

大气科学专业培养方案

专业名称与代码：大气科学 070601

专业培养目标：

大气科学专业是 2016 年我校与中国科学院大气物理研究所联合设立的“科教合作协同育人”菁英人才培养试点专业，按照本硕博贯通培养模式，培养具有继续深造潜力和很好发展前景的复合型大气科学人才。毕业生掌握地球系统科学、圈层交互作用、大气科学的跨学科专业知识和技能，接受全面的科学思维和科学技能训练，具备灵活运用现代信息技术、大气科学数据处理和分析能力和国际交流的综合能力，能在大气科学及其相关领域从事科学研究、业务预报、教育和管理等相关工作。

预期毕业生通过 5 年持续学习和职业发展，能够达到独立从事科学研究和业务预报工作的素质和能力，能在科研院所、高等学校等科研教学单位以及气象、环保等企事业单位成为科研骨干、技术负责或项目管理人才。

培养目标可以分解为如下四个子目标：

- (1) 具有扎实的数理化基础；
- (2) 掌握大气科学的基本理论和技能；
- (3) 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；
- (4) 具备良好的文化修养、心理素质、道德品质和职业素养，能运用所学知识，在科研、业务、教育、管理等领域从事大气科学相关工作。

专业毕业要求：

6. 基础知识：掌握数学、物理、化学、大气科学等基本理论知识；
7. 问题分析：掌握大气动力和热力的基本原理和方法、能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题，以获得有效结论；
8. 设计/开发解决方案：在系统的理论知识学习基础上，掌握本专业必需的探测、分析、计算等基本技能，从而解决实际业务和科研问题的能力，并能够在解决环节中体现创新意识，考虑社会、健康、安全、法律、文化以及环境等因素；
9. 研究：能够基于本学科专业所掌握的原理、技术、方法对大气动力、天气与气候、大气化学、大气物理与大气环境等相关问题进行研究，并通过信息综合得到合理有效的结论；
10. 使用现代工具：了解现代大气探测和天气预报先进技术，能运用现代计算机模拟技术进行大气模式模拟的工作，并能够理解其局限性；
11. 专业与社会：了解气象学、大气环境保护和可持续发展等方面的方针、政策和法律法规；能够基于大气学科专业相关背景知识对社会相关问题进行合理分析，充分考虑作出的解决问题的方案对社会、环境、健康、安全、法律、文化以及可持续发展的影响。

响，并理解应承担的责任；

12. 职业规范：具有人文社会科学素养、社会责任感，具有大气科学领域所应具有的职业技能、职业作风和职业意识；具备较高的综合素质，包括身体素质、心理素质、文化素质和专业素质，能够在业务和科研工作中理解并遵守职业道德和规范，履行责任；

13. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色；

14. 管理与沟通：具有一定的组织管理和决策能力，具有较好的文字表达能力，能够与业界同行及社会公众进行有效沟通和交流，并具备扎实的外语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；

15. 终身学习：树立终身学习思想；掌握文献检索、资料查询及运用现代信息技术获取相关信息的基本方法；具有较强的自我获取知识的能力，具备不断拓展自身知识面和终身获取新知识的能力，有不断学习和适应发展的能力。

毕业要求实现及途径：

序号	毕业要求	实现途径
1	掌握数学、物理、化学、大气科学等基本理论知识	① 课堂教学 ：高等数学、线性代数、概率论与数理统计、数学物理方程、大学物理、大学化学、大气科学导论、地球科学概论 ② 课外学习 ：课程配套实验课程、地质认识实习（北戴河）
2	掌握大气动力和热力的基本原理和方法，能够应用这些方法/技术，识别、表达、并通过文献研究分析相关学科专业问题	① 课堂教学 ：大气动力学、天气学、气候学、大气物理学、大气探测、大气化学、地球流体力学导论 ② 课外学习 ：课程配套实验课程、天气分析与预报
3	掌握本专业必需的探测、分析、计算等基本技能，从而解决实际业务和科研问题的能力	① 课堂教学 ：大气探测、大气物理学、数值天气预报、中小尺度天气学、边界层气象学等 ② 课外学习 ：参与本专业的科普活动周等
4	能够基于本学科专业所掌握的原理、技术、方法对大气动力、天气与气候、过去气候变化、大气化学、大气物理与大气环境等相关问题进行研究，并通过信息综合得到合理有效的结论	① 课堂教学 ：气象统计方法、气象大数据可视化、古气候学、大气数值模拟、天气分析与预报等 ② 课外学习 ：课程配套上机作业、大气科学前沿讲座、本科生科研训练等。
5	了解现代大气探测和天气预报先进技术，能运用现代计算	① 课堂教学 ：Python 语言程序设计、大气探测、数值天气预报、大气数值模拟

序号	毕业要求	实现途径
	机模拟技术进行大气模式模拟的工作，并能够理解其局限性；	②课外学习：计算机课程设计、大气数值模拟上机等。
6	了解气象学、大气环境保护和可持续发展等方面的方针、政策和法律法规	①课堂教学：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
7	能够在业务和科研工作中理解并遵守职业道德和规范	①课堂教学：思想道德修养与法律基础、生涯规划与就业指导等。 ②课外学习：引导学生树立正确的职业观、鼓励学生参与大学生职业规划大赛、求职方法讲座等活动。
8	能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色	①课堂教学：水文地质灾害与天气分析预报、古气候学、大气数值模拟等 ②课外学习：社会调查、地质认识实习（北戴河）、专业认知实习等。
9	能够就本学科专业问题与业界同行及社会公众进行有效沟通和交流	①课堂教学：大学英语、专业文献阅读与写作等 ②课外学习：鼓励学生参与英语演讲大赛、文献翻译大赛、科技论文报告会等活动。
10	具有较强的自我获取知识的能力，具备不断拓展自身知识面和终身获取新知识的能力	①课堂教学：心理学与自我成长 ②课外学习：引导学生树立终身学习观念，鼓励学生参与学科竞赛、地质技能大赛等活动。

主干学科：大气科学

专业主干课程：大气动力学、天气学、气候学、古气候学、大气物理、大气探测、大气化学、数值天气预报

主要专业实验：大气探测实验、天气学实验、大气动力学实验

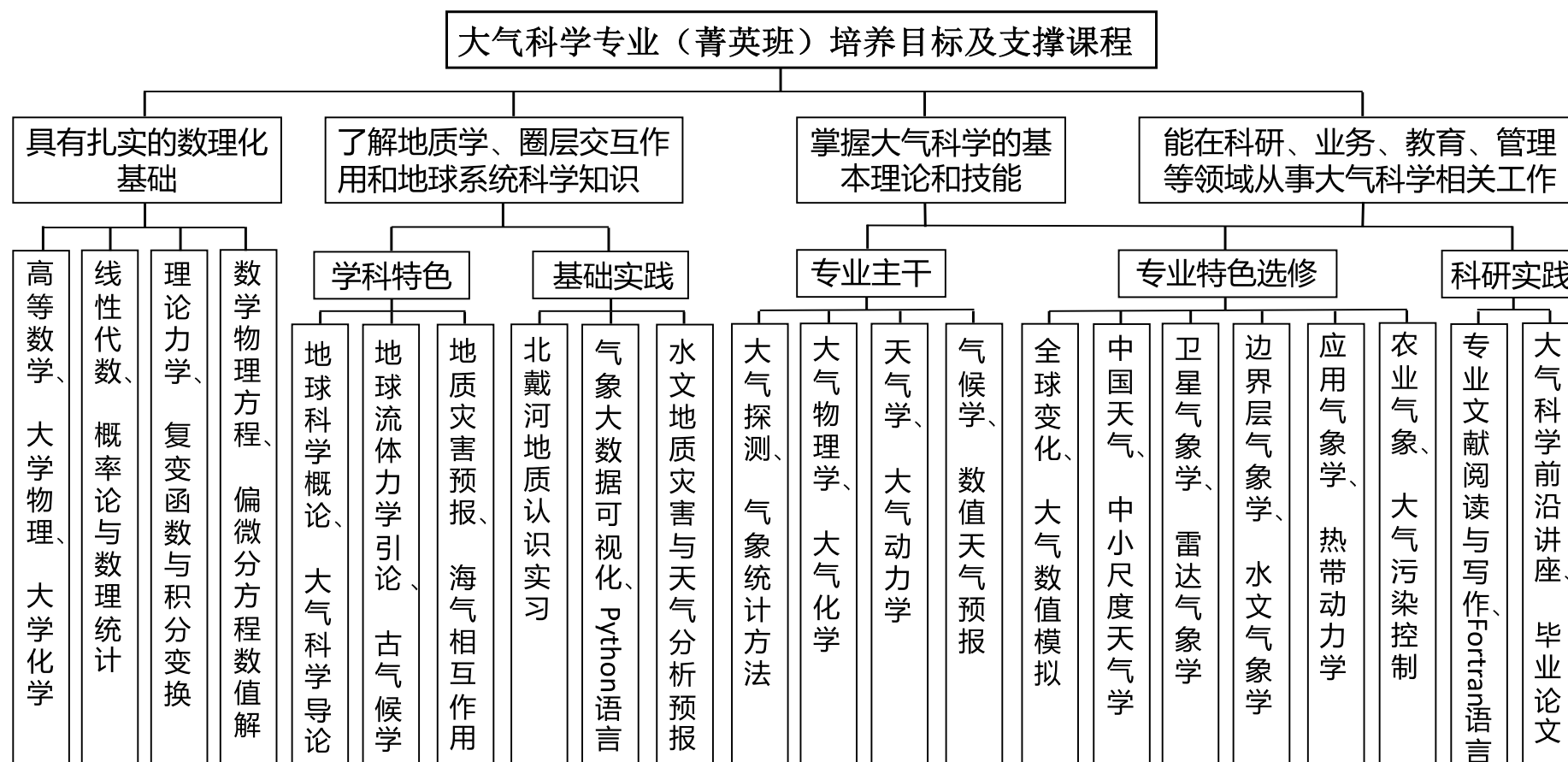
主要实践性教学环节：北戴河地质认识实习、气象大数据可视化、水文地质灾害与天气分析预报实习、毕业论文设计

毕业学分要求：170 学分

学制与学位：四年，理学学士

本专业学生可以辅修的其他专业：海洋科学、环境科学

相近专业：地球物理、应用物理、海洋科学、环境科学



Program For Atmospheric Science

Specialty and Code: Atmospheric Science, 070601

Education Objective:

The class of atmospheric science is a pilot class jointly established by our school and the Institute of Atmospheric Physics of the Chinese Academy of Sciences in 2016 for talent cultivation of "science and education cooperation and collaborative education". According to the training mode of undergraduate, master and doctoral students, it cultivates compound atmospheric science talents with potential for further education and good development prospects. Graduates master the interdisciplinary professional knowledge and skills of Earth system science, sphere interaction and atmospheric science, receive comprehensive scientific thinking and scientific skills training, have the comprehensive ability to flexibly use modern information technology, atmospheric science data processing and analysis capabilities and international exchanges, and can engage in scientific research, business forecasting, education and management in atmospheric science and related fields.

Graduates are expected to achieve the quality and ability to independently engage in scientific research and business forecasting work through 5 years of continuous learning and career development. They can become research backbone, technical responsible or project management talents in research institutes, universities and other scientific research and teaching units, as well as enterprises and institutions such as meteorology and environmental protection.

The training objectives can be decomposed into the following four sub objectives:

- (1) Having a solid foundation in mathematics, physics, and chemistry;
- (2) Mastering the basic theories and skills of atmospheric science;
- (3) Have some geological knowledge, understand the interaction between spheres and Earth system science;
- (4) Possess good cultural, psychological, moral, and professional qualities, and be able to apply the knowledge learned to engage in atmospheric science related work in scientific research, business, education, management, and other fields.

Graduation Requirements:

1. Basic knowledge: master basic knowledge and basic theories of mathematics, physics, chemistry and atmospheric science.

2. Analysis: master basic principles and methods of atmospheric dynamics and thermodynamics, apply these methods/techniques, identify, express, and analyze relevant subject professional problems through literature research, and obtain effective conclusions;

3. To solve the problem: on the basis of studying the theoretical knowledge systematically, master the basic skills for detection, analysis, and computing method, so as to solve the practical prediction and scientific research problems, and reflect the innovation consciousness in the solution process, considering the society, Health, safety, legal, cultural and

environmental factors;

4. Research: it is possible to study related issues such as meteorology dynamics, weather and climate, atmospheric chemistry, atmospheric physics and atmospheric environment based on the principles, techniques and methods mastered by the subject, and obtain reasonable and effective conclusions through information synthesis

5. Using modern tools: use modern computer simulation techniques to perform atmospheric model simulations and understand their limitations;

6. Professional and social: understand the guidelines, policies, laws and regulations on meteorology, atmospheric environmental protection and sustainable development; be able to conduct a reasonable analysis of social related issues based on relevant background knowledge of the atmospheric disciplines, and fully consider the solutions to the problems. The impact on society, the environment, health, safety, law, culture and sustainable development, and understanding the responsibilities that should be undertaken.

7. Professional standards: with humanistic and social science literacy, social responsibility, professional skills, professional behavior, professional style and professional consciousness in the field of atmospheric science; Have high comprehensive quality, including physical quality, psychological quality, cultural quality and professional quality, be able to understand and abide by prediction and scientific research, and fulfill responsibilities.

8. Individual and teamwork: strong teamwork spirit.

9. Management and communication: with certain organizational management and decision-making ability, good writing ability, able to effectively communicate and communicate with peers in the industry and the public, solid foreign language ability and certain international vision, able to communicate and communicate in the cross-cultural background. This includes writing reports and designing scripts, making presentations, and articulating or responding to instructions.

10. Lifelong learning: to establish the idea of lifelong learning; Master the basic methods of literature retrieval, data query and using modern information technology to obtain relevant information; Have a strong ability to acquire knowledge, constantly expand their own knowledge and lifelong ability to acquire new knowledge, have the ability to constantly learn and adapt to development.

Graduation Requirements and Pathways:

No.	Graduation requirements	Pathways (Teaching Process)
1	Master basic theoretical knowledge of mathematics, physics, chemistry, atmospheric science	① Classroom Teaching: Advanced Mathematics, College Physics, College Chemistry, An Introduction to Atmospheric Science, etc. ② Extracurricular Learning: Lab Experiments
2	Master basic theories, knowledge, analysis and design methods related to Atmospheric Science	① Classroom Teaching: Atmospheric sounding, Atmospheric Physics, Synoptic Meteorology, Atmospheric Chemistry, Atmospheric dynamics. ② Extracurricular Learning: Lab Experiments, daily weather forecast.
3	Basic skills of survey, test, investigation, evaluation, drawing, design and calculation are required for this major	① Classroom Teaching: Atmospheric sounding, Atmospheric Physics, Numerical Weather Predication, etc. ② Extracurricular Learning: Scientific and technological knowledge spread week held by this major.
4	Study related issues such as meteorology dynamics, weather and climate, past climate change, atmospheric chemistry, atmospheric physics and atmospheric environment based on the principles, techniques and methods mastered by the subject, and obtain reasonable and effective conclusions through information synthesis	① Classroom Teaching: Meteorological Statistical Methods, Meteorological Big Data Visualization, Paleoclimatology, Atmospheric Numerical Simulation, Weather Analysis and Forecasting, etc. ② Extracurricular Learning: The course is equipped with the machine work, the lectures on atmospheric science, undergraduate scientific research training.
5	Understand modern advanced atmospheric sounding and weather forecasting technology, be able to use modern computer simulation technology to simulate atmospheric models, and understand their limitations;	① Classroom Teaching: Python Language Programming, Atmospheric sounding, Numerical Weather Forecasting, Atmospheric Numerical Simulation ② Extracurricular Learning: Learn to forecast weather, analysis of the long-term weather trend, short-term climate prediction, as compared with the actual situation.
6	To be familiar with policies and regulations about meteorology, atmospheric environmental protection, and sustainable development	① Classroom Teaching: Meteorological Statistical Methods, Numerical Weather Forecasting, Atmospheric Numerical Simulation ② Extracurricular Learning: learn to apply meteorological data to forecast and research
7	Ability to understand and comply with engineering ethics and codes in	① Classroom Teaching: Morality Education and Fundamentals of Law, Career planning and career

No.	Graduation requirements	Pathways (Teaching Process)
	practice	guidance ② Extracurricular Learning: Guide students to set up a correct concept of career, encourage students to participate in college students career planning competition, job-seeking methods lectures and other activities
8	Ability to act as an individual, team member, and leader in a multidisciplinary team	① Classroom Teaching : Hydrogeological Hazards and Synoptic Analysis and Forecast, Atmospheric numerical simulation, etc. ② Extracurricular Learning: Social investigation, geological cognition practice, professional cognitive internship.
9	Able to effectively communicate and communicate with peers and the public on professional issues of the subject	① Classroom Teaching : College English , Literature retrieval ② Extracurricular Learning: Encourage Students to participate in English speech contest, literature translation contest, scientific paper presentation and other activities.
10	Have a strong ability to acquire knowledge, constantly expand their knowledge and lifelong ability to acquire new knowledge	① Classroom Teaching : Psychology and self-development ② Extracurricular Learning: Guide students to establish the concept of lifelong learning, encourage students to participate in discipline competition, geological skills competition and other activities.

Major Disciplines: Atmospheric Science

Core Courses: Atmospheric Dynamics, Synoptic Meteorology, Climatology, Paleoclimatology, Atmospheric Physics, Atmospheric Sounding, Atmospheric Chemistry, Numerical Weather Predication.

Lab Experiments: Atmospheric Sounding Practice, Meteorology Practice, Atmospheric Dynamics Practice.

Practical Work: Cognitive Geological Field Practice, Meteorological Big Data Visualization, Hydrogeological Hazards and Synoptic Analysis and Forecast, Graduation Design.

Requirements for Graduation Credits: 170

Duration & Degree Granted: Four years, BS (Bachelor of Science).

Recommended minor: Marine Science, Environmental Science

Related Specialties: Geophysics, Applied Physics, Marine Science, Environmental Science

大气科学专业课程教学计划表

Course Descriptions of Atmospheric Science

课程 类别 Classi- fication	课程 编号 Code	课程名称 Course Name	学 分 Crs	课 内 总 学 时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲 课 Lec.	课 内 实 验 Lab	实 验/ 科 研 实 践 Lab/Res.	研 讨 Dis	素 质 拓 展 Exp									
通 识 教 育 课 Liberal Education Courses	必修 Compulsory	12007800 马克思主义基本原理 Principles of Marxism	3	48	48						3							
		12008100 毛泽东思想和中国特色社会主义理论 体系概论 Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics	2	32	32								2					
		12008000 习近平新时代中国特色社会主义思想 概论 Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3	48	48									3				
		11711800 中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32							2						
		12007900 思想道德与法治 Ideological morality and rule of law	3	48	48						3							
		12005300 形势与政策 Situation and Policy	2	32	32						每学期平均分配							
		113076*0 体育 Physical Education	4	144	144						1	1	1	1				
		109234*0 大学英语 College English	9	144	144				48		3	3	3					
		14300300 军事理论 Military Theory	2	36	36						2							
		12008200 劳动教育 Labor Education	1	16	16						1							
	选修 Elective	包括美育、心理健康教育课程（各不少于2 学分）、地球科学概论总计 12 学分，跨学 科选修课不低于 4 学分		12	192	192												
		小计 Sum		43	772	772				48		13	6	9	1			

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
学科基础课 Disciplinary Fundamental Courses	20441500	大气科学导论 Introduction to Atmospheric Science	2	32	32			16			2							
	20326903	大学化学 C College Chemistry C	3	48	48						3							
	20327003	大学化学实验 C Chemistry Experiment C	1	24		24					1							
	212127*2	高等数学 B Advanced Mathematics B	10	160	160						5	5						
	21947400	Python 语言程序设计 A Python Language Programming A	2.5	56	40	16						2.5						
	212130*1	大学物理 A College Physics A	8	124	124							4	4					
	212169*1	物理实验 A Physical Experiments A	2	64	4	60						1	1					
	21212801	线性代数 A Linear Algebra A	3.5	56	56								3.5					
	21213501	概率论与数理统计 A Probability and Statistics A	3.5	56	56								3.5					
	21200100	（理科）理论力学 Theoretical Mechanics	3.5	56	56								3.5					
	20427800	地球流体力学引论 An Introduction to Fluid Dynamics	3	48	48									3				
	21206400	数学物理方程 Mathematical Physics Equation	3	48	48									3				
	21201902	复变函数与积分变换 B Complex Variable Function and Integral Transformation B	2.5	40	40									2.5				
	小计 Sum		48	812	712	100		16			11	12.5	15.5	8.5				
专业主干课 Main Specialty Courses	20442200	大气物理学 Atmospheric Physics	3	48	48			16						3				
	20442300	大气探测 Atmospheric Sounding	2.5	40	40		8							2.5				
	20425500	大气化学 Atmospheric Chemistry	3	48	48									3				
	20442400	天气学 Synoptic Meteorology	3	48	48			16							3			
	20425300	大气动力学（双语教学） Atmospheric Dynamics (Instructed in Chinese and English)	4	64	64		16								4			
	20442600	气象统计方法 Meteorological Statistical Methods	2	32	32			8							2			
	20442700	气候学 Climatology	3	48	48			8								3		
	20442800	数值天气预报 Numerical Weather Predication	3	48	48			16								3		
	20442900	古气候学 Paleoclimatology	2.5	40	40			8									2.5	
	小计 Sum		26	416	416		24	72						8.5	9	6	2.5	

课程类别 Classi- fication	课程 编号 Code	课程名称 Course Name	学 分 Crs	课 内 总 学 时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲 课 Lec.	课 内 实 验 Lab	实 验 / 科 研 实 践 Lab/Res.	研 讨 Dis	素 质 拓 展 Exp									
专业选修课 Specialty Elective Courses		可按方向设课, 具体见专业选修课列表	17	272														
合计 Sub-total																		
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周							2							
	42008300	劳动实践 Labor practice	1	1 周												1		
	41947500	Python 语言课程设计 A Python Language Course Projects A	1.5	1.5 周								1.5						
	40115200	地质认识实习 (北戴河) Cognitive Geological Field Practice	3	3 周								3						
	40443000	气象大数据可视化 Meteorological Big Data Visualization	2.5	2.5 周											2.5			
	40443100	水文地质灾害与天气分析预报 Hydrogeological Hazards and Synoptic Analysis and Forecast	6	6 周												6		
	40421600	毕业实习 Practice for Graduate	8	8 周													8	
	40452500	毕业论文 Bachelor Thesis	10	10 周														10
	小计 Sum		34	41 周								2	4.5			2.5	6	8
创新创业自主学习 Freedom study	ZZ35000S	社会调查 Social Investigation	2												2			
		其他(含创新创业课程、学科竞赛、发明创造、科研报告) Others (Start-up, Contest, Invention, Innovation and Research Presentation)	3															
	小计 Sum		5															
总计 Total																		
可开出专业选修课列表 Specialty Elective Courses	20432100	FORTRAN 语言程序设计 FORTRAN Language Programming	2	32	32									2				
	20426600	卫星气象学 Satellite Meteorology	2	32	32										2			
	20427700	中小尺度天气学 Mesoscale and Microscale Meteorology	2	32	32										2			
	20438100	水文气象学 Hydrometeorology	2	32	32										2			
	20436700	大气污染控制 Air Pollution Control	1.5	24	24				8							1.5		

课程类别 Classi- fication	课程 编号 Code	课程名称 Course Name	学 分 Crs	课 内 总 学 时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲 课 Lec	课 内 实 验 Lab	实 验/ 科 研 实 践 Lab/Res.	研 讨 Dis	素 质 拓 展 Exp									
	20438400	专业文献阅读与写作（英文教学） Professional Literature Reading and Writing (Instructed in English)	2	32	16	16								2				
	20452600	大气科学前沿讲座 Seminars for Atmospheric Sciences	1	16	16										1			
	20426800	全球变化 Global Change	2	32	32										2			
	20426400	边界层气象学 Boundary Layer Meteorology	2	32	32										2			
	20428400	农业气象 Agricultural Meteorology	2	32	32										2			
	20443300	中国天气 The weather in China	2	32	32										2			
	20427100	海气相互作用 Air-Sea Interaction	2	32	32										2			
	20438500	地质灾害预报 Forecast of Weather-induced Geological Hazard	2	32	32										2			
	21210400	偏微分方程数值解 Numerical Solution of Partial Differential Equation	2.5	40	40										2.5			
	20426500	雷达气象学 Radar Meteorology	2	32	32										2			
	21932502	机器学习 B Machine Learning B	2	32	32		16								2			
	20442100	大气数值模拟 Numerical Simulation of Atmosphere	1	16	16											1		
	20443400	热带动力学 Tropical Atmosphere	3	48	48											3		
	20438700	冰冻圈科学概论 An Introduction to Cryosphere Science	2	32	32											2		
	20443500	城市气候学 Urban Climatology	1.5	24	24											1.5		
	20428200	应用气象学 Applied Meteorology	2	32	32											2		

注：全英课程须在课程名称后打*标出，通识教育选修课学分未列入具体学期，学院须根据学校创新创业自主学习学分认定一览表制订实施细则。

大气科学专业课程分类统计

Course Classifications and Statistics of Atmospheric Science

课程类别 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 Hours	学分总计 Total Credits
	必修	选修							
课内总学时/学分	580/31	192/12	812/45	416/26	272/17	41 周/34	80/5	2352 +41 周	170
学分所占比例	25%		27%	15%	10%	20%	3%		100%

大气科学专业辅修课程教学计划表

Course Descriptions of Atmospheric Science (Minor)

课程类别 Classification	课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
					课内学时		课外学时				一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
					讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp									
Disciplinary Fundamental Courses 学科基础课	20441500	大气科学导论 Introduction to Atmospheric Science	2	32	32			16					2					
	20427800	地球流体力学引论 An Introduction to Fluid Dynamics	3	48	48								3					
	20442200	大气物理学 Atmospheric Physics	3	48	48			16					3					
	20442300	大气探测 Atmospheric Sounding	2.5	40	40		8						2.5					
	20425500	大气化学 Atmospheric Chemistry	3	48	48								3					
	小计 Sum		13.5	216	216		8	32				2	11.5					
Main Specialty Courses 专业主干课	20442400	天气学 Synoptic Meteorology	3	48	48			16						3				
	20442900	古气候学 Paleoclimatology	2.5	40	40			8					2.5					
	20442600	气象统计方法 Meteorological Statistical Methods	2	32	32			8					2					
	小计 Sum		7.5	120	120			32					7.5					
Practical Work 实践环节	40443000	气象大数据可视化 Meteorological Big Data Visualization	2.5	2.5 周										2.5				
	41947500	Python 语言课程设计 A Python Language Course Projects A	1.5	1.5 周										1.5				
	小计 Sum		4	4 周										4				
总计 Total			25	336+4 周	336							2	11.5	7.5	4			

大气科学辅修专业课程分类统计

课程类别 统计	学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	实践环节 Practical Work	学时总计 Total Hour	学分总计 Total Credits
学时/学分	216/13.5	120/7.5	4 周/4	336+4 周	25
学分所占比例	54%	30%	16%		100%

