

数学与应用数学

一、培养目标

本专业旨在培养具有良好的科学素养、较强的创新意识和扎实的数理基础，系统掌握数学科学的基本原理，受到严格的逻辑思维与抽象思维训练，具有较强的数学推理、定量分析、数据处理、数值计算、数学建模以及分析和解决实际问题的能力，较好地运用现代数学理论和方法以及计算机技术从事科学研究和实际应用的高级专门人才。可在本学科或相近、相关学科进一步攻读硕士、博士学位，能胜任科技、教育、经济、金融、行政等部门的数学教学、统计分析、科学计算、科研开发、信息管理和计算机应用等工作。

二、基本规格要求

(一) 品德修养方面：

热爱祖国，拥护党的路线、方针、政策，积极上进，具有良好的思想品德、社会公德和良好的心理素质，遵纪守法，在德、智、体等各方面全面发展。

(二) 专业知识结构：

掌握数学科学的基本原理和与数学应用背景相关的基础知识以及分析、几何、代数、计算和随机数学等方面的核心知识（通过开设学门类基础课程和专业核心课程来实现）；了解数学学科在专业领域的专门知识，拓展数学理论和数学应用的知识面（通过在分模块的专业任选课程中选修一定的学分来实现）。

(三) 素质能力要求：

获得数学的抽象推理、归纳综合和数学知识的运用、计算机的编程、软件的使用等方面的专门训练，具有较强的数学素质和运用所学知识分析问题和解决问题的能力，具有一定的计算机操作能力和较强的工作协调能力，具有一定的创新意识和不断获取知识、发挥自身潜能的能力。

三、培养特色

依照学校建设高水平研究型大学的定位，遵循厚基础、宽口径、强能力、重创新的办学理念，通过普通招生和自主招生等多种形式，按数学类大类招生，后期向“数学与应用数学”和“信息与计算科学”两个专业分流，培养研究型 and 复合应用型的专门人才。

四、学制、毕业基本要求及学位授予

1. 本科基本学制 4 年，弹性学习年限 3—6 年，按照学分管理制度管理。

2. 数学与应用数学专业学生毕业最低学分数为 170 学分，其中各类别课程及环节要求的学分数如下表：

课程类别	通识必修	学门核心	学类核心	专业核心	专业选修	通识选修	集中实践	合计
学分数	27	32	36	25	21	8	21	170

3. 学生修完培养方案规定的所有必修课、选修课及完成有关环节，达到规定的最低毕业学分数，德、智、体合格，即可毕业。达到学位授予相关文件要求的，授予理学学士学位。

五、课程设置及学分分布

(一) 通识教育课程〔必修 27+ (6) 学分+选修 8 学分〕

通识教育课程包括必修和选修两部分。通识选修课程按《湖南大学通识选修（文化素质教育）课程方案》实施，通识必修课程如下：

编码	课程名称	学分	备注
GE01101	毛泽东思想和中国特色社会主义理论体系概论	3+ (3)	
GE01039	思想道德修养与法律基础	1.5+ (1.5)	
GE01100	形势与政策	0.5+ (1.5)	
GE01102	中国近现代史纲要	2	
GE01103	马克思主义基本原理（上）	2	
GE01104	马克思主义基本原理（下）	2	
GE01012（-15）	大学英语	8	
GE01088	计算机基本能力测试	0.5	
GE01093	计算机导论与程序设计	2.5	
GE01107（-13）	心理素质与生涯发展	1	
GE01089（-92）	体育	4	

(二) 学门核心 (32 学分)

课程编码	课程名称	学分	备注
MA03001	数学分析（1）	6	
MA03002	数学分析（2）	6	
MA03003	数学分析（3）	6	
MA03012	普通物理（1）	4	
MA03013	普通物理（2）	4	
GE03007	普通物理实验 A（1）	1	
GE03008	普通物理实验 A（2）	1	
ME04020	理论力学	4	
合计		32	

(三) 学类核心 (36 学分)

课程编码	课程名称	学分	备注
MA04008	高等代数（1）	6	
MA04009	高等代数（2）	6	
MA03006	空间解析几何	4	
MA04001	常微分方程	4	
MA04004	复变函数	4	
MA05003	实变函数	4	
MA05005	泛函分析	4	
MA04002	概率论	4	
合计		36	

(四) 专业核心 (25 学分)

课程编码	课程名称	学分	
MA05002	近世代数 (双语)	5	
MA05007	拓扑学基础	3	
MA05015	数理统计	4	
MA05016	数值分析 (双语)	5	
MA05004	微分几何	4	
MA04007	偏微分方程	4	
合计		25	

(五) 选修课 (21 学分)

专业选修课设置三个模块:

第一模块

课程编码	课程名称	学分	备注
MA06013	流形上的微积分	4	
MA06003	代数拓扑	4	
MA06022	微分流形	4	
MA06023	多复变函数	3	
MA06024	数论基础 (双语)	3	
MA06012	Lie 群基础	3	
MA06025	Riemann 几何初步	3	
MA06026	动力系统	3	
MA06027	测度论	3	
MA06028	组合数学 (双语)	3	
MA06029	图论及其应用	3	
MA06030	现代偏微分方程选讲	3	
MA06031	常微分方程定性与稳定性理论	3	
MA05014	高等几何 (双语)	3	

第二模块

课程编码	课程名称	学分	备注
MA06021	微分方程数值解	4	
MA05018	最优化理论与方法	4	
MA06033	数值代数	3	
MA06034	并行计算	3	
MA06035	多尺度分析	3	
MA06036	运筹学	3	
MA04006	数学模型	3	
MA05017	数据结构与算法分析	4	
MA05009	信息论	3	
MA06038	数据库原理	4	
MA05013	面向对象程序设计	3	
MA06014	软件工程	4	
MA06039	数字图像处理	4	

第三模块

课程编码	课程名称	学分	备注
MA06040	随机微分方程	4	
MA06004	多元统计分析	4	
MA06041	应用随机过程	3	
MA06001	Bayes 统计	3	
MA06042	应用回归分析	3	
MA06043	宏观经济学	3	
MA06044	微观经济学	3	
MA06006	计量经济学	3	
MA06045	金融市场学	3	
MA06046	金融工程学	3	
MA06047	国际金融	3	
MA06048	金融风险管埋	3	

注意：每位学生须至少选修 21 学分，建议按照模块选修，也可跨专业选修，但跨专业选修课程不超过 11 学分；申请参加免试推荐攻读研究生学位的同学至少有 12 学分集中在某一个模块中选修。

(六) 集中实践 (21 学分)

课程编码	课程名称	学分	备注
GE01040	军事训练	0	军训、军事与国防（含军事理论）
GE09030	中文写作实训	1	
GE09027	英文应用写作实训	1	
MA10011	应用数学软件	2	
MA10012	学科创新训练	2	学分要求：在读期间成功参加全国大学生数学竞赛、全国大学生数学建模竞赛、美国国际大学生数学建模竞赛、丘成桐大学生数学竞赛、ACM 国际大学生程序设计竞赛、“挑战杯”全国大学生课外学术科技作品竞赛等学科竞赛一次，或参加各级大学生创新训练计划项目（SIT）等业余科技研究项目一项并结题，或按照课程要求撰写相关课程论文 1 篇成绩合格。
MA10013	新生讨论课（1）	0.5	
MA10014	新生讨论课（2）	0.5	
MA10006	毕业实习	2	
MA10007	毕业论文	12	
	总计	21	

六、课程责任教师一览表

序号	姓名	职称	学历学位	专业特长	课程 (专业核心、专业选修、通识选修)
1	杜卓然	助理教授	博士	偏微分方程	泛函分析、偏微分方程、现代偏微分方程选讲
2	郭上江	教授	博士	微分方程与动力系统	常微分方程、微分几何、动力系统
3	蒋月评	教授	博士	复分析	高等代数、空间解析几何、微分几何
4	舒小保	副教授	博士	非线性泛函分析、动力系统	数学分析、实变函数、微分流形、测度论
5	韦志坚	副教授	博士	微分方程与动力系统	常微分方程、复变函数、流形上的微积分
6	肖映青	助理教授	博士	复分析	空间解析几何、微分流形
7	杨林	副教授	博士	偏微分方程	数学分析、偏微分方程
8	胡艳	助理教授	博士	偏微分方程	实变函数、泛函分析
9	周湘南	副教授	博士	拓扑学	实变函数、近世代数、拓扑学基础
10	邹劭芬	副教授	博士	泛函微分方程	复变函数、实变函数、测度论
11	郭振远	副教授	博士	不连续动力系统理论及应用	复变函数, 常微分方程定性与稳定性理论
12	桂长峰	教授	博士	偏微分方程	偏微分方程
13	熊玮	助理教授	博士	数论	概率论、数理统计、近世代数、数论基础
14	柴劲松	助理教授	博士	数论、表示论	高等代数、近世代数、数论基础、Lie 群基础
15	房艳芹	助理教授	博士	偏微分方程	实变函数、偏微分方程
16	谢宝华	助理教授	博士	双曲几何	复变函数、代数拓扑
17	王华	助理教授	博士	调和分析	数学分析、实变函数
18	董超平	助理教授	博士	李群表示	高等代数、近世代数、代数拓扑、Lie 群基础
19	熊林杰	助理教授	博士	偏微分方程	泛函分析、偏微分方程
20	李军	助理教授	博士	多复分析与复几何	复变函数、多复变函数
21	江瑞奇	助理教授	博士	几何分析、偏微分方程	空间解析几何、微分几何、流形上的微积分、Riemann 几何初步
22	黄超群	助理教授	博士	偏微分方程	泛函分析、概率论、随机微分方程

七、专业责任教授

序号	姓名	职称	学历学位	专业特长	承担授课课程
1	蒋月评	教授	博士	复分析	空间解析几何

Mathematics and Applied Mathematics

I . Objectives

The Mathematics and Applied Mathematics program will enable students to have good scientific literacy, strong innovation and solid mathematical background. The students in the program will systematically grasp the fundamental knowledge of mathematics, get the training in logical thinking and abstract thinking, be capable of mathematical deduction, quantitative analysis, data processing, numerical computation, mathematical modeling and solving practical problems. The students in the program will apply mathematical theory and methods and computers to scientific research and practical applications so that they are able to pursue higher degree in science or qualified for mathematics teaching, statistics analysis, scientific computation, research development, information management and computer application, et. al. .

II . Basic Specifications

1. Moral cultivation:

Love the motherland; Support CPP's policy; Have good morality, social ethics and psychological diathesis; Have comprehensive development in moral, intelligence and sports.

2. Knowledge:

Gain the basic knowledge in mathematical science and its application, and the solid knowledge in analysis, geometry, algebra, computation and statistics; Grasp professional knowledge in mathematics, broaden the knowledge in mathematical theory and application.

3. Quality and Ability:

Have the professional training in mathematical deduction, induction and application, computer programming and software; Have the ability to solving practical problems, operating computers collaborating, learning new knowledge and realizing ones potential.

III . Characteristics

According to the requirements of high-level research university, the program emphasizes particularly the mathematical background, wide perspective, strong ability and innovation. By the flexible student recruitment such as traditional university entrance exam and independent university entrance test, the program enrolls students in general mathematics, and it is further specialized into two majors: mathematics and applied mathematics, information and computation science. The program is devoted to training students in both research and comprehensive application.

IV . Length of Schooling, Basic Requirements for Graduation, and Degree Conferment

1. The length of schooling for undergraduate studies is four years, with a flexible length lasting from 3 to 6 years, based on the regulation of credit system.

2. Students of Mathematics and Applied Mathematics majors are expected to complete a minimum of 170 credits upon graduation, and the required credits for different courses are illustrated in the following table.

Course Category	Required General Education Courses	Introductory Major Courses	Major Survey Courses	Required Core Course	Elective Courses	General Education Electives	Intensive Practice	Total
Credits	27	32	36	25	21	8	21	170

3. On successful completion of the prescribed courses and intensive practice, students, who are qualified enough to meet all the requirements of this program, will thus be awarded the Bachelor's Degree of Science.

V. Curriculum and Credits

1. General Education Courses [required 27 + (6) + elective 8 credits]

The general education courses consist of required courses and elective courses. General education electives are designed according to the *Curriculum Design of General Education Electives of Hunan University*. Required general education courses are illustrated in the following table.

Code	Course Title	Credit(s)	Remarks
GE01101	Introduction to Maoism and Theoretical System of Socialism with Chinese Characteristics	3+ (3)	
GE01039	Moral Cultivation and Law Basics	1.5+ (1.5)	
GE01100	Current Situation and Policies	0.5+ (1.5)	
GE01102	Outline of Modern Chinese History	2	
GE01103	Fundamentals of Marxism I	2	
GE01104	Fundamentals of Marxism II	2	
GE01012(-15)	College English	8	
GE01088	Computer Proficiency Test	0.5	
GE01093	Introduction to Computer Science and Programming	2.5	
GE01107(-13)	Psychological Health & Career Planning	1	
GE01089(-92)	Physical Education	4	

2. Introductory Major Courses (32 credits)

Code	Course Title	Credit(s)	Remarks
MA04008	Mathematical Analysis I	6	
MA04009	Mathematical Analysis II	6	
MA03003	Mathematical Analysis III	6	
MA03012	College Physics I	4	
MA03013	College Physics II	4	
GE03007	Physical Experiments A(I)	1	
GE03008	Physical Experiments A(II)	1	
ME04020	Theoretical Mechanics	4	
Total		32	

3. Major Survey Courses (36 credits)

Code	Course Title	Credit(s)	Remarks
MA03004	Advanced Algebra I	6	
MA03005	Advanced Algebra II	6	
MA03006	Space Analytic Geometry	4	
MA04001	Ordinary Differential Equations	4	
MA04004	Complex Variable Functions	4	
MA05003	Real Variable Functions	4	
MA05005	Functional Analysis	4	
MA04002	Probability Theory	4	
Total		36	

4. Required Core Courses (25 credits)

Code	Course Title	Credit(s)	Remarks
MA05002	Abstract Algebra (Bilingual)	5	
MA05007	Basics of Topology	3	
MA05015	Mathematical Statistics	4	
MA05016	Numerical Analysis (Bilingual)	5	
MA05004	Differential Geometry	4	
MA04007	Partial Differential Equations	4	
Total		25	

5. Elective courses (21 credits)

Three orientations

Orientation I

Code	Course Title	Credit(s)	Remarks
MA06013	Calculus on Manifold	4	
MA06003	Algebraic Topology	4	
MA06022	Differentiable Manifold	4	
MA06023	Several Complex Variables	3	
MA06024	Number Theory (Bilingual)	3	
MA06012	Introduction to Lie Groups	3	
MA06025	Introduction to Riemann Geometry	3	
MA06026	Dynamical Systems	3	
MA06027	Measure Theory	3	
MA06028	Combinatorics (Bilingual)	3	
MA06029	Graph Theory and its Applications	3	
MA06030	Topics in Modern PDEs	3	
MA06031	Qualitative and Stability Theory of ODEs	3	
MA05014	Advanced Geometry (Bilingual)	3	

Orientation II

Code	Course Title	Credit(s)	Remarks
MA06021	Numerical Solution of Differential Equations	4	
MA05018	Optimization Theory and Method	4	
MA06033	Numerical Algebra	3	
MA06034	Parallel Computing	3	
MA06035	Multiscale Analysis	3	
MA06036	Operations Research	3	
MA04006	Mathematical Modeling	3	
MA05017	Data Structure and Algorithm Analysis	4	
MA05009	Information Theory	3	
MA06038	Database Principles	4	
MA05013	Object-oriented Programming	3	
MA06014	Software Engineering	4	
MA06039	Digital Image Processing	4	

Orientation III

Code	Course Title	Credit(s)	Remarks
MA06040	Stochastic Differential Equations	4	
MA06004	Multivariate Statistical Analysis	4	
MA06041	Applied Stochastic Process	3	
MA06001	Bayesian Statistics	3	
MA06042	Applied Regression Analysis	3	
MA06043	Macro-economics	3	
MA06044	Micro-economics	3	
MA06006	Econometrics	3	
MA06045	Finance Markets	3	
MA06046	Financial Engineering	3	
MA06047	International Finance	3	
MA06048	Financial Risk Management	3	

Note: Each student must take 21 credits at least. Although students are suggested to take the courses in one orientation, they can also take courses with no more than 11 credits from different orientations. The postgraduate candidates exempt from admission exam for graduate study must take at least 12 credits in an orientation.

6. Intensive Practice (21 credits)

Code	Course Title	Credit(s)	Remarks
GE01040	Military Training	0	Military training, affairs and national defense
GE09030	Chinese Practical Writing and Training	1	
GE09027	English Practical Writing and Training	1	
MA10011	Applied Mathematical Software	2	

Cont

Code	Course Title	Credit(s)	Remarks
MA10012	Mathematics Innovation Training	2	Credit Requirements: Student in this program will earn 2 credits upon he/she has: (a) successfully taken participation at least once in contests like Chinese Mathematics Competitions (CMC), China Undergraduate Mathematical Contest in Modeling (CUMCM), Mathematics Contest in Modeling (MCM/ICM), S. T. Yau College Mathematics Contests, ACM International Collegiate Program Contest, The Challenge Cup, etc; or (b) taken participation in some amateur scientific and technological research projects like college student innovation and training program (SIT) and concluded with a report; or (c) written a curriculum related and qualified paper based on the course requirements.
MA10013	Freshman Seminar I	0.5	
MA10014	Freshman Seminar II	0.5	
MA10006	Graduation Internship	2	
MA10007	Graduation Thesis	12	
	Total	21	

VI. Course Instructor list

No.	Name	Academic Title	Academic Degree	Research Areas	Courses
1	Du Zhuoran	Assistant Professor	Ph. D	Partial Differential Equations	Functional Analysis, Partial Differential Equations, Topics in Modern PDEs
2	Guo Shangjiang	Professor	Ph. D	Differential Equations and Dynamic System	Ordinary Differential Equations, Differential Geometry, Dynamic System
3	Jiang Yueping	Professor	Ph. D	Complex Analysis	Advanced Algebra, Space Analytic Geometry, Differential Geometry
4	Shu Xiaobao	Associate Professor	Ph. D	Nonlinear Functional Analysis, Dynamic System	Mathematical Analysis, Real Variable Functions, Differentiable Manifold, Measure Theory
5	Wei Zhijian	Associate Professor	Ph. D	Differential Equations, Dynamic System	Ordinary Differential Equations, Complex Variable Functions, Calculus on Manifold
6	Xiao Yingqing	Assistant Professor	Ph. D	Complex Analysis	Space Analytic Geometry, Differentiable Manifold

Cont

No.	Name	Academic Title	Academic Degree	Research Areas	Courses
7	Yang Lin	Associate Professor	Ph. D	Partial Differential Equations	Mathematical Analysis, Partial Differential Equations
8	Hu Yan	Assistant Professor	Ph. D	Partial Differential Equations	Real Variable Functions, Functional Analysis
9	Zhou Xiangnan	Associate Professor	Ph. D	Topology	Real Variable Functions, Abstract Algebra, Basics of Topology
10	Zou Shaofen	Associate Professor	Ph. D	Functional Differential Equations	Complex Variable Functions, Real Variable Functions, Measure Theory
11	Guo Zhenyuan	Associate Professor	Ph. D	Discontinuous Dynamic System and Application	Complex Variable Functions, Qualitative and Stability Theory of ODEs
12	Gui Changfeng	Professor	Ph. D	Partial Differential Equations	Partial Differential Equations
13	Xiong Wei	Assistant Professor	Ph. D	Number Theory	Probability Theory, Mathematical Statistics, Abstract Algebra, Number Theory
14	Chai Jinsong	Assistant Professor	Ph. D	Number Theory, Representation Theory	Advanced Algebra, Abstract Algebra, Number Theory, Fundamental of Lie Groups
15	Fang Yanqin	Assistant Professor	Ph. D	Partial Differential Equations	Real Variable Functions, Partial Differential Equations
16	Xie Baohua	Assistant Professor	Ph. D	Hyperbolic Geometry	Complex Variable Functions, Algebra Topology
17	Wang Hua	Assistant Professor	Ph. D	Harmonic Analysis	Mathematical Analysis, Real Variable Functions
18	Dong Chaoping	Assistant Professor	Ph. D	Representation of Lie Group	Advanced Algebra, Abstract Algebra, Algebra Topology, Fundamental of Lie Groups
19	Xiong Linjie	Assistant Professor	Ph. D	Partial Differential Equations	Functional Analysis, Partial Differential Equations
20	Li Jun	Assistant Professor	Ph. D	Several Complex Analysis and Complex Geometry	Complex Variable Functions, Several Complex Variable Functions
21	Jiang Ruiqi	Assistant Professor	Ph. D	Geometry Analysis, Partial Differential Equations	Space Analytic Geometry, Differential Geometry, Calculus on Manifold, Introduction to Riemann Geometry
22	Huang Chaoqun	Assistant Professor	Ph. D	Partial Differential Equations	Functional Analysis, Probability Theory, Stochastic Differential Equations

VII. Course Scheduler

No.	Name	Academic Title	Academic Degree	Research Areas	Courses
1	Jiang Yueping	Professor	Ph. D	Complex Analysis	Space Analytic Geometry

(翻译人:蒋月评)