

STUDENT HANDBOOK

PH.D. PROGRAM IN EARTH AND ENVIRONMENTAL SCIENCES

Including:

Specialization in Environmental and Geological Sciences

Specialization in Geography

GRADUATE SCHOOL OF THE CITY UNIVERSITY OF NEW YORK

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STUDENT HANDBOOK: Ph.D. Program in Earth and Environmental Sciences

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EES Student Handbook

1. PREFACE

This handbook summarizes the requirements and procedures that you need to know as a Ph.D. student in the Earth and Environmental Sciences Program (EES). It is an informal document that compiles information contained in the Graduate School Bulletin and Graduate School Student Handbook regarding both the general requirements for the Ph.D. degree in Earth and Environmental Sciences, and the more specific requirements for the two specializations: 1, environmental and geological sciences; and 2, geography. The 2009-2011 Bulletin of the Graduate Center and the Student Handbook 09-10, together with the minutes of the Executive Committee of the Ph.D. Program in Earth and Environmental Sciences are authoritative statements of the policies and regulations that govern the Ph.D. Program. The purpose of this handbook is to assist you to navigate the path through the program. You should be aware of changes in the program which have been approved by the Executive Committee of the EES, and are available in the Program office. The Executive Officer should be consulted if you are unsure of your status in the Program.

2. INTRODUCTION

From its inception in 1983, the Doctoral Program in Earth and Environmental Sciences has identified itself with promoting teaching and research in the study of the earth. With faculty in atmospheric sciences, environmental sciences, geography and geology, the Earth and Environmental Sciences Program at CUNY spans a broad array of subjects focusing on the earth, its environments, human activities, and the linkages among them. Our students have the unique opportunity to study both the physical and human environments simultaneously, or to focus on specific subjects within the program's specializations.

EES Student Handbook

Students entering the Ph.D. Program in Earth and Environmental Sciences select either the specialization in Geography or the specialization in Environmental and Geological Sciences, but are encouraged to consider courses across the program. Although there is a common structure to both programs, the curricular requirements differ. This handbook describes in detail both the elements that are common to the Ph.D. Program in Earth and Environmental Sciences and those that differ between the two specializations.

Geography provides an opportunity to pursue doctoral studies in one of the world's largest and most dynamic metropolitan locations with a diverse faculty at the Graduate Center and at Hunter and Lehman Colleges within the CUNY system. The program has six core areas: Cities and Urban Processes, Physical Geography, Globalization and Uneven Development, Productions of Nature, Geographic Information Science and Spatial Methods, and Health Geographies.

Cities and Urban Processes. Located in the heart of Manhattan, the program aims to combine a general understanding of the role of cities in regional, national and international developments with deep analysis of the elements that make the city what it is: the built environment, transportation systems, migration flows, ethnic and religious differentiation, and the cultural, economic, and social uses of space. Within the varying frameworks of location theory, political economy, and political ecology, faculty research encompasses transportation system modeling, retail and consumption patterns, business location (including financial services), urban governance and administration, the role of philanthropic institutions and NGOs, social differentiation, transnational migration, gentrification, economic practices of the household, the environmental impacts of

urbanization and sustainable urban development, climate change, urban health, social movements, public space and privatization of urban space, urban daily life, the ongoing urban transformation, and the dynamics of interregional and inter-urban relations in their global context. Social theorists examine the production of space and questions of race, gender, class and ethnic differentiations in the urban and regional context.

Physical Geography. Studies of the physical environment, at all spatial and temporal scales, have always been important. In the context of environmental problems facing humanity in the twenty-first century, an appreciation of the earth system, including all its components and their interactions, is even more critical. To understand, mitigate, and/or adapt to any significant environmental problem, from urban pollution to global climate change, an interdisciplinary approach including aspects of physical science working in conjunction with other disciplines is usually essential. Faculty members in Physical Geography, with colleagues in Environmental and Geological Sciences, are conducting research in a diverse array of fields, including climatology, geology, atmospheric sciences, oceanographic sciences, and remote sensing of the earth's environment. Research projects focus on sub-disciplines such as geochemistry, paleoclimate, land-surface interactions, hydrology, climate change, and cryospheric studies. Students are encouraged to avail themselves of opportunities to work on research projects with CUNY faculty, as well as with experts from other institutions. Many students are currently working in one of our active laboratories, including a geochemistry laboratory, a computer-based environmental geosciences laboratory, and a climate laboratory. Our students have participated in the NOAA-CREST (National Oceanic and Atmospheric Administration's Cooperative Remote Sensing Science and Technology Center) program, of which CUNY is one of the

lead institutions. NOAA-CREST is a partnership between government, academe, and industry to conduct research consistent with NOAA's missions of environmental assessment, prediction, and stewardship using a variety of modern techniques.

Globalization & Uneven Development. A critical investigation of globalization and uneven development is an important focus of the program. Globalization is viewed as a multifaceted process that consists of economic, cultural, and political developments. Its outcomes and challenges to it are studied in many contexts including global North and South as well as a post-socialist world.

Productions of Nature. Nature does not stand outside of history; indeed it is continuously made and re-made within the complex of socio-spatial relationships that constitute human collectivities. While people have long modified nature for human ends, with capitalism this material transformation of nature now extends from the molecular to the planetary. Agricultural landscapes, managed forests, fish farms, genetically modified organisms, and built environments are all hallmarks of this 'second nature'. So thoroughgoing is this production of nature that even the 'natural' existence of our own bodies is no longer self-evident. But production of nature is not to be confused with control over nature. The re-arranging of matter that is involved in producing nature can lead to novelty-by-combination and unexpected ecological outcomes – such as acid rain, avian flu, or global warming – that can thwart human design. More positively, the production of nature foregrounds the political and resolutely geographic character of justice: to the extent that human wellbeing is premised on nature being 'available' in particular ways, some deeply iniquitous and some more equal, the question becomes how we produce nature and who controls this production of nature.

Geographic Information Science and Spatial Methods. Geographic information science and spatial methods deals with the development and applications of the concepts, principles, models, methods, and technologies for gathering, processing, and analyzing geographically referenced data, and effectively communicating the derived information to scientists, engineers, legislators, managers, and the general public for judicious and timely spatial decision-making. Program faculty have active research programs in spatial analysis, GIS programming, participatory GIS, critical GIS, global positioning systems, and remote sensing. The program covers the theoretical aspects and technical issues using as well as a wide range of applications. Particular emphasis is placed on the representation, visualization and communication of spatial information; models, algorithms and methodologies for efficient extraction of spatial information from remotely sensed data; spatial statistics and analysis; collaborative spatial decision-making; and innovative applications of geographic information technologies in environmental and resource management, urban and regional planning, international development, public safety, human health, and policy analysis.

Health Geographies. Health Geographies focuses upon the spatiality of disease and other public health issues, particularly health in the urban environment. It explores the intersection of population geography, ecological studies, community health research, epidemiology, environmental analysis, and hazard and risk assessment. The influence of environmental and socio-economic factors upon health are examined in a geographical context, including patterns of health disparities and inequities; environmental health justice; environmental burdens and impacts; differential access to health care and healthy lifeways; the impact of the built environment upon health outcomes; linking health outcomes with

social and physical environments; the relationship between social capital and health; patterns of disproportionate vulnerability, exposure, and risk; local-scale and global health inequalities; migration and health; the provision and utilization of health services, the geographies of disease, illness, disability, and specific gender and age health issues. Health is studied from a geographical perspective through the relevant theory, methodologies and research, using both qualitative and quantitative methods, including GISc, spatial analysis, and geostatistics. The theoretical framework can include the positivist, social interactionist, structuralist, and post-structuralist approaches to the geographies of health. Doctoral students and faculty in Health Geographies share research interests with those in the Urban Environments and Public Health core area within the specialization in Environmental and Geological Sciences.

Environmental and Geological Sciences offers research opportunities in a broad spectrum of Earth-focused science, including topics of classical Geology; studies of Earth's fluid envelopes; and applying combinations of geology, biology, chemistry, and physics to studying Earth's diverse environments and their ecosystems. The program has four core areas: Atmospheric and Hydrologic Sciences; Terrestrial, Estuarine, and Marine Studies; Earth Materials and Earth Processes; and Urban Environments and Public Health.

Atmospheric and Hydrological Sciences addresses the two fluid envelopes that support life on Earth. CUNY faculty members are leaders in studies of weather, climate and hydrology. Our studies in paleoclimatology not only help with understanding the Earth's climate history, but also can provide clues to what the future holds in store. Current research projects include: development of the history of hurricanes, isotope distributions within

hurricanes, remote sensing of atmospheric pollutants, surface enhanced zeolites in groundwater treatment facilities, and paleoclimates recorded in the sediments below Antarctic ice shelves.

Terrestrial, Estuarine and Marine Studies is designed for students interested in a wide range of environmental sciences encompassing both basic and applied research. TEMS research emphasizes physical, biological, geochemical and ecological interactions. TEMS offers opportunities for research in one of the world's most densely populated areas, including impacts of urbanization, climate change and invasive species on a variety of areas such as Long Island Sound and of the Hudson River Estuary. World-wide, studies include: impacts of changing atmospheric chemistry on forests of the Upper Midwest; global change and the intensification of Gulf hurricanes; the role of post-glacial climate change and rising sea level in the flooding of Eurasian inland seas; and arsenic contamination of South Asian water supplies.

Earth Materials and Earth Processes comprises topics that have traditionally resided in classically oriented Geology programs but are increasingly incorporated in modern, broad-spectrum studies of urban and rural environments. These include mineralogy and petrology; sedimentology and stratigraphy; paleontology and paleoecology; tectonics; geomorphology; geochemistry; geochronology; seismology and other areas of geophysics; and resource exploration and development. Such work not only advances the frontiers of these disciplines but also improves our understanding of the factors controlling environment and environmental change.

Urban Environments and Public Health focuses on the environmental, geological, and geomedical aspects of urban life. Current research in this core area includes studies of: the

effect of New York City power station effluents on fish populations; monitoring of heavy metal and organic compounds in benthos/bottom sediment/water in New York City estuaries; repopulation of native species in New York coastal waters; the epidemiology and risk assessment of asbestos, arsenic, silica, talc, polychlorinated biphenyls, and cigarette smoke in human populations. Doctoral students and faculty in Urban Environments and Public Health share research interests with those in the Health Geographies core area within the specialization in Geography.

3. GENERAL INFORMATION FOR THE CUNY GRADUATE CENTER

ADMISSIONS REQUIREMENTS

(Bulletin of the Graduate Center of the City University of New York, 2009-2011, pp. 17 ff).

Scholastic Requirements

Depending upon the intended doctoral program, an applicant must have earned a bachelor's from an accredited institution whose requirements for the degree are substantially equivalent to those of the City University. In addition, the applicant must complete the prerequisites specified by the program, submit evidence that he or she shows promise of ability to carry out research, and be approved by the admissions committee of the program in which he or she intends to specialize.

Requirements for International Students

Graduates of foreign colleges and universities who meet the standards of admission equivalent to

those described above may be considered for admission to the City University's doctoral programs. The applicant must present authoritative evidence of sufficient competence in the English language to pursue a regular course of study at the City University. An applicant who has not studied in an English-speaking country must take the Test of English as a Foreign Language (TOEFL), administered internationally by Educational Testing Service, and request ETS to report examination results directly to the Admissions Office, the City University Graduate Center, 365 Fifth Avenue, New York, NY 10016. Inquiries concerning this examination may be made to: Test of English as a Foreign Language, Box 6151, Princeton, NJ 08540, U.S.A. or to most American embassies and consulates.

A student residing alone in New York City should have about \$31,000 for the year to cover tuition, books, room, board, and personal expenses. University assistance for which international students are eligible to compete is limited and may not be adequate to fund the student's total expenses. Before receiving a visa for entrance into the United States, students must certify (documentary evidence is required) that they will have sufficient support for the entire period of their stay in the United States while pursuing a full-time program.

Transfer of Credit

A maximum of 30 acceptable graduate credits taken prior to admission to the doctoral program at the City University may be applied toward the degree provided the courses were completed with a grade of B or higher within an appropriate period preceding the time of application and are equivalent to comparable courses at the City University. [...] An evaluation of previously earned credits may be made before the end of the student's first year in residence by the student's program.

Application Process

The City University of New York Graduate Center application process is self-managed. Responsibility for gathering required documents such as official transcripts and letters of recommendation rests with the applicant. The applicant (this includes students who are attending or have attended a college of the City University) then must submit these supporting items as a package to the Office of Admissions, including official documents in their original sealed envelopes. The applicant must submit the following material to the Office of Admissions, City University Graduate Center, 365 Fifth Avenue, New York, NY 10016:

1. Application form, which is available online.
2. Two letters of recommendation from faculty members personally acquainted with the applicant's academic achievement.
3. An official transcript from each college or university attended, bearing the seal and/or signature of the appropriately authorized college official.

All documents, except those foreign certificates considered irreplaceable, become the property of the Graduate Center and cannot be returned. No original foreign documents can be returned unless accompanied at the time of filing by photostatic copies that have been verified by admissions personnel. All foreign documents must be accompanied by official English translations.

4. Scores for the Graduate Record Examination General Test and, where applicable, for the subject test in the area of intended study, except in the Ph.D. Program in Business, where the Graduate Management Admissions Test is required in lieu of the GRE. Arrangements should be made to register for the tests well before the administration dates. For information, call 1.800.GRE.CALL. Official GRE scores must be reported to the CUNY Graduate

Center—ETS College Code-2113.

Application Deadlines

Application deadlines for fall admissions vary. Visit our Web site for program deadlines.

Financial Assistance

A student wishing to apply for financial assistance should refer to the listing of awards in a later section of this bulletin as well as our Web site for application dates and other pertinent information. An admissions applicant seeking financial assistance must submit both the admissions and financial forms and supporting documents by the award deadline date.

DEGREE REQUIREMENTS

(Bulletin of the Graduate Center of the City University of New York, 2009-2011, pp. 19 ff).

Requirements for the Doctor of Philosophy

The degree of Doctor of Philosophy is awarded for mastery of subject matter and demonstration of research ability. It is given in recognition of the candidate's superior attainments and ability in his or her major field. A student must maintain high academic standards to retain matriculated status in a doctoral program. Normally three or more years of full-time study and research beyond the bachelor's degree are needed to complete a doctoral program. See section on time limits for degree. The requirements for the Ph.D. vary from program to program. [...] Listed below are general University Ph.D. requirements; special requirements are indicated under the specific program listings.

Residency

At least 30 of the credits required for the degree must be taken in residence at the City University.

Doctoral students are expected to spend at least one year as full-time students at the City University. Full-time consists of a schedule of no fewer than 12 credits or the equivalent for each of two consecutive semesters.

Credits

At least 60 credits of approved graduate work, including the course requirements in the field of specialization, are required for the degree. Specific credit requirements vary and should be discussed with the Executive Officer of the individual program.

First Examination

Each student must pass a First Examination in his or her field. Depending on individual doctoral program procedures, the examination shall be oral and/or written and may be administered within a narrow time period or may be administered in parts over a more extended time period. A student may continue in the doctoral program after completing 45 credits only if he or she has passed this examination.

Tools of Research

Each program may require its students to qualify in such tool subjects (computer languages, statistics, etc.) as are necessary to conduct research in its field.

Second Examination

A student must pass a Second Examination within ten (10) registered semesters of enrollment in a doctoral program. The Second Examination shall be of at least two hours', duration and is usually taken after the completion of course requirements. A student may be admitted to the Second Examination only upon recommendation of a sponsor.

Advancement to Candidacy

Before a student can be certified as a candidate for a doctoral degree (advancement to Level III of the process of earning the doctoral degree), he or she must have completed the following requirements: all required course work (of which at least 30 credits must be taken at the City University) with at least an overall B average; any language requirements; the First and Second Examinations; and any special program requirements for certification.

Human Subjects Certification

The Graduate Center has an ethical and legal commitment to protect human subjects in research. All such research, whether for the dissertation or for other purposes, must be reviewed and approved by the Committee on the Protection of Human Subjects prior to its initiation. This includes interviews, observations, questionnaires, use of previously collected data with identifiers, and any other methods by which data are obtained from human subjects. Student researchers who are conducting research with human subjects must complete the CITI human subjects training, as must their advisors. The Registrar sends all students advanced to Level III a "Dissertation Proposal Clearance: Human Participants" form. Students are required to submit the completed form to the Office of Research and Sponsored Programs after their

committee approves the dissertation topic and methodology and before research begins. If human participants are not involved, students submit the completed “Dissertation Proposal Clearance: Human Participants” form, with the dissertation project abstract and methodology, to the Graduate Center’s Office of Research and Sponsored Programs, Room 8309, 365 Fifth Avenue, New York, New York 10016. If human participants are involved, the student must also complete an “Institutional Review Board (IRB) Application for Approval To Use Human Subjects in Research,” available at <http://web.gc.cuny.edu/orup/> and from the Office of Research and Sponsored Programs, and submit it to their home campus Institutional Review Board (IRB).

Dissertation

The student must complete a dissertation that embodies original research. The dissertation must be defended at an oral Final Examination and be deposited in the Graduate Center’s Mina Rees Library before the degree is granted. To defend the dissertation, the student must have been advanced to candidacy. The dissertation must be microfilmed or published. Instructions for preparing the dissertation may be secured from the Registrar’s Office at the Graduate Center. The preparation of a dissertation and a defense of it form the final evaluation of a candidate’s qualification for the doctoral degree within the academic program. Approval by the program is typically confirmed by action of the Graduate Council and the City University’s Board of Trustees. Dissertation committees consist of at least three members of the CUNY doctoral faculty and are approved according to procedures detailed in the governance document of each program. The program will announce to the Provost, and, by posting and/or other means, to the general public and the members of the committee, the time and the date of the defense.

Time Limit for [the] Doctoral Degree

All requirements for the degree must be completed no later than eight years after matriculation. A student who matriculates after the completion of 30 credits of acceptable work must complete all requirements within seven years.

Satisfactory Academic Progress

Students must be making satisfactory progress toward the degree in order to maintain status at the Graduate Center and to be eligible for any student financial assistance. A student is deemed not to be making satisfactory progress if he or she has a grade point average below 3.00, has accumulated more than two open grades (INC, INP, NGR, ABS and ABP), has completed 45 credits without having passed the First Examination, has completed 10 semesters without having passed the Second Examination, has received two “NRP” grades in succession, or has exceeded the time limit for the degree. The Graduate Center reviews each student’s record every semester. If formal standards have not been met, a student may register (and receive financial aid, if otherwise eligible) only upon petition of the student’s Executive Officer to the Vice President for Student Affairs. Students whose petitions are approved are considered to be making satisfactory progress toward the degree and are eligible to receive financial aid.

Teaching, Research, or Fieldwork

Teaching, research, or fieldwork is required as part of the student’s training toward the degree.

Special Requirements

Additional requirements or variations may be specified in the individual programs.

Waiver of Requirements

To waive any specific requirement for the degree, a student may petition the Associate Provost and Dean for Humanities and Social Sciences or the Associate Provost and Dean for Sciences.

4. PROGRESS THROUGH THE PH.D. PROGRAM IN EARTH AND ENVIRONMENTAL SCIENCES

The time required to complete the Ph.D. degree is dependent on individual circumstances. Students entering with a B.S. or B.A. degree can expect to take longer to complete the program than those entering with an M.A. or M.S. Students with other responsibilities, such as full-time employment, may expect to take longer to complete coursework requirements. With these qualifications in mind, this section is designed to outline model time-lines for students in the Ph.D. Program in Earth and Environmental Sciences. Feel free to schedule an appointment with the Executive Officer if you would like to discuss your personal situation and set realistic goals for your progress through the program.

A well-prepared student entering the Ph.D. Program with a master's degree in geography, geology, environmental science or a related field can expect to compete for one of the five-year financial aid packages offered by the CUNY Graduate Center, which can enable the student to complete the Ph.D. degree in 4-5 years.

Students who enter the Ph.D. Program in Earth and Environmental Sciences with a master's degree may have a clearly focused research agenda, and enter the Ph.D. Program to pursue

that agenda with a particular mentor. A student who has a strong foundation and who is attending full-time can complete the core courses in the first year, and take the First Examination in the Summer after the first year. For students in the Geography specialization, first year coursework includes Geographic Thought and Theory (EES 709), Geographic Knowledge in Action (EES 712), The Nature of Scientific Research (EES 704) and courses in two fields. In the Environmental and Geological Sciences specialization, first year coursework includes Earth Systems I and II (EES 716-717), The Nature of Scientific Research (EES 704) and courses in one or more core areas. The student can then complete coursework during the second year, and take the Second Examination during the summer after the second year. The time-path to complete a doctoral dissertation is highly variable, but an aggressive schedule would allow the student to defend the dissertation (Third Examination) at the end of four years.

Student Entering with A Well – Defined Research Agenda			
	Fall	Spring	Summer
Year 1	EES 709 or 716 EES 704 Course(s) in core Areas	EES 712 or 717 Course(s) in core Areas Methods course	First Examination
Year 2	Advanced Courses	EES 802 Advanced Courses	Second Examination
Year 3	Research for the Doctoral Dissertation		
Year 4	Research for the Doctoral Dissertation		Third Examination

Year 1. Student will complete core courses in area of specialization (EES 716-717 in Environmental and Geological Sciences; EES 709-712 in Geography); courses in fields of interest, a methods course and The Nature of Scientific Research (EES 704), for a minimum

of 15 credits.

During the Spring semester the student will meet with her (his) advisor to discuss the requirements for the First Examination. (S)he will work with the principal advisor to assemble a dissertation committee, and prepare a brief abstract of the proposed dissertation project to submit to the Executive Committee; this is a prerequisite for permission to register in EES 802. With the completion of first-year courses and the first examination, a student with a total of 45 credits (including up to 30 transfer credits) will be eligible to move from Level 1 to Level 2.

Year 2. With permission of the Executive Committee, the student will register in EES 802, Advanced Research Seminar, and prepare a complete draft of her (his) dissertation proposal. The student will take additional coursework required to prepare for the dissertation project. Upon successful completion of EES 802, the student will meet with the dissertation committee to prepare for the Second Examination. Upon successful completion of the second examination, 60 credits of coursework (including transfer credits) and the computer literacy requirement, the student will be admitted to candidacy for the doctoral degree (Level 3).

Years 3-4. With the supervision of the student's advisor, the student will conduct research for the doctoral dissertation and prepare the dissertation manuscript. Upon approval of the dissertation by the dissertation committee, the EES Program Office will schedule the Third Examination (dissertation defense).

Alternatively, a student may enter the program with a broader interest in geography, geology or environmental science, and use the first-year courses to identify possible areas of interest. The first year would then be devoted to core courses in the student's specialization, methods courses, and courses in areas of the student's interest. It would be advisable to defer EES 704,

The Nature of Scientific Research, to the third semester. The goal would be to prepare for the first examination in January of the second year, and select a mentor for the dissertation committee no later than the following semester. This would allow a student to take the second examination during the third year, and complete a dissertation in five-six years.

Student Entering with a Broadly-Defined Area of Interest			
	Fall	Spring	Summer
Year 1	EES 709 or 716 EES 704 Course(s) in core areas	EES 712 or 717 Course(s) in core areas Methods course	
Year 2	Advanced Courses First Exam (in January)	Advanced Courses	
Year 3		EES 802	Second Examination
Year 4	Research for the Doctoral Dissertation		
Year 5	Research for the Doctoral Dissertation		Third Examination

5. EES PROGRAM REQUIREMENTS FOR THE PH.D. DEGREE

Requirements for the Specialization in Geography

Curriculum Requirements

Incoming students are expected to consult with the Executive Officer or their prospective advisor(s) and devise a personal program of study to acquire command over the skills and methods they need to work in their proposed area of research within their first semester. If courses for specific skills and methods are not available within the department then students will be encouraged to seek the necessary instruction elsewhere.

The core coursework includes the following requirements

EES 709 Geographical Thought and Theory (3 credits, first semester) This course explores the foundations of geographical knowledge. The course situates the history of geographical thought in its broad philosophical and historical context. Topics may include themes such as the concept of nature (incorporating scientific, anthropological, historical and humanistic perspectives), questions of technology and society (with particular emphasis upon technologies of geographical enquiry and representation, e.g. cartography to Geographical Information Science, remote sensing, statistics); how to think about basic geographical concepts such as space, place, region and environment in historical perspective; and examination of the relations between geographical knowledges and political power.

EES 712 Geographical Knowledge in Action (3 credits, second semester) This integrated course takes the form of an investigative workshop in which students and faculty collaborate in the examination of a specific geographical problem using the New York metropolitan region as a focus for study. Students with different research interests will here be encouraged to integrate their skills (along with those of participating faculty) in studying a general problem in an integrative way. Research seminars will bring in outside experts to look at different facets of a common problem.

EES 704 The Nature of Scientific Research (3 credits, first semester). This course is designed to introduce first-semester students in the Ph.D. Program in Earth and Environmental Sciences to the principles of scientific inquiry. Following a broad overview of the epistemological foundations of the sciences, we compare and contrast the nature of explanation in the historical sciences (biology and geology), experimental sciences (physics and chemistry) and social sciences. We will discuss in detail the mix of quantitative and qualitative methods that are appropriate to each of these fields of inquiry. Finally, we explore ethics in scientific research. We will go beyond the issues of fabrication, falsification and plagiarism to look at

the broader responsibilities of the researcher to their research subjects, co-authors, mentor / mentee, scientific community, and society at large.

EES 802 Dissertation Proposal Workshop (3 credits). This seminar is designed to teach students how to write a dissertation proposal, prepare grant proposals, and present ideas in a seminar setting. The student is required to formulate a dissertation proposal under the supervision of the student's mentor and the instructor. Prerequisites for EES 802 are: 1, satisfactory completion of all first-year core courses; 2, satisfactory completion of the First Examination; 3, submission of a one-page dissertation proposal abstract; 4, approval of the student's dissertation advisor; and 5, permission of the Executive Officer.

I. First Examination: A written and oral examination is administered by the Geography First Examination Committee, comprising members of the doctoral faculty in Geography, following the student's successful completion of between 18 and 24 course credits including the following requirements:

- A. The three first-year core courses (EES 704, EES 709, EES 712), each with a grade of B or better;
- B. A methods course directed to the student's specific needs;
- C. At least one graduate-level course in each of two of the following areas: Cities and Urban Processes, Physical Geography, Globalization and Uneven Development, Productions of Nature, Geographic Information Science and Spatial Methods, and Health Geographies; and
- D. An overall average of 3.0 or better in all courses.

Note: Earth Systems Science I (EES 716) or Earth Systems Science II (EES 717), the first year core courses in Environmental and Geological Sciences, satisfy requirement C for students electing Physical Geography as one of the two fields of study.

Note: A student who has taken any of the required courses in section A or B in a master's program or equivalent may test out of the course by taking the course final examination.

The written component of the first exam will be an open-book, take-home exam. The questions will be prepared by members of the Geography First Examination Committee, based on selective sets of readings for each core course and area of specialization. Students will be expected to provide substantive responses to several essay questions, with citations and references to all the salient literature. The committee, following a 1-2 week period to review the written examination, will meet with the student and have the opportunity to provide feedback and ask follow up questions based on the written responses. The grade (pass/fail) will be based on the student's performance on both the written and oral examinations. A student who fails all or part of the written or oral examinations will be given one opportunity to retake those parts of the examination, no more than 12 months after the original examination.

II. Second Examination: The Second Examination involves the submission and defense of a proposal describing the dissertation research planned by the student. (See Appendix A: Format for Dissertation Proposals). A dissertation committee, comprising a minimum of three members of the doctoral faculty, is appointed to assist the student in preparing for the Second Examination.

The dissertation proposal must be written in an acceptable research-journal format, and presented to the student's Dissertation Committee for a critical review of content. The Dissertation Committee must receive the Proposal at least two weeks prior to the scheduled Second Examination. The Second Examination is an oral examination conducted by the Dissertation Committee during which the student describes and defends all aspects of his/her proposal. The student must be able to explain his/her research in the context of the historical development of the research discipline; relate his/her project to ongoing research in his/her field, and must demonstrate a thorough command of the literature relevant to the research. Normally, the Second Examination takes place upon completion of 60 credits, and requires approximately 2 hours.

The Dissertation Committee will require that the student rectify any errors in the research plan or address specific inadequacies in the literature review through a retake of all or a portion of the exam as specified by the Dissertation Committee no more than 12 months from the date of the first attempt.

III. Third Examination (Oral Defense of the Dissertation)

Requirements for the Specialization in Environmental and Geological Sciences

Within the student's first semester, she (he) is expected to consult with their prospective advisor(s) and devise a personal program of study to acquire command over the skills and methods needed to work in their proposed area of research.

Course work in the Specialization includes the following required courses:

EES 71600; Earth Systems I: Origin and Evolution of Earth and Life (3 credits, first semester). The evolution of planet Earth, its fluid envelopes, and its biota examined through a combination of high-temperature geochemistry and low-temperature biogeochemistry that considers planetary accretion and differentiation; origin and evolution of the atmosphere, hydrosphere, and biosphere; thermodynamic and kinetic bases for Earth processes; geochemical and biogeochemical cycles; ecosystem cycling and its anthropogenic effects.

EES 71700; Earth Systems II: Earth's Energy Networks (3 credits, second semester). This course covers major aspects of planetary structures and Earth's interior (geophysics, tectonics) and the evolution and dynamics of oceans and atmospheres (oceanography, meteorology). Many aspects of these sub-disciplines converge into studying the Earth's climate evolution and dynamics (global climate change, climatology, paleoclimatology, paleoceanography). The study of the Earth's

climate is synonymous with "systems interactions", interactions among the subcomponents of the Earth's systems. These interactions take place on all time and space scales by way of materials and energy flows among lithosphere, atmosphere, hydrosphere and biosphere. These systems interactions play an increasingly central role in predictions of the impacts of global climate change, as well as our understanding of an ever-increasing number of environmental issues.

EES 71600 and 71700 constitute a two-semester sequence of courses, which together provide a broad, systems approach to basic concepts in the earth and environmental sciences and the linkages between them. These courses will provide an understanding of the complex inter-relations of Earth systems that all students in the Environmental and Geological Sciences Specialization require.

EES 704 The Nature of Scientific Research (3 credits, first semester). This course is designed to introduce first-semester students in the Ph.D. Program in Earth and Environmental Sciences to the principles of scientific inquiry. Following a broad overview of the epistemological foundations of the sciences, we compare and contrast the nature of explanation in the historical sciences (biology and geology), experimental sciences (physics and chemistry) and social sciences. We will discuss in detail the mix of quantitative and qualitative methods that are appropriate to each of these fields of inquiry. Finally, we explore ethics in scientific research. We will go beyond the issues of fabrication, falsification and plagiarism to look at the broader responsibilities of the researcher to their research subjects, co-authors, mentor / mentee, scientific community, and society at large.

EES 802 Dissertation Proposal Workshop (3 credits). This seminar is designed to teach students how to write a dissertation proposal, prepare grant proposals, and present ideas in a seminar setting. The student is required to formulate a dissertation proposal under the supervision of the student's mentor and the instructor. A continuation of the Research Methods course in

which the student is required to present original research in a mock dissertation defense employing current conference-like presentation methods.). Prerequisites for EES 802 are: 1, satisfactory completion of all first-year core courses; 2, satisfactory completion of the First Examination; 3, submission of a one-page dissertation proposal abstract; 4, approval of the student's dissertation advisor; and 5, permission of the Executive Officer.

From the first stages of matriculation, the student directs his/her program toward the desired research specialization. The major steps occur in the following order: First Examination, Second Examination, Third Examination (Oral Defense of the Dissertation).

- I. First Examination: The examination is a written and oral examination administered by the Environmental and Geological Sciences Curriculum Committee following the student's successful completion of at least 15 course credits, including the following requirements:
 - A. The three first-year core courses (EES 704, EES 716, EES 717), each with a grade of B or better;
 - B. At least two other graduate-level courses in at least one of the four Environmental and Geological Sciences Subdivisions: Atmospheric and Hydrologic Sciences; Earth Materials and Earth Processes; Terrestrial, Estuarine, and Marine Studies; and Urban Environments and Public Health.
 - C. An overall average of 3.0 or better in all courses.

The written part of the first exam will consist of an open-book, take-home exam. The questions will be prepared by members of the Environmental and Geological Sciences Curriculum Committee, based on the content and selective sets of readings for each core course and area of specialization selected by the student. Students will be expected to provide substantive responses to several essay questions, with citations and references to all the salient literature.

The committee, following a short period to review the written examination, will meet with the student and have the opportunity to ask follow up questions, based on the written responses. The grade (pass/fail) will be based on the student's performance on both the written and oral examinations. A student who fails all or part of the written or oral examinations will be given one opportunity to retake those parts of the examination, no more than 12 months after the original examination.

II. Second Examination: The Second Examination involves the submission and defense of a proposal describing the dissertation research planned by the student. (See Appendix A: Format for Dissertation Proposals). A dissertation committee, comprising a minimum of three members of the doctoral faculty, is appointed to assist the student in preparing for the Second Examination.

The dissertation proposal must be written in an acceptable research-journal format, and presented to the student's Dissertation Committee for a critical review of content. The Dissertation Committee must receive the Proposal at least two weeks prior to the scheduled Second Examination. The Second Examination is an oral examination conducted by the Dissertation Committee during which the student describes and defends all aspects of his/her proposal. The student must be able to explain his/her research in the context of the historical development of the research discipline; relate his/her project to ongoing research in his/her field, and must demonstrate a thorough command of the literature relevant to the research. Normally, the Second Examination takes place upon completion of 60 credits, and requires approximately 2 hours.

The Dissertation Committee will require that the student rectify any errors in the research plan or address specific inadequacies in the literature review through a retake of all

or a portion of the exam as specified by the Dissertation Committee no more than 12 months from the date of the first attempt.

III. Third Examination (Oral Defense of the Dissertation).

6. STUDENT STATUS

Every student must register every semester with the Executive Officer, who reviews the student's proposed schedule and issues the advisement PIN number which is required for on-line registration. When you meet with the Executive Officer for registration, you have an opportunity to discuss any matter bearing on your status in the program. Before coming to registration, you should meet with your principal advisor to review the courses for which you intend to register.

The student's satisfactory progress is assessed at this time. "A student is deemed not to be making satisfactory progress if he or she has a grade point average below 3.00, has accumulated more than two open grades (INC, INP, NGR, ABS and ABP), has completed 45 credits without having passed the First Examination, has completed 10 semesters without having passed the Second Examination, has received two "NRP" grades in succession, or has exceeded the time limit for the degree. The Graduate Center reviews each student's record every semester." (Graduate Center Bulletin, 2005-2007). At the time that the EES Program Office is notified that a student is not making satisfactory progress, according to the satisfactory progress criteria outlined in the Graduate Center Bulletin, the Executive Officer will submit a request to the student's principal advisor requesting that documentation be provided as to the student's current and expected progress toward the Ph.D. degree. Based on the response of the student's advisor, the Executive Officer will attest to the student's satisfactory progress, thus removing the hold on the student's registration, or affirm that the student is not making satisfactory progress.

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Appendix A. Format for Dissertation Proposals

A proposal describing the work to be done in your dissertation research is a requirement of the EES Program. This proposal is submitted to your Dissertation Committee for evaluation and approval, and must be successfully defended as part of the Second Examination. The following is an outline of the format to which Dissertation Proposals in the EES Program should adhere.

Title Page: Title of Research Proposal; Name & Address of Student Researcher; Name of Dissertation Advisor; List of Names of Dissertation Committee

Abstract: A short (300 word maximum), capsule outline of the proposed research. It should include statements describing the problems or hypotheses to be resolved; research methods; expected results; significance of the research; and how the proposed research fits into the historical development of work on this subject.

Introduction and Background: General treatment of the research topic, and its historical development. In this discussion you should be careful to include a full exposition of previous work on this subject and how this material relates to the research you propose. It must be clear that you have the necessary command of the literature relevant to your work, and that you understand your role in advancing knowledge in your field, and how your work fits into the broad picture of research on such subjects.

Statement of Research Problem: This is a full and detailed description of the research questions, problems and/or hypotheses you intend to resolve with this research project.

Methods: A full exposition of the research methods you intend to use in your work. This should include field, ethnographic, and archival methods, laboratory work and analytic or narrative techniques, as appropriate. You must also describe any statistical methods you plan to use, and why these methods are appropriate. Resources and instrumentation available to you must be listed and its role in your research fully described. Work planned for laboratory facilities outside CUNY should also be discussed.

Expected Research Findings: You must describe the kind of information you will acquire in this study and how it will be useful in resolving the issues that are the focus of your research. In this regard, it is essential that you have some preliminary findings already in hand, and include these in your discussion. This will be an important means of demonstrating the viability of your research project, and of your ability to achieve your research goals.

Significance of Research Findings: Discussion and interpretation of your findings, both expected and preliminary. You will want to show that your research addresses the issues that you want to resolve, and that your methods are effective and form an adequate basis for the work you propose to do.

Bibliography: a list of publications cited in the proposal text.

You should be careful to give full credit to the work and ideas of others that you use in your dissertation proposal by citing this work in the text of the proposal (e. g., “(Jones, 2005)”; “Jones (2005) shows that”). Full references for all publications thus cited, must be included in the bibliography section of the proposal. For a discussion of the CUNY Graduate Center policies on plagiarism see L. Edwards and M. Schoengood (2005)¹. You should also make liberal use of illustrations (photographs, graphs, sketches, etc.). Keep in mind that each illustration must be numbered, have an explanatory figure caption associated with it, and be referred to in the text of the proposal (e. g., “(see Figure 1)”; “Figure 1 shows that”). If you use tables, they also must be numbered, contain an explanatory caption, and be referred to in the text. Dissertation proposals must be submitted in digital format with all figures and tables incorporated into the text, and must be written in flawless English, so you must give close attention to phraseology and the elements of English usage, and carefully proof-read the document before presenting it to your committee.

¹ Avoiding and Detecting Plagiarism: A Guide for Graduate Students and Faculty with Examples, The CUNY Graduate Center, <http://web.gc.cuny.edu/provost/pdf/AvoidingPlagiarism.pdf>.

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Appendix B. EES Doctoral Faculty: Physical and Natural Sciences

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Geographic Information Science.

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Natural hazards and disasters; glacial studies and climate change; spatial data integration, analysis,
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Geochemistry of meteorites.

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Structural geology, basin analysis, neotectonics.

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Environmental fluid mechanics, linkages between air quality and mesoscale weather models.

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Hydrology, environmental geology.

Yan Zheng, Professor; Ph.D., Columbia University

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Biogeochemical cycles of elements in the environment, marine geochemistry.

Appendix C. EES Doctoral Faculty: Geography and Social Sciences

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Jochen Albrecht, Associate Professor; Ph.D. University of Vechta, Germany
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Geographic Information Science.

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Urban planning and community development, environmental justice.

James J. Biles, Associate Professor; Ph.D., Michigan State University
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Development theories and policies, globalization and development, economic geography, Latin
American Studies, work and labor.

Joshua Fogel, Assistant Professor; Ph.D., Yeshiva University
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Urban public health, epidemiology and biostatistics.

Ruth W. Gilmore, Professor; Ph.D., Rutgers University
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Race and gender, labor and social movements, prison, uneven development, politics and culture,
California, the U.S., the African Diaspora.

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Urban geography, Geographic Information Systems.

Kenneth Gould, Professor; Ph.D., Northwestern University
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Environmental sociology, ecotourism and development, ecodisasters.

Roger A. Hart, Professor; Ph.D., Clark University
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Child environmental research.

David Harvey, Distinguished Professor; Ph.D., St. Johns College, Cambridge, England
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