology to obtain relevant information	Literature retrieval seminars, assignments, Extracurricular Teaching, Technology Practice, Undergraduate Thesis, etc.	Thesis oral defense
Graduation Requirements 5	5.1 Having the ability to read foreign language documents and communicate simply in a foreign language	French language courses, Engineer English, proficiency test, French course, Technology Practice, Undergraduate Thesis, etc.	Course assessment, final assessment, and thesis oral defense
	5.2 Having a certain degree of knowledge in literature, philosophy, history, economics, humanities, social sciences, and natural sciences	College Chinese, Natural Science development, Economy and Management, College Physics C, Physical Experiment of college B, etc.	Course assessment, final assessment, and thesis oral defense
Graduation Requirements 6	6.1 Having a strong sense of innovation and entrepreneurship and innovation	Entrepreneurial Fundamental, Career planning and guidance for college students practice, academic innovation forum and seminars, innovative open experiment, academic competitions, extracurricular activities of science and technology, technology innovation, Technology Practice, Undergraduate Thesis, etc.	Course assessment, final assessment, and thesis oral defense

	6.2 Awareness of self-directed learning and lifelong learning, and the ability to continuously learn and adapt to development	Induction of university life and guidance for various courses.	
Graduation Requirements 7	Have certain ability of organization, good communication skills, strong interpersonal skills, team working	Competitions, extracurricular science and technology activities, ideological and political social practice, student associations, class management, volunteer activities, etc	

4. Major Disciplines

Mathematics, Computer Science and Technology, Statistics

5. Core Courses

Database, Optimization Methods, Multivariate Statistical Analysis, Machine learning, Computer Organization and Architecture, Data Warehouse, Data Mining, Programming and Algorithm, etc.

6. Internship and Practice

Cognition Practice, Integrated Course Design, Special Experiments on Machine Learning Algorithms, Technology Practice, Undergraduate Design/Thesis

7. Duration of Schooling, Degree and Credits Requirements for Graduation

(1) Duration of Schooling: The duration of schooling is flexible, generally it lasts four years. The students can graduate one year in advance or within 8 years.

(2) Degree Conferred: In this project, students who successfully complete all courses stipulated in the teaching plan shall be granted a graduation certificate in Data Science and Big Data Technology by Zhejiang University of Science and Technology. Students who are qualified for degree-granting requirements of Zhejiang University of Science and Technology shall be granted a bachelor's degree in Data Science and Big Data Technology by Zhejiang University of Science and Technology and a Licence's degree in Computer Science by UCP.

(3)The Minimum Graduation Credits: 216 (including French language 60).

8. Credits Structure and Ratio:

In the project, there are 21 courses introduced from UCP, which are all academic core courses. Among them, there are 15 courses delivered by

faculty members from UCP in French (including class teaching, textbook, exercise and examination). The other 5 courses introduced from UCP are delivered in Chinese by faculty members from ZUST.

The curriculum Provision and Study Type			Credits	Credits Ratios
Theory Teaching (Experiments excluded)	General Education Courses	Required	81	37.50%
	Discipline & Specialty Basic Courses	Required	19	8.80%
	Specialty Core Courses (Required)		82	37.96%
	Expand and Recombination Courses (Required)		0	0
	Subtotal		182	84.25%
Practice Teaching	Required		34	15.75%
Total			216	100%

课程设置与学时安排（表一）

课程类别	课程性质	课程代码	课程名称	学分	总学时	教学安排					学期	各学期周学时分配								备注
						理论学时	实验实践学时	习题学时	研讨学时	课外学时		第一学年		第二学年		第三学年		第四学年		
												1	2	3	4	5	6	7	5	
												16周	16周	16周	16周	16周	16周	16周	16周	
通识教育课程	必修	2615A078	中国近现代史纲要 Outline of Contemporary Chinese History	2	32	24	2	2	4		2									
		2615A079	思想道德修养与法律基础 Fundamentals of Morality and Law	3	48	36	2	4	6		1	3								
		2615A080	马克思主义基本原理概论 Introduction to Fundamental Principles of Marxism	3	48	36	2	4	6		4			3						
		2615A081	毛泽东思想与中国特色社会主义理论体系概论 Introduction to Mao Zedong's Thought and Theoretical System of Socialism with Chinese Characteristics	4	64	48	4	4	8		3		4							
		26115201 - 26115204	形势与政策 Situation and Policy	2	32	32					1-4	长 1-4 讲座								
		2717A122	大学生心理健康教育 Mental Health Education for College Students	1	16	8		4	4		1	2								
外语类	必修	21114387 - 21114390	法语 French	60	960	960					1-4	15	15	15	15					
		1316A007 - 1316A010	体育 1-4 Physical Education 1-4	4	144		1	4	4		1-4	2	2	2	2					
		1012A906	大学物理 E College-level Physics E	2	32	22		6	4		2	2								

	通识教育课程小计		81	1376	1166	154	24	32	0		20.5	20.5	20.5	19.5	0	0	0	0	
学科专业基础课	必修	1027A002 数学分析 I Mathematic Analysis I	6	96	72		18	6	96	1	6								
		1027A003 数学分析 II Mathematic Analysis II	4	64	48		12	4	64	2		4							
		1027A007 常微分方程 Ordinary Differential Equations	2	32	24		6	2	32	6						2			
		1027A008 概率论 Theory of Probability	3	48	34		10	4	48	3			3						
		1029A910 线性代数与解析几何 Linear Algebra and Geometry	4	64	42		13	9	64	1	4								
	学科专业基础课小计		19	304	220	0	59	25	304		10	4	3	0	0	2	0	0	
专业核心课程	必修	1027A009 数理统计 Mathematical Statistics	2	32	24		6	2	32	4				2					
		1029A905 矩阵计算 Matrix Computations	3	48	42		6		48	3			3						
		1029A904 数据科学导论 Introduction to Data Science	0.5	8	8					8	1	0.5							
		1029A905 数值计算方法 Numerical Computation Methods	2	32	22	8		2	32	4				2					
		▲*52PLP L12 命题逻辑与谓词逻辑 Propositional Logic and Predicate Logic	2	32	26		4	2	32	2			2						
		▲*52PAA L12 程序设计与算法 I Programming and Algorithm I	2	32	20		12		32	2			2						
		1031A016 最优化方法 Optimization Methods	3.5	56	38	8	6	4	56	5					3.5				

1039A901	多元统计分析 Multivariable Statistical Analysis	3	48	38	8		2	4 8	4					3				
1039A903	回归分析与应用 Regression Analysis and Applications	2	32	22	8		2	3 2	5						2			
1039A911	数据科学中的统计 分析方法与应用 Statistical Analysis Methods in Data Science	3	48	38	8		2	4 8	5						3			
*52DAWA 32	数据仓库 Data Warehouse	2	32	20		1 2		3 2	6							2		
*52DAMI3 2	数据挖掘 Data Mining	3	48	32		1 6		4 8	6							3		
*52CLCO 32	云计算 Cloud Computing	3	48	32		1 2	4	4 8	6							3		
*52MALE 32	机器学习 Machine Learning	3	48	30		1 6	2	4 8	6							3		
*52ARIN3 2	人工智能 Artificial Intelligence	2	32	20		6	6	3 2	6							2		
*52DIDP4 1	数字图像处理 Digital Image Data Processing	2	32	14		1 6	2	3 2	7								2	
▲*52INTI 12	信息学导论 Introduction to Informatics	4	64	32		3 2		6 4	2		4							
*52PRAA 22	程序设计与算法 II Programming and Algorithm II	4	64	32		3 0	2	6 4	4				4					
*52PRAA 31	程序设计与算法 III Programming and Algorithm III	4	64	32		3 0	2	6 4	5					4				
*52WEPR 31	Web 程序设计 Web Programming	4	64	32		3 0	2	6 4	5						4			
*52DABA 31	数据库 Database	4	64	32		3 2		6 4	5						4			

专业核心课程

必修

实践教学安排（表二）

课程代码	所属模块	实践教学活动名称	学分	周或学时	按学期分配（周或学时）											备注
					第一学年			第二学年			第三学年			第四学年		
					长1	长2	短1	长3	长4	短2	长5	长6	短3	长7	长8	
31461014	公共实践	大学始业教育 Induction of university life	1	1												
13461013		军事理论及训练 Military Theory and Training	3	3												
13461015		体质健康训练 Health Training	0.5	16学时							2					
31463007		思政社会实践 Ideological Social Practice	2	2						2						
31467084		大学生职业发展与就业指导实践 Practice of career planning and guidance for college students	1	22												
1061A902	专业大实验	机器学习算法专项实验 Special Experiments on Machine Learning Algorithms	2	2							2 (16-17周)					
1039A912	专业大实验	数据挖掘项目 Data Mining Project	2	2							2 (16-17周)					
合计			34													

注： 1) 考虑到引进课程占总学时总学分的比率要求，大学始业教育 Introduction to University Life, 体质训练 Health Training, 和大学生职业发展与就业指导实践 Practice of Career planning and guidance for collage students 等四门课不列入教学培养计划。

2) 在合适的时间安排大学生始业教育 Introduction to University Life, 体质训练 Health Training, 和大学生职业发展与就业指导实践 Practice of Career planning and guidance for collage students 等四门课实践教学课程。

数据科学与大数据技术专业专业课程地图

