

**Major and Minor in  
Global Environmental Change and Sustainability (GECS)**

Department of Earth and Planetary Sciences,  
Johns Hopkins University

*April 2009*

**Overview**

A new interdisciplinary major and minor in Global Environmental Change and Sustainability (GECS) will be starting Fall 2009 (pending MHEC review & endorsement).

The GECS major and minor are interdepartmental programs introducing students to the science of the Earth and its living and nonliving systems as well as how humans interact with Earth and its natural systems and how humans can use powerful tools, such as policy and communication to harm or help those systems. The goals are to advance awareness of the magnitude and consequences of these issues and to train the next generation of problem-solvers who will address the effects of global environmental change. Students' backgrounds are typically specialized within traditional disciplines; a primary purpose of this major is to develop the ability of students to venture beyond the confines of those disciplines. Students will be exposed to theory, research, and the practical applications of both throughout their coursework.

**Curriculum for Major**

The major in GECS will provide all of its students with a solid background in the study of both the environmental science and social science of our changing world with the core requirements for all majors. After completing the core requirements, students will be allowed to choose either the Science or Social Science concentration for more in-depth study in their area of greater interest. While allowing students to concentrate, however, both concentrations will continue to require some courses in both environmental science and social science; the proportion will depend on the concentration.

A key component of the GECS major will be senior projects, internships, and field trips that will give students “hands on” experience. These projects could be coordinated with other activities at JHU, including those of the Hopkins Sustainability Committee, and could also lead to greater outreach activities.

To further enhance the students' perspective of the global nature of the issues and differences in world views of different cultures, the major will cultivate and nurture relationships with international institutions to provide a variety of culturally and academically challenging opportunities abroad to augment the JHU experience.

**Course Requirements:**

Requirements for the major will include a total of 23 or 24 courses and 78 or 75 credits respectively, depending on the concentration. These can be selected from a diversity of offerings available from different departments. GECS major students must take a “core”

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of 12 courses listed in Table 1 that will provide them with the foundations of global environmental science and sustainability. Core courses are offered through E&PS, Mathematics, Economics, Chemistry, Engineering, Psychology, Sociology, and Political Science. For electives, the major draws upon additional pertinent course offerings from these departments as well as from Anthropology, Biology, Physics, and History. Economics, Sociology, and Political Science are relevant to global environmental change and sustainability, both in their contributions to the problems we face and in their potential contributions to solutions to achieving sustainability. JHU is fortunate to have many courses from these disciplines with vitally relevant content. As such, these three disciplines contribute the majority of the Social Science Elective courses.

1. Core courses: 12 core courses required for all GECS majors are listed in Table 1 below.
2. Science Concentration core courses are listed in Table 2 below. In addition to these Science Concentration core courses, students choosing this concentration must take an additional 2 upper-level courses from Table 3: Major Electives in Earth and Environmental Science and 4 courses from Table 4: Major Electives in Social Sciences, 2 of which must be upper-level.
3. Social Science Concentration majors must take 2 courses from Table 3: Major Electives in Earth and Environmental Science, at least 1 of which must be upper-level, and 10 courses from Table 4: Major Electives in Social Sciences, at least 6 of which must be upper level.
4. Because GECS is inherently interdisciplinary, students fulfill the University's distribution requirements by completing the requirements for the major.
5. Capstone Experience
  - a) Majors will be required to complete a senior capstone experience in conjunction with the Director and relevant faculty. The capstone will consist of a senior project, based on research, internship, or independent study, and will be a demonstration of integration and synthesis of knowledge and skills obtained during the 4-year program.
  - b) Majors will be encouraged to begin planning their capstone experience during their junior year and will be required to submit a proposal by the end of September of their senior year. Subsequent milestones will be designated throughout the senior year to ensure that all majors are making satisfactory progress on their projects.
  - c) Prerequisites for the capstone course include current status as GECS Major, completion of all core courses, and an acceptable plan for completing all requirements for the major by end of the senior year, or approval of Director.
  - d) Credit for work in earlier terms using standard research, internship, or independent study courses can be applied to the capstone experience.
  - e) All majors will make an oral presentation about their capstone experience to involved faculty, advisors, and parents at the end of their senior year.

### Honors Program:

Majors with a GPA of 3.5 or above through their junior year will be eligible to do an honor's thesis as part of their capstone project. Successful completion of the honor's thesis will result in the conferring of a B.A. with Honors.

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**Table 1: Required Courses for all GECS Majors:**

<b>Course Number</b>	<b>Course Title</b>	<b>Instructor</b>	<b>Credits, (category), prerequisites</b>
270.103	Intro. to Global Environmental Change	Szlavec /Olson	3(N)
270.107	Introduction to Sustainability	Parker	3 (N)
030.101/105	Chemistry I + lab	Staff + Pasternack	3 + 1 (N)
110.106/108	Calculus I	Staff	4 (Q)
180.102	Microeconomics	Hamilton	3 (S) same as .101
270.501	Capstone Seminar for GECS Majors	Parker	3 (N)
Choose 1 of:			
550.111	Statistical Analysis I	Fishkind, Torcaso	4 (Q,E)
280.345	Introduction to Biostatistics	Staff	4 (Q) 3 yrs high school math
230.205	Introduction to Social Statistics	McDonald	4 (S,Q)
Choose 2 of:			
190.102	Intro Comparative Politics	Blyth, Tsai	3 (S)
190.209	Contemporary International Politics	David	3 (S)
190.211	Intro to Political Economy	Blyth	3 (S)
190.213	International Politics	Deudney	3 (S)
Choose 2 of:			
270.308	Population and Community Ecology	Szlavec	3 (N) none
270.360	Climate: Science & Policy	Waugh	3 (N) none
270.320	The Environment & Health	Kensler	3 (N)
Choose 1 of:			
200.101	Introduction to Psychology	Drigotas, Holland	3 (S)
200.133	Introduction to Social Psychology	Drigotas	3 (S)
230.101	Introductory Sociology	Staff	3 (S)
230.150	Issues in International Development	Agarwala	3 (S)

**Table 2: Science Concentration Core Courses**

<b>Course Number</b>	<b>Course Title</b>	<b>Instructor</b>	<b>Credits, (Category), prerequisites</b>
110.107/9	Calculus II	Staff	4 (Q)
030.102	Chemistry II + lab	Staff	4 (N)
270.307	Geoscience Modeling	Haine	3 (N,Q)
Choose 2 of:			
171.101/103	Physics I + lab	Staff	5 (E,N)
171.102/104	Physics II + lab	Staff	5 (E,N)
020.151 +.153	Biology I + lab	McCarty, Pearlman, Shingles	4 + 1 (N)
020.152 + .154	Biology II + lab	McCarty, Pearlman, Shingles	4 + 1 (N)
2 courses from <b>Table 3: Earth and Environmental Science Electives</b> ; both must be upper level			
4 courses from <b>Table 4: Social Science Electives</b> ; and at least 2 must be upper level			

**Social Science Concentration**

2 courses from **Table 3: Earth and Environmental Science Electives**; at least 1 must be upper level

10 courses from **Table 4: Social Science Electives**; at least 6 must be upper level

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**Table 3: GECS Electives in Earth and Environmental Science<sup>#</sup>**

Course Number	Course Title	Instructor	Credits, (Category), prerequisites
270.104	History of the Earth and Its Biota	Hinnov	3 (N)
270.108*	Oceans and Atmospheres	Haine, Waugh	3 (N)
270.220	The Dynamic Earth: An Introduction to Geology	Veblen, Ferry	3 (N) 030.101 or 171.101-102
270.308*	Population and Community Ecology	Szlavec	3 (N)
270.315	Principles of Natural Catastrophes	Olson	3 (N)
270.320	Environment and Health	Kensler	3 (E)
270.332	Soil Ecology	Szlavec	3 (N) 270.308 or Instructor's permission
270.360	Climate: Science and Policy	Waugh	3 (N)
270.369	Geochemistry of Earth and Environment	Sverjensky	3 (N)
270.377	Climates of the Past	Hinnov	3 (?) 270.120 or Instructor's permission
270.3xx	Combining Models and Measurements	Haine	3 (N,Q)
360.236	Ecuador and Galapagos Islands	Fortune	3
420.633*	Introduction to GIS	Staff	3 (?)
570.108	Introduction to Environmental Engineering	Ellis, Alavi	3 (E)
570.239	Current/Emerging Environmental Issues	Roberts	3 (E,N) Chem II
570.328	Geography and Ecology of Plants	Brush	3 (N)
570.353	Hydrology	Hilpert	3 (E) diff equations, fluid mechanics
570.395	Principles of Estuarine Environment: The Chesapeake Bay	Brush	3 (N)
570.411	Environmental Microbiology	Ward/Bouwer	4
570.424	Air Pollution	Ellis	3 (E)
570.443	Aquatic Chemistry	Stone	3 (E,N) 1 yr each chem & calc.

\*These courses satisfy requirements for the MSc in Environmental Sciences and Policy

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**Table 4: GECS Electives in Social Sciences<sup>#</sup>**

<b>Course Number</b>	<b>Course Title</b>	<b>Instructor</b>	<b>Credits, (Category), prerequisites</b>
070.132	Invitation to Anthropology	Das	3 (H,S,W)
070.219	Anthropology and Public Action	Guyer	3 (H,S,W)
070.327	Poverty's Life: Anthropologies of Health and Economy	Han	3 (H,S,W)
140.302	Rise of Modern Science	Kingsland	3 (H,S)
140.360	Changes in the Land: Science, Technology, and the American Environment	Kingsland	3 (H,S,W)
180.101	Elements of Macroeconomics	Maccini, Ball	3 (S)
180.215	Game Theory and the Social Sciences	Young	3 (S)
180.227	Economic Development	Gersovitz	3 (S) 180.101-102
180.231	Comparative Economic Systems	Morgan	3 (S) 180.101-102
180.241	International Trade	Staff	3 (S) 180.101-102
180.252	Economics of Discrimination	Morgan	3 (S) 180.102
180.266	Financial Markets and Institutions	Fohlin	3 (S)
180.280	Population Economics	Staff	3(S) 180.101-102
180.301	Microeconomic Theory	Staff	4.5 (S) 180.101-102 OK concurrent with 180.102, Calculus 110.106 or permission of Instructor
180.302	Macroeconomic Theory	Ball, Maccini	4.5 (S) same as above
180.311	Intro to Economics of Uncertainty and Information	Karni	3 (S) 180.301
180.365	Public Finance	Carroll	3 (S) 180.301
190.101	Introduction to Comparative Politics	Keck, Tsai	3 (S)
190.209	Contemporary International Politics	David	3 (S)
190.211	Introduction to Political Economy	Blyth	3 (S)
190.213	International Politics	Deudney	3 (S)
190.304	Introduction to Public Policy	Sheingate	3 (S) upper-level students
190.309	Politics and Policy Design	Teles	3 (S)
190.316	An Introduction to Globalization	Hazbun	3 (?)
190.323	Introduction to International Law	Grovogui	3 (S)
190.363	Politics of International Development	Tsai	3 (S,W)
190.411	Environment and Development in the Third World	Keck	3 (S,W)
195.477-	Introduction to Urban Policy: Seminar and	Newman	3 seminar

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478	Internship		3 internship
200.133	Introduction to Social Psychology	Drigotas	3 (S)
200.205	Behavior Modification	Fogel	3 (S)
200.343	Motivation	Petri	3 (S,N)
220.146	Introduction to Science Writing	Finkbeiner	3 (H,W)
230.101	Introductory Sociology	Staff	3 (S)
230.150	Issues in International Development	Agarwala	3 (S)
230.213	Social Theory	Andreas	3 (S,W)
230.306	Economic Sociology	Arrighi	3 (S)
230.313	Space, Place, Poverty, and Race: Sociological Perspectives on Neighborhoods and Public Housing	DeLuca	3 (S,W)
230.335	Political Sociology	Silver	3 (S)
230.342	Gender and International Development	Agarwala	3 (S)
230.349	Globalization and Social Movements	Silver	3 (S)
230.391	Theories of International Development	Silver, Arrighi	3 (S)
420.614*	Environmental Policymaking	Staff	3
420.656*	Environment Impact Assessment and Decision Methods	Staff	3
570.109	Environment and Society: Towards Sustainability	Norman	3 (E,N)
570.334	Engineering Microeconomics	Norman	3 (S) Calc III or permission of instructor
570.404	Political Ecology	Schoenberger	3
570.406	Environmental History	Schoenberger	3 (H,S)
570.427	Natural Resources, Society and the Environment	Schoenberger	3 (S)

#The list of acceptable Social Science Electives will be reviewed and updated annually by the Director, with guidance from the Advisory Committee. Courses no longer taught will be removed and new courses will be added. Relevant courses not included in the elective list may be able to be substituted for an elective with approval of the Director. Students wishing to make such a substitution should submit a substitution request in writing via email to the Director explaining the justification for the substitution and include the syllabus from the proposed course.

**Curriculum for Minor**

The GECS minor consists of seven courses (Table 5). All minors are required to take two core courses: Intro to Global Environmental Change provides the necessary content about the science of the Earth and its environments and Intro to Sustainability covers a thorough overview of the interactions between humans and the Earth’s systems and how those interactions could become sustainable. Students then have a choice of one of three other science courses that further explores a subset of interactions of humans with Earth’s living and nonliving systems, depending on the student’s area of interest. Students must choose two more courses from the list of Earth and Environmental Science Electives (Table 2) and two more courses from the list of Social Science Electives (Table 3). At least one course from each elective list must be upper level. A total of five Earth and Environmental Science courses provide the science basis of the minor, which is then rounded out with two relevant Social Science courses. Because students will be acquiring the methodological tools of their major discipline, this curriculum removes the science methodology required in the GECS major, while keeping the most important core content.

**Table 5: Required Courses for GECS Minor**

<b>Course Number</b>	<b>Course Title</b>	<b>Instructor</b>	<b>Credits, (category), prerequisites</b>
270.103	Intro. to Global Environmental Change	Szlavec /Olson	3(N)
270.10X	Introduction to Sustainability	Parker	3 (N)
Choose 1 of:			
270.308	Population and Community Ecology	Szlavec	3 (N) none
270.360	Climate: Science & Policy	Waugh	3 (N) none
570.320	The Environment & Health	Kensler	3 (N)
2 courses from <b>Table 3: GECS Electives in Earth and Environmental Science</b> ; at least 1 must be upper level			
2 courses from <b>Table 4: GECS Electives in Social Sciences</b> ; at least 1 must be upper level			

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