

信息与计算科学

Information and Computing Science

专业代码：070102

学 制：4 年

Program Code: 070102

Duration: 4 years

培养目标：

本专业是以信息技术与计算技术的数学基础为研究对象的理科专业。培养具有良好的数学基础和数学思维能力，掌握信息和计算数学的基本理论、方法与技能，得到科学研究的初步训练，能解决信息技术和科学与工程计算中的实际问题，能在科技、教育、信息产业、经济金融等部门从事研究、教学、应用开发和管理工作的高级专门人才。

Educational Objectives:

This specialty is based on the mathematical basis of information technology and computing technology. The students are cultured in the basis of good mathematics and mathematical thinking ability and skills, basic theories and methods of information and computational mathematics, elementary training of scientific research. They can solve the practical problems of information technology, engineering and scientific computing and become the senior specialized personnel engaged in research, teaching, application development and management work in science and technology, education, information industry, economic and financial departments etc.

毕业要求：

№1. 职业道德与规范：具备良好的法律意识、职业道德和社会责任感；具有正确的人生观、价值观和道德观。

№2. 自然科学与人文素养：了解自然科学与社会科学中的基础和前沿知识，具有的良好科学文化素养。

№3. 专业知识与素养：掌握扎实的数学基础和专业领域知识，具有良好数学思维和素养。

№4. 分析与解决问题：运用数学和专业知识以及计算机技术分析和解决实际问题。

№5. 科学研究：熟悉高级专业知识，能够运用科学原理与方法对理论及应用问题进行研究。

№6. 沟通交流：能够与同行及社会公众进行有效的沟通和交流，具备一定的国际视野，可以在跨文化背景下进行沟通和交流。

№7. 团队合作：具有较强的团队意识，能够承担团队成员及负责人的角色。

№8. 终身学习：具有自主学习和终身学习的意识，具备不断学习和适应发展的能力。

Student Outcomes:

№1. Professional ethics and standard: To have good sense of law, professional ethics and social

responsibility; and to have correct philosophy of life, values and ethics.

№2. Natural science and humanistic literacy: understanding the basic and frontier knowledge in natural science and social science, and having good scientific and cultural accomplishment

№3. Professional knowledge and literacy: master a solid foundation of mathematics and professional field knowledge, have good mathematical thinking and literacy.

№4. Analysis and problem solving: An ability to apply the mathematics and professional knowledge and computer technology to analyze and resolve the practical problems.

№5. Scientific research: familiar with advanced professional knowledge, and can apply scientific principles and methods to study theoretical and applied problems.

№6. Communication and interchange: to communicate effectively with peers and the public, to have a certain international perspective, and to communicate and interchange in a cross-cultural context.

№7. Team work: Strong sense of teamwork, and ability to play the central role of team members and managers.

№8. Lifelong Learning: With independent learning and lifelong learning consciousness, with continuous learning and adapt to the development of ability.

专业简介:

信息与计算科学专业为理科专业。专业以计算数学为基础，信息领域为背景，培养具有宽厚的数学基础和思维能力，掌握信息技术和计算技术的基本理论、方法与技能，得到科学研究的初步训练，能解决信息技术和科学与工程计算中的关键问题。能在科技、教育、信息产业、经济金融等部门从事研究、教学、应用开发和管理工作的高素质、高层次、高水平的创新人才。

专业始于 2002 年，师资力量雄厚。专业拥有学生机房 5 个，各类工作室 30 间，多媒体学术报告厅 6 个。资料室收藏图书 6667 册；期刊 88 种。近五年来，曾获国家级教学成果 2 项、省级教学成果 5 项。大学生数学建模竞赛成绩名列前茅，学生就业率 100%。举办国际学术研讨会 3 次，国内学术研讨会 5 次。先后邀请菲尔兹奖在内的专家 50 余人次访问讲学。参加加拿大西安大略大学等培养项目合计 20 人。

Program Profile:

Information and computing science is a science major. The major is based on Computational Mathematics, and information field is the background. The students are cultured with solid mathematical foundation and thinking ability and skills, basic theory, methods of information technology and computing technology, preliminary training of scientific research. They can solve the key problem of information technology and science and engineering. Able to engage in research, teaching, application, development and management in the fields of science and technology, education, information industry, economy, finance and other departments with high quality, high level and high creative talents.

The specialty began in 2002 with the strong faculty. There are 7 professors (3 level-2 professor and 2

level-3 professor). One is the "The Yangtze River Scholar " Chair professor, national "Outstanding ", the ministry of education in the new century talents. One is the Teaching Masters in Guangdong province and one is the provincial "1000" talent project, One is the pearl river new star of science and technology. There are 6 PhD supervisors and 10 master supervisors.

Now the major has 5 students working rooms, 30 workshops, 6 multimedia academic lecture halls. The library has 6667 books and 88 kinds of journals. In the recently five years, there have been two winners for the prize of national teaching award, five winners for the provincial teaching award. The university students have the highest achievement in the mathematical modeling competition, and the student employment rate is 100%. The specialty held international symposium 3 times, domestic academic seminar 5 times. More than 50 experts are invited to lecture including the Fields medal. A total of 20 students were enrolled at the university interchange of Ontario in Canada and united training program.

专业特色:

本专业依托广东省数学技术实验中心, 致力人才培养, 形成如下特色: (1) 宽厚的数学基础: 学生具有宽厚的数学基础, 有较强的创新意识; (2) 信息与计算的交叉: 立足信息科学与计算科学的交叉领域, 有较强的创新能力。

Program Features:

The specialty relying on the Guangdong Provincial Mathematical Technology Experimental Center, dedicated personnel training and formation of the following distinguishing features:(1) The generous mathematical basis: students have a generous mathematical foundation, a strong sense of innovation.(2) The intersection of information and computing: based on the field of information science and computing science, there is a strong ability to innovate.

授予学位: 理学学士学位

Degree Conferred: Bachelor of Natural Sciences

主干课程:

数学分析、高等代数、概率论、离散数学、C++程序设计、数据结构、数据库系统、数值分析、微分方程数值解、计算智能。

Core Courses:

Mathematical Analysis, Advanced Algebra, Probability Theory, Discrete Mathematics, C++ Programming, Data Structures, Database Systems, Numerical Analysis, Numerical Solutions of Differential Equations, Computational Intelligence.

特色课程:

全英语教学课程：微分方程定性方法与数值模拟

双语教学课程： 计算智能、统计学习与智能处理方法、小波分析

研究型课程：微分方程定性方法与数值模拟、计算智能、统计学习与智能处理方法、并行计算

专题研讨课：数字图像处理

MOOC： 计算智能

本研贯通课：微分方程定性方法与数值模拟、算法设计与分析

创新实践课程：数学建模

创业教育课程：大数据应用

Featured Courses:

Courses Taught in English: The Qualitative Methods and Numerical Simulation for Differential Equations

Bilingual Courses: Computational Intelligence, Statistical Learning and Intelligent Processing, Wavelet Analysis

Research Courses: The Qualitative Methods and Numerical Simulation for Differential Equations, Computational Intelligence, Statistical Learning and Intelligent Processing, Parallel Computations

Special Topics: Digital Image Processing

MOOCs: Computational Intelligence

Baccalaureate-Master's Integrated Courses: The Qualitative Methods and Numerical Simulation for Differential Equations, Algorithm Analysis and Design

Innovation Practice: Mathematical Modeling

Entrepreneurship Courses: Big Data Application

一、教学计划总体安排表 (General Teaching Schedule)

学 年	学 期	教 学 进 度 安 排 (周)																		理 论 教 学	考 试	入 学 教 育	军 训	课 程 设 计	大 作 业	工 程 训 练	电 子 实 习	综 合 实 验	社 会 实 践	生 产 实 习	毕 业 实 习	其 它 实 习	中 外 合 作 项 目	毕 业 设 计	就 业 安 排	机 动	假 期	小 计					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R				
		一	1		C	A	A	A	A	A	A	A	A	A	A	A	A	A	B	D	D	D	14	1	1	3															19		
	2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	B	16	2			2														20				
二	3	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	B	16	2			2														20				
	4	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	B	16	2			2														20				
三	5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	B	16	2			2														20				
	6	A	A	A	A	A	A	A	A	A	A	A	A	A	A	E	E	B	B	B	16	2			2														20				
四	7	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	18	2																	20				
	8	L	L	L	O	O	O	O	O	O	O	O	O	O	O	O	O	O	P	P												3		15	2				20				
合 计 (周)																		112	13	1	3	10														3		15	2				159

二、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	61.0	940	
	通识 General Education	10.0	160	
	选修 Elective	2.0	32	
学科基础课 Disciplinary Basic Courses	必修 Compulsory	45.5	736	
	选修 Elective	0.0	0	
专业领域课 Specialty-related Courses	必修 Compulsory	0.0	0	
	选修 Elective	22.5	360	
合 计 Total		141.0	2228	
集中实践教学环节 (周) Practice Training (Weeks)	必修 Compulsory	36.0	36 周 36 weeks	
毕业学分要求 Credits Required for Graduation	141.0 + 36.0 = 177.0			

备注：学生在取得专业教学计划规定学分的同时，还必须取得第二课堂 2 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-concentrated Training	理论教学学分 Theory Course Credits	实验教学学分 Lab	创新创业教育学分 Innovation and Entrepreneurship Education
2228	1676	552	1940	288	177	142.5	34.5	36	132	9	25.0

三、专业教学计划表 (Teaching 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 Credits	开课 学期 Semester	毕业 要求 Student Outcomes	
				总学 时 Class Hours	上机 Computer-aided Class Hours	实 验 Lab Hours	实 践 Practice Hours				
公共基础课 General Basic Courses	143093	思想道德修养与法律基础 Cultivation of Thought and Morals & Fundamental of Law	必修 课 C	(40) (36)				2.5	2	No1	
	143091	中国近现代史纲要 Skeleton of Chinese Modern History		(32) 24				2.0	1	No2	
	143106	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		(80) 48				5.0	4	No1 No2	
	143090	马克思主义基本原理 Fundamentals of Marxism Principle		(40) 36				2.5	3	No1,2	
	143094	形势与政策 Analysis of the Situation & Policy		(128)				2.0	1-8	No1,2	
	144001	大学英语 (一) College English(1)		64				4.0	1	No6,8	
	144002	大学英语 (二) College English(2)		64				4.0	2	No6,8	
	152001	体育 (一) Physical Education (1)		32			32	1.0	1	No8	
	152002	体育 (二) Physical Education (2)		32			32	1.0	2	No8	
	152003	体育 (三) Physical Education (3)		32			32	1.0	3	No8	
	152004	体育 (四) Physical Education (4)		32			32	1.0	4	No8	
	106001	军事理论 Military Principle		(16)				1.0	2	No1	
	141001	大学物理 I (一) General Physics (1)		48				3.0	2	No2	
	141002	大学物理 I (二) General Physics (2)		48				3.0	3	No2	
	141007	大学物理实验 (一) Physics Experiment(1)		32		32		1.0	2	No2	
	141008	大学物理实验 (二) Physics Experiment(2)		32		32		1.0	3	No2	
	140042	数学分析 (一) Mathematical Analysis(1)		80				5.0	1	No3,4	
	140043	数学分析 (二) Mathematical Analysis(2)		96				6.0	2	No3,4	
	140044	数学分析 (三) Mathematical Analysis(3)		96				6.0	3	No3,4	
	140033	高等代数 (上) Advanced Algebra		64				4.0	1	No3,4	
	140034	高等代数 (下) Advanced Algebra		80				5.0	2	No3,4	
	140215	数学分析习题课 (一) Mathematical Analysis Exercises Course (I)		26	选修 课				1.5	1	No3,4
	140216	数学分析习题课 (二) Mathematical Analysis Exercises Course (II)		32					2.0	2	No3,4
	140217	数学分析习题课 (三) Mathematical Analysis Exercises Course (III)		32					2.0	3	No3,4
	140218	高等代数习题课 (一) Advanced Algebra Exercises Course (I)		26					1.5	1	No3,4

	140219	高等代数习题课(二) Advanced Algebra Exercises Course (II)		32				2.0	2	№3,4
		人文科学领域 Humanities	通识课 E	96				6.0		№2
		社会科学领域 Social Science		64				4.0		№2
	合 计 Total			必 C	940		64	128	61.0	
			选 E	选修课修读最低要求 12.0 学分 (含通识 10.0 学分) minimum elective course credits required 12						

三、专业教学计划表(续)(Teaching 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 Credits	开课学期 Semester	毕业要求 Student Outcomes	
				总学时 Class Hours	上机 Computer-aided Class Hours	实验 Lab Hours	实践 Practice				
学科基础课 Disciplinary Basic Courses	140039	离散数学 Discrete Mathematics	必	48				3.0	1	№3,4,5	
	140036	解析几何 Analytic Geometry	必	48				3.0	1	№3,4	
	140088	C++程序设计 C++ Programming	必	80	16			4.5	2	№3,4	
	140030	常微分方程 Ordinary Differential Equations	必	64				4.0	3	№3,4	
	140076	数据结构 Data Structures	必	64				4.0	3	№3,4	
	140066	计算机原理 Principles of Computer Organization	必	64				4.0	4	№3,4	
	140072	概率论 Probability Theory	必	64				4.0	4	№3,4	
	140125	数值分析 Numerical Analysis	必	64				4.0	4	№3,4,5	
	140220	数据库系统 Database Systems	必	64				4.0	4	№3,4	
	140083	微分方程数值解 Numerical Solutions of Differential Equations	必	48				3.0	5	№3,4,5	
	140205	信息论与编码 Information Theory and Coding	必	64				4.0	5	№3,4	
	140118	计算智能 Computational Intelligence	必	64	8			4.0	6	№3,4,5	
	合 计 Total			必 C	736	24			45.5		
				选 E	选修课修读最低要求学分 minimum elective course credits required:						
专业领域课 Specialty-related Courses	140177	面向对象程序设计 Object-oriented Programming	选	64	16			3.5	3	№3,4	
	140221	矩阵计算 Matrix Computations	选	48				3.0	3	№3,4,5	
	140060	数学模型 Mathematical Modeling	选	48				3.0	3	№3,4	
	140032	复变函数 Complex Analysis	选	64				4.0	4	№3,5	
	140332	数值优化算法 Numerical Optimization Algorithms	选	48				3.0	4	№3,4,5	
	140065	计算机网络 Computer Networks	选	48				3.0	4	№3,4	

140206	算法设计与分析 Design and Analysis of Algorithms	选	64				4.0	4	№3,4
140333	数学分析选讲 Selected Topics in Mathematical Analysis	选	32				2.0	4	№3,4
140334	高等代数与解析几何选讲 Selected Topics in Advanced Algebra and Analytic Geometry	选	32				2.0	4	№3,4
140040	实变函数 Real Variable Function	选	64				4.0	4	№3,5
140062	数理统计 Mathematical Statistics	选	64				4.0	5	№3,4
140059	运筹学 Operational Research	选	64				4.0	5	№3,4
140056	操作系统 Operating Systems	选	64				4.0	5	№3,4
140222	小波分析 Wavelet Analysis	选	48				3.0	5	№3,4,5
140223	并行计算 Parallel Computing	选	48				3.0	5	№3,4,5
140161	随机过程 Stochastic Process	选	64				4.0	5	№3,4,5
140224	大数据应用 Big Data Application	选	32				2.0	5	№4
140225	微分方程定性方法与数值模拟 The Qualitative Methods and Numerical Simulation for Differential Equations	选	64	8			4.0	6	№3,4,5
140226	统计学习与智能处理方法 Statistical Learning and Intelligent Processing	选	48				3.0	6	№3,4,5
140227	数字图像处理 Digital Image Processing	选	32				2.0	6	№3,4,5
140208	统计软件 Statistical Software	选	48	16			2.5	6	№4
140041	泛函分析 Functional Analysis	选	64				4.0	5	№3,5
140037	近世代数 Abstract Algebra	选	72				4.5	7	№3,5
140156	计算机图形学 Computer Graphics	选	48				3.0	7	№3,4
140134	数学软件与数学实验 Mathematical Software and Mathematical Experiments	选	48	32			2.0	7	№4
120003	创新研究训练 Train on creativity	选 E	32				2.0		№5,8
120004	创新研究实践 I Innovation Research Practice 1	选 E	32				2.0		№5,8
120005	创新研究实践 II Innovation Research Practice 2	选 E	32				2.0		№5,8
120006	创业实践 Entrepreneurial Practice	选 E	32				2.0		№5,8
		选 E	选修课修读最低要求 22.5 学分 minimum elective course credits required:22.5						

备注：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。

Remarks: Students ,according to their own conduct scientific research training program, course contests, published papers, self-employment and patented application, converted into certain professional elective credits (innovation research and training, innovation study practice-I, innovation study practice-II, innovation research practice or others practice innovation entrepreneurship).Each student has applied for a total of 4 credits for a professional elective course. The programs, approved by the school as an elective course or competition, has no longer receive innovation credits for the second class

四、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	毕业要求 Student Outcomes
			实践 Practice weeks	授课 Lecture Hours			
106002	军训 Military Training	必 C	3周		3.0	1	№7,8
143197	马克思主义理论与实践 Marxism Theory and Practice	必 C	2周		2.0	假期 Vacation	№2,8
140021	C++程序设计课程设计 C++ Programming (Course Project)	必 C	2周		2.0	2	№3,4
140080	数据结构课程设计 Data Structures (Course Project)	必 C	2周		2.0	3	№3,4
140179	面向对象程序设计课程设计 Object-oriented Programming (Course Project)	选	2周		2.0	3	№3,4
140089	数值分析课程设计 Numerical Analysis (Course Project)	必 C	2周		2.0	4	№3,4
140331	数据库系统课程设计 Database Systems (Course Project)	必 C	3周		3.0	4	№3,4
140123	微分方程数值解课程设计 Numerical of Differential Equation (Course Project)	必 C	2周		2.0	5	№3,4
140092	数学模型课程设计 Mathematical Modeling (Course Project)	选 E	2周		2.0	6	№3,4
140228	统计学习与智能处理方法课程设计 Statistical Learning and Intelligent Processing (Course Project)	选 E	2周		2.0	6	№3,4
140229	大数据应用课程设计 Big Data Application (Course Project)	选 E	2周		2.0	5	№4
140123	毕业实习 Graduation Intern	必 C	5周		5.0	8	№4,6,7
140124	毕业设计(论文) Graduation Project	必 C	15周		15.0	8	№4,5,6
合计 Total		必 C	36		36.0		
		选 E	选修课修读最低要求 学分 minimum elective course credits required:				

五、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 2 个学分。

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或广东省创新创业训练计划或 SRP（学生研究计划）或百步梯攀登计划或一定时间的各类课外创新能力培养活动（如学科竞赛、学术讲座等），参加活动的学分累计不少于 4 个学分。

5. “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 two credits.

(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.