

# **Bachelor of Science in Earth and Atmospheric Sciences**

## **Georgia Institute of Technology**

*(last revised February 19, 2009)*

Welcome to Earth and Atmospheric Sciences (EAS). In EAS, we are motivated by the desire to understand the world around us. Often dramatic events trigger our curiosity; events like the destruction of a tornado, the trembling of an earthquake, the health concerns over air pollution, the beauty of mountain ranges, or just the many ways our planet affects our lives. As an EAS major you will be joining us on a journey of discovery. Graduating from our major, you will be prepared for an interesting career and advanced studies in graduate school in the many facets of the Earth and Atmospheric Sciences.

This document contains

- 1. The requirements to receive your Bachelors of Science as an EAS major.**
- 2. Degree Options**
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## **1. Bachelor of Science in Earth and Atmospheric Sciences**

Georgia Tech requires 122 semester hours to receive a B.S. The following five sections list the courses required to receive a B.S. in EAS.

### **A. Institutional Core Courses - 41 hours**

- MATH 1501 Calculus I (4-0-4)\*
- MATH 1502 Calculus II (4-0-4)\*
- MATH 2401 Calculus III (4-0-4)\*
- MATH 2403 Differential Equations (4-0-4)\*
  
- PHYS 2211 Physics I (3-3-4)\*
- PHYS 2212 Physics II (3-3-4)\*
  
- CHEM 1310 General Chemistry (3-3-4)\*
- CHEM 1311 Inorganic Chemistry (3-0-3)\*
- CHEM 1312 Inorganic Chemistry Lab (0-3-1)\*
  
- BIOL 1510 or 1520 (3-3-4)\*
  
- CS 1371 Computing for Engineers (3-0-3)\*
  
- HPS 1040 Wellness (2-0-2)

\*To earn a B.S. in EAS, a grade of C or better is required

**B. EAS Core Courses - 30 hours**

EAS 1600 Intro to Environmental Science (3-3-4) [Fall, Spring]  
EAS 2600 Earth Processes (3-3-4) [Fall, Spring]  
EAS 2655 Quantitative Methods (3-0-3) [Spring]  
EAS 3603 Thermo of the Earth System (3-0-3) [Fall]

**Two of (with at least one being 3620 or 4740/4641)**

EAS 3620 Geochemistry (3-3-4) [Fall]  
EAS 3610 Introduction to Geophysics (3-0-3) [Fall]  
EAS 4655 Atmospheric Dynamics (3-0-3) [Fall]  
EAS 4740 Atmospheric Chemistry (3-0-3) and EAS 4641  
(0-3-1) [Spring]

**One of (Research Courses)**

EAS 4699 Undergraduate Research (0-9-3)  
EAS 4651 Practical Internship (0-9-3)

**Two of (Capstone Courses)**

EAS 4420 Environmental Field Methods (2-6-4) [Spring]  
EAS 4480 Environmental Data Analysis (3-0-3) [Spring]  
EAS 4610 Earth System Modeling (3-0-3) [Fall]

**C. EAS Technical Electives - 15 hours from the following<sup>1</sup>:**

EAS 1601 Habitable Planet (3-3-4) [Fall, Spring]  
EAS 2420 Environmental Measures (3-0-3) [Alternate Springs]  
EAS 2551 Intro. to Met. Analysis (0-3-1) [Spring]  
EAS 2750 Physics of the Weather (3-0-3) [Fall]  
EAS 2803cp Introduction to Space Weather (3-0-3)  
EAS 2803 Natural Hazards (3-0-3)  
EAS 4110 Energy, Resources and the Environment (3-0-3) [Fall]  
EAS 4200 Structural Geology (3-3-4) [Spring]  
EAS 4300 Oceanography (3-0-3) [Fall]  
EAS 4350 Paleoclimatology and Paleoceanography (3-0-3) [Spring]  
EAS 4410 Climate and Global Change (3-0-3) [Fall]  
EAS 4450 Synoptic Meteorology (2-3-3) [Spring]  
EAS 4460 Satellite and Radar Meteorology (3-0-3) [Fall]  
EAS 4470 Large-Scale Atmospheric Circulations (3-0-3) [Spring]  
EAS 4510 Exploration Geophysics (3-3-4) [Alternate Years]  
EAS 4515 Fluids in the Earth's Crust I (3-0-3) [Alternate Years]  
EAS 4520 Seismic Methods in Exploration Seismology  
(3-0-3) [Alternate Years]  
EAS 4602 Biogeochemical Cycles (3-0-3) [Spring]  
EAS 4625 Water Quality Modeling (3-0-3) [Spring]  
EAS 4651 Practical Internship in EAS (0-9-3)<sup>2</sup>  
EAS 4699 Undergraduate Research (0-9-3)<sup>2\*</sup>  
EAS 4795 Groundwater Hydrology (3-0-3)  
EAS 4801 Atmospheric Dynamics Lab (0-3-1) [Fall]  
EAS 4803jd Physical Volcanology (3-0-3) Spring  
EAS 4803cp Introduction to Space Physics (3-0-3) Spring  
EAS 4803zp Seismology (3-0-3) Fall  
EAS 4803kf Tectonics, Climate, and Landscape (3-0-3) Fall

EAS 4803an Geodynamics (3-0-3) Spring  
EAS 4803 YD Introduction to Weather Risk and Catastrophe Modeling (3-0-3) [Fall]  
CEE 4210 Hydrology (3-0-3) [Fall, Spring]  
CEE 4300 Environ. Eng. System (3-0-3) [Fall, Spring]  
CEE 4330 Air Pollution Engineering (3-0-3) [Fall]

1. Other courses may be TEs, if approved by the Undergraduate Coordinator. See handbook for details.
2. Six hours total of 4699 and 4651 are permitted toward EAS major.

**D. Humanities and Social Science – 24 hours**

See “Core Curriculum” in the Information for Undergraduates in the Georgia Tech General Catalog for the required courses in Humanities and Social Science.

**E. Free Electives – 11 hours**

Additional hours of free electives are needed to reach a total of 122 hours as required for a B.S. degree.

## 2. Degree Options in Earth and Atmospheric Sciences

- a) **Research Option**
- b) **Business Option**
- c) **International Plan**
- d) **5 year BS/MS program**

**a) Research Option**

The BS in Earth and Atmospheric Sciences with Research Option allows a student to emphasize their interest in research. To complete Research Option in the School of Earth and Atmospheric Sciences, students must:

- Complete at least 9 units of undergraduate research over at least two, preferably three terms
- Research may be for either pay or credit. To get credit towards completion of research option for research for pay, students must be registered for the appropriate audit-only, research for pay class (EAS 2698 or 4698).
- Take the class LCC 4700: Writing an Undergraduate Thesis
- Taken prior to or during the thesis-writing semester
- Write an undergraduate thesis/report of research on their findings.
- To submit your intent form to Undergraduate Research Opportunities Program (UROP), please go to the web form at <http://undergradresearch.gatech.edu/intentForm.php> This form must be completed and can also be reached from the main UROP webpage.

**b) EAS BS with Business Option**

The EAS B.S. degree will be granted with Business Option if the following courses are taken along with the EAS major requirements:

- Management 3000: Accounting for Decision Making (3-0-3)
  - Management 3300: Marketing Management I (3-0-3)
  - Management 3150: Principles of Management (3-0-3) or new Management capstone course
  - Economics 2106: Principles of Microeconomics (3-0-3)\*
  - Psychology 2220: Industrial/Organizational Psychology (3-0-3)\*
- \*also a social science elective in the Institute core

Business Option students may apply the Management courses towards 6 of the 15 hours of technical electives (substitution only for Business Option students). The other 9 must include 2 EAS courses.

**c) International Plan**

The EAS with International Plan (EAS-IP) is designed to give a student a solid, global competence within the context of an Earth and Atmospheric Science degree.

The major course requirements are the same for both EAS and EAS-IP. Where they differ is that for the EAS-IP degree, a student:

- Spends twenty-six weeks abroad engaged in any combination of study abroad, research, or internship.
- Take the Social Science/Humanities electives in targeted areas:
  - International relations
  - Global economics
  - A course about a particular country or region
- Complete the equivalent to two years of college-level language study.
- Complete a capstone course that combines their global experience with their EAS degree.

\* See Georgia IP requirements for the different options:

[www.internationalplan.gatech.edu/students/requirements.html](http://www.internationalplan.gatech.edu/students/requirements.html)

**d) EAS Five Year BS/MS Program**

EAS offers a 5-year BS/MS Program. EAS majors may apply to the BS/MS program after completing at least 30 semester credit hours at Georgia Tech with a GPA of at least 3.5.

Students admitted to the program must maintain a cumulative GPA of at least 3.0.

As part of the program, students may use up to six credit hours of graduate-level course work in the major discipline for both degrees.

To apply, complete the [BS/MS application form](#), a biographical statement, and two letters of recommendation. For more information contact [Dr. Dana Hartley](#), Director of Student Affairs, 404-894-3991.

### 3. Undergraduate Research

We feel strongly that getting to do research is a very exciting part of your undergraduate experience in EAS. While it is important that you graduate with a strong sense of understanding the earth around you, we also want you to leave our major with a strong sense of how science is done in this field and what this means for your future endeavors. Our senior courses are designed to give you experience in posing and solving research questions. However, we highly encourage doing research with faculty prior to your senior year.

Research can be done for credit or for pay. Research stipends are available through:

- Individual faculty grants
- Rutt Bridges Research Fellowship (a one page proposal and letter from faculty mentor – due in February for the following summer)
- Presidents Undergraduate Research Award (a one page proposal and letter from faculty mentor - due the semester prior to research semester. See [www.urop.gatech.edu](http://www.urop.gatech.edu) for details and deadlines.

## 4. Academic Advising

Academic advisors in EAS are there to help you plan your courses and research activities. Dr. Dana Hartley (Undergraduate Coordinator, [hartley@eas.gatech.edu](mailto:hartley@eas.gatech.edu)) is available for all advisement issues. Kathy Plummer can help you with course planning and degree petitions ([kathy@eas.gatech.edu](mailto:kathy@eas.gatech.edu)). You may also select any faculty member to act as your advisor.

Please be aware that the Undergraduate Coordinator (Dr. Dana Hartley) has final approval for all petitions, substitutions and deviations from the standard undergraduate program. Kathy Plummer gives the permits and overloads for courses.

## 5. Awards and Honors

### a) Quarter Century Award

Each year this award is granted to the most outstanding senior in the School of EAS. The award is based on GPA and the quality of work such as a term paper, project report, research report, or report on an internship done off campus.

### b) Rutt Bridges Undergraduate Fellowship

Rutt Bridges is an alum of EAS who has donated money to make sure support is available for students interested in doing research. Up to a \$4,000 stipend is available for a summer internship or for part-time over the year. The stipend is applied for in February by writing a short proposal with an accompanying letter of support from the mentoring faculty. See Dr. Dana Hartley ([hartley@eas.gatech.edu](mailto:hartley@eas.gatech.edu)) for more details.

### c) Gamma Alpha Tau Environmental Science Honor Society

Gamma Alpha Tau seeks to recognize undergraduate excellence in the environmental sciences with emphasis on extracurricular scholastic activities. Dr. Greg Huey is the current faculty advisor. Induction is based on:

1. The top 25% of EAS juniors and seniors are eligible (extracurricular activities considered)
2. A maximum of 25% of the EAS juniors and seniors can be inducted

## 6. EAS Minor

The EAS minor is 18 semester hours of which 12 semester hours are advanced upper level (3000 level or above) courses. Note that minors are available only to non-majors. Courses required by name in a student's major may not be used in satisfying the course requirements for a minor. Substitutions may be made with advance approval of the Undergraduate Coordinator, Dr. Dana Hartley ([hartley@eas.gatech.edu](mailto:hartley@eas.gatech.edu)).

### A. Minor Requirements

One of:

- EAS 2600 Earth Processes
- EAS 2750 Physics of the Weather (3-4 units)

Two of:

- EAS 3620 Geochemistry
- EAS 4630 Geophysics
- EAS 4740 Atmospheric Chemistry
- EAS 4655 Atmospheric Dynamics
- EAS 4420 Environmental Field Methods (6-7 units)

One of:

- EAS 4610 Earth Systems Modeling
- EAS 4602 Biogeochemical Cycles (3 units)

AND

4-6 units of other EAS courses (to reach a total of 18 for the minor)

Undergraduate Research (4699) and/or Practical Internships (4651) are particularly appropriate for field or laboratory studies related to a student's area of interest. Only three hours total of such courses will normally be permitted toward the minor.

## **6. EAS Certificates**

The School of Earth and Atmospheric Sciences offers Certificates in Geochemistry and in Geophysics to qualified students from other Georgia Tech units. Note that certificates are available only to non-majors. Courses required by course name and number in a student's program of study may not be credited by that student toward any certificate. Courses counting toward a certificate must be taken on a letter grade basis, and a grade of C or better must be received in each course.

### **A. Certificate in Geochemistry**

The Geochemistry Certificate offers recognition to students who have completed a coherent set of courses designed to provide background for employment in industries using environmental chemistry or for entrance to graduate school.

Required courses:

- EAS 2600 Earth Processes
- EAS 3603 Thermodynamics
- EAS 3620 Geochemistry

At least one additional course (3 semester hours minimum) selected from:

- EAS 4300 Oceanography
- EAS 4420 Environmental Field Methods
- EAS 4602 Biogeochemical Cycles
- EAS 4610 Earth Systems Modeling
- EAS 4620 Environmental Biogeochemistry of Soils and Sediments

### **B. Certificate in Geophysics**

The geophysics certificate offers recognition to students taking a coherent set of courses designed to provide background for employment in industries that use geophysics or for entrance into graduate programs.

Required courses:

- EAS 2600 Earth Processes
- EAS 3610 Geophysics

Two additional courses selected from:

- EAS 4200 Structural Geology and Continuum Mechanics
- EAS 4420 Environmental Field Methods
- EAS 4510 Exploration Geophysics
- EAS 4515 Fluids in the Earth's Crust I
- EAS 4520 Seismic Methods in Exploration Geophysics
- EAS 480X Special Topics in Geophysics (preapproved)