

# ATMOSPHERIC AND OCEANIC SCIENCES, B.A.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatelibrarytext>) section of the *Guide*.

General Education	<ul style="list-style-type: none"> <li>• Breadth–Humanities/Literature/Arts: 6 credits</li> <li>• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits</li> <li>• Breadth–Social Studies: 3 credits</li> <li>• Communication Part A &amp; Part B *</li> <li>• Ethnic Studies *</li> <li>• Quantitative Reasoning Part A &amp; Part B *</li> </ul>
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\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

### COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF ARTS (B.A.)

Students pursuing a bachelor of arts degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum.

#### BACHELOR OF ARTS DEGREE REQUIREMENTS

Mathematics Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.

Foreign Language	<ul style="list-style-type: none"> <li>• Complete the fourth unit of a foreign language; OR</li> <li>• Complete the third unit of a foreign language and the second unit of an additional foreign language.</li> </ul>
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L&S Breadth	<ul style="list-style-type: none"> <li>• 12 credits of Humanities, which must include 6 credits of literature; and</li> <li>• 12 credits of Social Science; and</li> <li>• 12 credits of Natural Science, which must include one 3+ credit Biological Science course and one 3+ credit Physical Science course.</li> </ul>
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Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced work	Complete at least 60 credits at the intermediate or advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW-Madison Experience	<ul style="list-style-type: none"> <li>• 30 credits in residence, overall; and</li> <li>• 30 credits in residence after the 86th credit.</li> </ul>
Quality of Work	<ul style="list-style-type: none"> <li>• 2,000 in all coursework at UW–Madison</li> <li>• 2,000 in Intermediate/Advanced level coursework at UW–Madison</li> </ul>

### NON-L&S STUDENTS PURSUING AN L&S MAJOR

Non-L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

### REQUIREMENTS FOR THE MAJOR

Code	Title	Credits
<b>Calculus (complete all):</b>		
MATH 221	Calculus and Analytic Geometry 1	5
MATH 222	Calculus and Analytic Geometry 2	4
MATH 234	Calculus--Functions of Several Variables	4
<b>Physics (complete one course from each group):</b>		
PHYSICS 207	General Physics	5
or PHYSICS 201	General Physics	
or PHYSICS 247	A Modern Introduction to Physics	
PHYSICS 208	General Physics	5
or PHYSICS 202	General Physics	
or PHYSICS 248	A Modern Introduction to Physics	
<b>Computer Sciences (complete one):</b>		
COMP SCI 220	Data Science Programming I	
COMP SCI 310	Problem Solving Using Computers	
COMP SCI 320	Data Science Programming II	
COMP SCI/ E C E 354	Machine Organization and Programming	
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/ I SY E/ MATH 425	Introduction to Combinatorial Optimization	

**Total Credits** 26

Code	Title	Credits		
<b>Core Sequence (complete all):</b>			MATH/ HIST SCI 473	History of Mathematics
ATM OCN 310	Dynamics of the Atmosphere and Ocean I	3	MATH/ COMP SCI/ STAT 475	Introduction to Combinatorics
ATM OCN 311	Dynamics of the Atmosphere and Ocean II	3	MATH 490	Undergraduate Seminar
ATM OCN 330	Physics of the Atmosphere and Ocean I	3	MATH 491	Topics in Undergraduate Mathematics
ATM OCN 340	Physics of the Atmosphere and Ocean II	3	MATH/ COMP SCI 513	Numerical Linear Algebra
<b>Quantitative Analysis (complete one): 3</b>			MATH/ COMP SCI 514	Numerical Analysis
COMP SCI 412	Introduction to Numerical Methods		MATH 519	Ordinary Differential Equations
COMP SCI/ MATH/STAT 475	Introduction to Combinatorics		MATH 521	Analysis I
COMP SCI/ MATH 514	Numerical Analysis		MATH 522	Analysis II
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization		MATH/ COMP SCI/I SY E/ STAT 525	Linear Optimization
MATH/STAT 309	Introduction to Probability and Mathematical Statistics I		MATH 531	Probability Theory
MATH/STAT 310	Introduction to Probability and Mathematical Statistics II		MATH 535	Mathematical Methods in Data Science
MATH 319	Techniques in Ordinary Differential Equations		MATH 540	Linear Algebra II
MATH 320	Linear Algebra and Differential Equations		MATH 541	Modern Algebra
MATH 321	Applied Mathematical Analysis		MATH 542	Modern Algebra
MATH 322	Applied Mathematical Analysis		MATH 551	Elementary Topology
MATH 331	Introductory Probability		MATH 552	Elementary Geometric and Algebraic Topology
MATH 340	Elementary Matrix and Linear Algebra		MATH 561	Differential Geometry
MATH 341	Linear Algebra		MATH 567	Modern Number Theory
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra		MATH 570	Fundamentals of Set Theory
MATH 376	Topics in Multi-Variable Calculus and Differential Equations		MATH/ PHILOS 571	Mathematical Logic
MATH 407	Topics in Mathematics Study Abroad		MATH 605	Stochastic Methods for Biology
MATH 415	Applied Dynamical Systems, Chaos and Modeling		MATH 607	Topics in Mathematics Study Abroad
MATH 421	The Theory of Single Variable Calculus		MATH/B M I/ BIOCHEM/ BMOLCHEM 609	Mathematical Methods for Systems Biology
MATH/ COMP SCI/ I SY E 425	Introduction to Combinatorial Optimization		MATH 619	Analysis of Partial Differential Equations
MATH/STAT 431	Introduction to the Theory of Probability		MATH 621	Introduction to Manifolds
MATH/ COMP SCI/ E C E 435	Introduction to Cryptography		MATH 623	Complex Analysis
MATH 441	Introduction to Modern Algebra		MATH 627	Introduction to Fourier Analysis
MATH 443	Applied Linear Algebra		MATH 629	Introduction to Measure and Integration
MATH 461	College Geometry I		MATH/I SY E/ OTM/STAT 632	Introduction to Stochastic Processes
MATH 467	Introduction to Number Theory		STAT/MATH 309	Introduction to Probability and Mathematical Statistics I
MATH/ CURRIC 471	Mathematics for Secondary School Teachers		STAT/MATH 310	Introduction to Probability and Mathematical Statistics II
			STAT 311	Introduction to Theory and Methods of Mathematical Statistics I
			STAT 312	Introduction to Theory and Methods of Mathematical Statistics II

STAT 324	Introductory Applied Statistics for Engineers
STAT 327	Learning a Statistical Language
STAT 333	Applied Regression Analysis
STAT 340	Data Science Modeling II
STAT 349	Introduction to Time Series
STAT 351	Introductory Nonparametric Statistics
STAT 360	Topics in Statistics Study Abroad
STAT 371	Introductory Applied Statistics for the Life Sciences
STAT 411	An Introduction to Sample Survey Theory and Methods
STAT 421	Applied Categorical Data Analysis
STAT/M E 424	Statistical Experimental Design
STAT/MATH 431	Introduction to the Theory of Probability
STAT 456	Applied Multivariate Analysis
STAT 461	Financial Statistics
STAT/COMP SCI 471	Introduction to Computational Statistics
STAT/COMP SCI/MATH 475	Introduction to Combinatorics
STAT 479	Special Topics in Statistics
STAT/COMP SCI/ I SY E/MATH 525	Linear Optimization
STAT/B M I 541	Introduction to Biostatistics
STAT/B M I 542	Introduction to Clinical Trials I
STAT/F&W ECOL/HORT 571	Statistical Methods for Bioscience I
STAT/F&W ECOL/HORT 572	Statistical Methods for Bioscience II
STAT 575	Statistical Methods for Spatial Data
STAT 601	Statistical Methods I
STAT 602	Statistical Methods II
STAT 605	Data Science Computing Project
STAT 609	Mathematical Statistics I
STAT 610	Introduction to Statistical Inference
STAT 615	Statistical Learning
STAT 627	Professional Skills in Data Science
STAT 628	Data Science Practicum
STAT/I SY E/MATH/OTM 632	Introduction to Stochastic Processes
STAT/B M I 641	Statistical Methods for Clinical Trials
STAT/B M I 642	Statistical Methods for Epidemiology
STAT 679	Special Topics in Statistics
STAT 681	Senior Honors Thesis
STAT 682	Senior Honors Thesis
<b>Capstone</b>	
ATM OCN 405	AOS Senior Capstone Seminar 1
<b>Electives 11</b>	
ATM OCN 401	Topics in Meteorology
ATM OCN 404	Meteorological Measurements

ATM OCN 425	Global Climate Processes
ATM OCN 441	Radar and Satellite Meteorology
ATM OCN 452	Synoptic Laboratory I: The Frontal Cyclone
ATM OCN 453	Synoptic Laboratory II: Mesoscale Meteorology
ATM OCN/ ENVIR ST 520	Bioclimatology
ATM OCN 522	Tropical Meteorology
ATM OCN/ ENVIR ST/ GEOG 528	Past Climates and Climatic Change
ATM OCN/ AGRONOMY/ SOIL SCI 532	Environmental Biophysics
ATM OCN/ ENVIR ST 535	Atmospheric Dispersion and Air Pollution
ATM OCN 573	Computational Methods in Atmospheric and Oceanic Sciences
ATM OCN 575	Climatological Analysis
ATM OCN 610	Geophysical Fluid Dynamics I
ATM OCN 611	Geophysical Fluid Dynamics II
ATM OCN 615	Laboratory in Rotating Fluid Dynamics
ATM OCN 630	Introduction to Atmospheric and Oceanic Physics
ATM OCN 637	Cloud Physics
ATM OCN 638	Atmospheric Chemistry
ATM OCN 640	Radiation in the Atmosphere and Ocean
ATM OCN 651	Synoptic-Dynamic Laboratory
ATM OCN 660	Introduction to Physical Oceanography
ATM OCN 681	Senior Honors Thesis
ATM OCN 682	Senior Honors Thesis
ATM OCN 691	Senior Thesis
ATM OCN 692	Senior Thesis
ATM OCN 698	Directed Study <sup>2</sup>
ATM OCN 699	Directed Study <sup>2</sup>

**Total Credits**
**27**

## RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all ATM OCN and major courses
- 2.000 GPA on 15 upper-level credits in the major, taken in Residence.<sup>3</sup>
- 15 credits in ATM OCN, taken on campus

## HONORS IN THE MAJOR

Students may declare Honors in the Atmospheric and Oceanic Sciences Major in consultation with the Atmospheric and Oceanic Sciences undergraduate advisor.

## REQUIREMENTS

To earn Honors in the Major in Atmospheric and Oceanic Sciences, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.300 University GPA
- Earn a 3.400 GPA for all ATM OCN courses, and all courses accepted in the major
- Complete the following additional coursework:
  - ATM OCN 610 or ATM OCN 611 and
  - ATM OCN 681 and ATM OCN 682 for a total of 6 credits

## FOOTNOTES

1

Note that core sequence begins in the fall semester only.

2

A maximum 2 credits of Electives may come from Internship or Directed Study courses.

3

ATM OCN 300 through ATM OCN 699 are upper-level in the major.

## UNIVERSITY DEGREE REQUIREMENTS

**Total Degree** To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.