

大气科学专业培养方案（菁英班）

专业名称与代码：大气科学 070601

专业培养目标：

具有扎实的数理化基础，掌握大气科学的基本理论和技能，具备一定的地质学知识、了解圈层交互作用和地球系统科学，能在气象、民航、环保、水利、海洋等部门从事气象业务和科研工作，具有继续深造潜力和很好发展前景的专业人才。

专业毕业要求：

1. 具有扎实的数学物理基础；
2. 掌握大气科学的基本理论、基本知识、基本技能；
3. 了解大气科学的发展历史、在经济社会发展中的重要作用，对学科前沿和发展趋势有一定的认识；
4. 初步掌握大气科学研究的基本方法和手段，具备一定的发现、提出、分析和解决大气科学及相关问题的能力；
5. 具有一定的地质学知识，对地球系统科学及大气圈、岩石圈、水圈、生物圈等圈层间的相互作用有一定的理解；
6. 掌握一门外语和必要的信息技术，能够获取和应用大气科学相关数据并进行分析。

毕业要求实现及途径：

序号	毕业要求	实现途径（教学过程）
1	具有扎实的数理化基础	① 课堂教学： 高等数学 A、线性代数与矢量分析、数学物理方程、复变函数与积分变换 B、（理科）理论力学等、大学物理 C、大学化学 C ② 课外学习： 配套实验课程
2	掌握大气科学的基本理论、基本知识	① 课堂教学： 大气动力学、天气学、大气物理学、大气探测、大气化学 ② 课外学习： 配套实验课程
3	掌握一定的地质学知识，地球系统科学理念，着眼于地球系统的大气	① 课堂教学： 地球科学概论、地质灾害预报、古气候学 ② 课外学习： 参与学校及学院其他专业的科

序号	毕业要求	实现途径（教学过程）
	圈、岩石圈、水圈、生物圈，强调圈层间的相互作用	普活动周、地质学实习
4	了解大气科学的发展历史、学科前沿和发展趋势；认识大气科学在经济社会发展中的重要地位与作用	① 课堂教学 ：大气科学导论、大气科学前沿讲座 ② 课外学习 ：积极参加学校举办的各类讲座
5	初步掌握大气科学研究的基本方法和手段，初步具备发现、提出、分析和解决大气科学及相关问题的能力	① 课堂教学 ：天气预报实习、气象统计方法、数值天气预报、大气数值模拟 ② 课外学习 ：学做天气预报，分析长期天气趋势，进行短期气候预测，与实际情况作对比，验证学习成果
6	掌握必要的信息技术，能够获取和应用大气科学相关数据	① 课堂教学 ：C 语言课程设计、专业技术培训 ② 课外学习 ：利用气象资料进行实践性预报和研究

主干学科：大气科学

核心课程：大气动力学、天气学、大气物理、大气化学、大气科学导论、数值天气预报

主要专业实验：天气分析与预报、大气探测实验、天气学实习、大气动力学实验

主要实践性教学环节：气象观测场实习、地质认识实习、气象专业实习实训、毕业论文设计

修业年限：四年。

授予学位：理学学士。

相近专业：地球物理、应用物理、环境科学、水文与水资、物理海洋学

Program For Atmospheric Science

Specialty and Code: Atmospheric Science, 070601

Education Objective: The program aims at cultivating composite academic talents well trained in Atmospheric-related sciences, with a solid background in Geosciences. The graduates will be able to work in academia as atmospheric researchers, as well as perform as engineers in relevant industries.

1. Solid mathematical, physical and chemical knowledge.
2. Fundamental methods and theories in Atmospheric Science.
3. Basic knowledge in Geosciences, with a focus on Geology. The ability to deal with the interactions between atmosphere, lithosphere, hydrosphere and biosphere is important.
4. Basic knowledge of the history and the current trending topics of Atmospheric Science. Knowledge of the importance of Atmospheric Science in economic and social developments.
5. Commonly used methods and tools in Atmospheric Science, the ability to find, formalize, analyze and solve relevant problems.
6. Access to information technologies, the ability to acquire and utilize Atmospheric datasets.

Graduation Requirements:

Graduation requirements and ways to achieve:

No.	Graduation requirements	Ways to achieve (teaching process)
1	Solid mathematical, physical and medical knowledge	① Classroom Teaching: Atmospheric Physics, Atmospheric Sounding, Synoptic Meteorology, Atmospheric Dynamics

No.	Graduation requirements	Ways to achieve (teaching process)
2	Fundamental methods and theories in Atmospheric Science	<p>①Classroom Teaching: Atmospheric Physics, Synoptic Meteorology, Atmospheric Physics, Atmospheric Chemistry, Atmospheric Sounding</p> <p>②Out-of-class Learning: Lab Experiments, daily weather forecast.</p>
3	Basic knowledge in Geosciences, with a focus on Geology. The ability to deal with the interactions between atmosphere, lithosphere, hydrosphere and biosphere is important	<p>①Classroom Teaching: An Introduction to Geosciences, Geological Hazard Forecast and Paleoclimatology</p> <p>②Out-of-class Learning: Scientific and technological knowledge spread week held by other major.</p>
4	Basic knowledge of the history and the current trending topics of Atmospheric Science. Knowledge of the importance of Atmospheric Science in economic and social developments.	<p>①Classroom Teaching: An Introduction to Atmospheric Science, Seminars for Atmospheric Sciences</p> <p>②Out-of-class Learning: All kinds of lectures held in our university.</p>
5	Commonly used methods and tools in Atmospheric Science, the ability to find, formalize, analyze and solve relevant problems	<p>①Classroom Teaching: Meteorological Statistical Methods, Numerical Weather Predication and Professional Skills Training</p> <p>②Out-of-class Learning: Learn to forecast weather, analysis of the long-term weather trend, short-term climate prediction, as compared with the actual situation.</p>
6	Access to information technologies, the ability to acquire	① Classroom Teaching: Numerical Simulation of Atmosphere, Geological

No.	Graduation requirements	Ways to achieve (teaching process)
	and utilize Atmospheric datasets	Hazard Forecast ② Out-of-class Learning: learn to apply meteorological data to forecast and research

Major Disciplines: Atmospheric Science

Main Courses: Atmospheric Dynamics, Synoptic Meteorology, Atmospheric Physics, Atmospheric Chemistry, An Introduction to Atmospheric Science, Atmospheric Sounding, Climatology.

Lab Experiments: Synoptic Analysis and Forecast, Atmospheric Sounding Practice, Meteorology Practice, Atmospheric Dynamics Practice.

Practical Work: Meteorological Sounding Field Practice, Cognitive Geological Field Practice, Meteorological Professional Practice, Graduation Design.

Duration: Four years.

Degree Granted: BS (Bachelor of Science).

Related Specialties: Geophysics, Application Physics, Environmental Science, Hydrology and Water Resources.

大气科学专业课程教学计划表

Table of Course Descriptions of Atmospheric Science Major

课程类别 Classi- fication	课程 编号 Code	课程名称 Course Name	学 分 Crs	学 时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
								一	二	三	四	五	六	七	八
					讲课 Lec.	实验 Lab.		1st	2nd	3rd	4th	5th	6th	7th	8th
通识教育课 Liberal Education Courses	必修 Compulsory	马克思主义基本原理 Principles of Marxism	3	48	48			3							
		毛泽东思想与中国特色社会主义理论体系概论 Mao Tse-tung Thought and Introduction to the Theoretical System of Socialism with Chinese Characteristics	4	64	64					4					
		中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32						2				
		思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	48			1.5	1.5						
		体育 Physical Education	4	144	144			1	1	1	1				
		大学英语 College English	12	192	192			2.5	2.5	3.5	3.5				
		大气科学导论 An Introduction to Atmospheric Science	3	48	44	4		3							
		军事理论 Military Theory	2	32	32			2							
		C 语言程序设计 A Computer High-level Language (C)	3.5	56	40	16		3.5							
	选修 Elective	总计 12 学分, 含创新创业选修课学分, 跨学科选修课不低于 6 学分."形势与政策"课程为限选课,由马克思主义学院实施	12	192											
学科基础课 Disciplinary Fundamental Courses	小计 Sum		48.5	856	644	20		16.5	5	8.5	6.5				
		高等数学 A Advanced Mathematics A	11.5	184	184			5	6.5						
		线性代数 B Linear Algebra	2.5	40	40				2.5						
		概率论与数理统计 A Probability and Mathematics Statistics A	3.5	56	56					3.5					
		大学物理 C College Physics C	6	96	96				3.5	2.5					
		物理实验 A Physical Experiments A	3.5	56		56			2	1.5					
		地球流体力学引论 An Introduction to Fluid Dynamics	3	48	48					3					
		数学物理方程 Mathematical Physics Equation	3	48	48						3				

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
								一	二	三	四	五	六	七	八
					讲课 Lec.	实验 Lab.		1st	2nd	3rd	4th	5th	6th	7th	8th
		复变函数与积分变换 B Complex Variable Function and Integral Transformation B	2.5	40	40					2.5					
		(理科) 理论力学 Theoretical Mechanics	3.5	56	56					3.5					
		地球科学概论 An Introduction to Geosciences	2	32	32				2						
		大学化学 C College Chemistry C	4	64	50	14					4				
	小计 Sum		45	720	650	70		5	16.5	16.5	7				
专业主干课 Main Specialty Courses		大气物理学 Atmospheric Physics	4	64	64						4				
		大气探测 Atmospheric Sounding	3	48	40	8					3				
		天气学 Synoptic Meteorology	5	80	64	16						5			
		大气动力学 Atmospheric Dynamics	4	64	64							4			
		气候学 Climatology	3	48	48								3		
		大气化学 Atmospheric Chemistry	3	48	48							3			
		数值天气预报 Numerical Weather Predication	3	48	32	16							3		
		气象统计方法 Meteorological Statistical Methods	3	48	40	8							3		
		古气候学 Paleoclimatology	3	48	40	8								3	
	小计 Sum		31	496	440	56					7	12	9	3	
专业选修课 Specialty Elective Courses		具体见专业选修课列表	20	320	320										
合计 Sub-total			144.5	2392	2246	146		21.5	21.5	25	20.5	12	9	3	
实践环节 Practical Work		C 语言课程设计 A Course Design for C Language Level A	1.5	1.5 周				1.5							
		军事训练 Military Training	2	2 周				2							
		气象观测场实习 Meteorological Observing Station Practice	0.5	0.5 周							0.5				
		专业技术培训 Professional Skills Training	2	2 周								2			

课程类别 Classi- fication	课程 编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
								一	二	三	四	五	六	七	八
					讲课 Lec.	实验 Lab.		1st	2nd	3rd	4th	5th	6th	7th	8th
		地质认识实习（北戴河） Primary Field Training	2	2 周					2						
		天气分析与预报 Synoptic Analysis and Forecast	4	4 周									4		
		毕业实习（气象业务科研 相关部门实习实训） Practice for Graduate	12	12 周											12
		毕业设计 Bachelor Thesis	12	12 周											12
	小计 Sum		36	36 周				3.5	2		0.5	2	4		24
创新创业学习学分 Freedom study		社会调查 Social Investigation	2												
		其他(学科竞赛、发明创造、科研报 告) Others (Contest, Invention, Innovation and Research Presentation)	3												
	小计 Sum		5												
总计 Total			185.5	2392+ 36 周	2246	146		26	23.5	25	21	14	13	3	24
专业选修课列表 Specialty Elective Courses		全球变化 Global Change	2	32	24	8							2		
		空气污染气象学 Air Pollution	2.5	40	40								2.5		
		中小尺度天气学 Mesoscale and Microscale Meteorology	2	32	32							2			
		地质灾害预报 Geological Hazard Forecast	1.5	24	24								1.5		
		大气科学前沿讲座 Seminars for Atmospheric Sciences	1.5	24	24								1.5		
		大气数值模拟 Numerical Simulation of Atmosphere	2.5	40	8	32							2.5		
		环境评价 C Environmental Evaluation C	2	32	32								2		
		冰冻圈与气候 Cryosphere and Climate	1.5	24	24									1.5	
		海气相互作用 Air-Sea Interaction	2	32	32									2	
		偏微分方程数值解 Numerical Solution of Partial Differential Equation	3	48	40	8							3		
		城市气候学 Urban Climatology	2	32	24	8								2	

课程类别 Classi- fication	课程编号 Code	课程名称 Course Name	学分 Crs	学时 Hrs	学时分类 Class Hours		先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					讲课 Lec.	实验 Lab.		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
		应用气象学 Applied Meteorology	2	32	32									2	
		生态学 General Ecology	2	32	32								2		
		大气污染控制 Atmospheric Pollution Control	2	32	32							2			
		热带动力学 Tropical Atmosphere	2	32	32									2	
		农业气象 Agricultural Meteorology	2	32	32									2	
		环境科学概论 An Introduction to Environmental Science	2.5	40	40					2.5					
		边界层气象学 Boundary Layer Meteorology	2	32	32									2	

注：通识教育选修课学分和创新创业自主学习学分未列入具体学期。

大气科学菁英班专业课程分类统计

	通识教育课程 Liberal Education Courses		学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环节 Practical Work	创新创业自主学习 Freedom Study	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/ 学分	664/36.5	192/12	720/45	496/31	320/20	36 周/36	80/5	2392+36 周	185.5
学分所 占比例	26.2%		24.2%	16.7%	10.8%	19.4%	2.7%		100%