

# Department of Geography, University of Delaware

## Graduate Program Policy

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## Introduction

**Rules, Policies, Guidelines, and Exceptions.** This document mostly contains consensus **advice** of the faculty of the Geography Department, intended to guide students seeking a graduate degree through the required steps. The University of Delaware publishes definitive **rules** regarding these degrees in the *Catalog*, the *Thesis and Dissertation Manual* and other policy and deadline notices from the Office of Graduate Study. Each student is responsible for conforming to the rules published in those other documents. This policy document does not recapitulate all the details of requirements, time limits, page margins, and so forth that those documents contain. Any disagreement between this document and the Graduate Office or Graduate Catalog requirements will almost certainly be resolved by deferring to the Graduate Office and subsequently editing this document to bring it back into compliance.

Official regulations:

<http://udcatalog.udel.edu/general/grad/gradregs.html>

Office of Graduate Study:

<http://www.udel.edu/gradoffice/>

Application Procedures:

<http://www.udel.edu/gradoffice/applicants/>

Thesis manual:

<http://www.udel.edu/gradoffice/current/thesismanual.html>

UDThesis macros:

<http://www.udel.edu/topics/udthesis>

Some elements of this document are **policies** of the Geography Department, as opposed to guidelines or suggestions. These are expectations regarding such things as the normal composition of a thesis advisory committee and requirements for examinations and presentations. Most of the rest of the document is advisory only, although we regard this advice as very important. Whenever the imperative level of any piece of information is not obvious, please ask your adviser, department staff, or department administration for clarification.

Each individual student in all of our degree programs will work on a unique thesis problem after arriving with a unique background and engaging in a distinctive set of courses. Occasionally a rule becomes redundant or inappropriate for a particular thesis program. Students may request **exceptions** to rules. Exceptions are granted on a case-by-case basis. Departmental exceptions require a request supported by the adviser and approved by the Chair, often in consultation with other departmental faculty members.<sup>1</sup> University exceptions require a request from the Department to the Graduate Office. The Graduate Office may make an immediate decision or may consult with other authorities as well. Appeals at either level are always possible, but will generally be considered only with additional information.

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<sup>1</sup> Department governance is described in its Bylaws, available along with other departmental documents at <http://www.udel.edu/provost/dept.html>. In most situations, the Chair makes decisions intended to follow a consensus of the faculty.

**History.** Geography at Delaware has a long history dating back to 1925, initially consisting of service courses for education majors.<sup>2</sup> Geography has been an independent department since 1966 beginning with the leadership of Prof. John R. Mather. Russ Mather had been teaching part-time at Delaware for several years prior, having already had a distinguished research career as a protégé of C. Warren Thornthwaite at the C. W. Thornthwaite & Associates Laboratory in New Jersey, and had only recently moved to being a full-time professor at UD. Professor Mather served as Chair of the Geography Department for 24 years, and his international reputation within climatology served as a catalyst for building the department's strength around that specialty. Russ established this department's emphasis in climatology and physical geography based on clear roots in Thornthwaite's vision for a scientifically rigorous postgraduate education in geographical climatology, as presented in his 1960 presidential address to the Association of American Geographers.

In the early 1970s, a master's degree program was initiated, from which the first degree was granted in 1977. In the late 1970s, the department became more focused on climatology, eventually leading to the creation of a Ph.D. program in Climatology as a major within an interdisciplinary Applied Science program. The first Climatology Ph.D. was granted in 1986. Shortly thereafter the Applied Science program was dissolved so that the Climatology Ph.D. was housed within the Geography Department. Since then, we have graduated nearly 40 Ph.D.s. Over two-thirds of them have found permanent jobs in academia (over half in graduate-degree-granting institutions), with the others primarily working in research/consulting firms. The Climatology Ph.D. was changed to a Ph.D. in Geography with concentrations in Land-Surface Processes and in Climatology in 2008. That name change brought the description of the Ph.D. program into better alignment with the actual range of dissertation topics that had been completed over the first 20 years of the program.

Through the 1990s and 2000s, our faculty and graduate programs grew slowly but steadily to their current levels: 12 full-time tenure-track faculty and roughly 30 graduate students. Our undergraduate programs showed remarkable growth during the 1990s, especially with the creation of the interdisciplinary B.S. program in Environmental Science. Our undergraduate programs currently serve approximately 80 Environmental Science majors and another 60 or so in Geography or Geography Education

**Degree Programs.** Graduate studies in Geography at Delaware lead to Master of Arts (M.A.), Master of Science (M.S.) degree and Doctor of Philosophy (Ph.D.) degrees in Geography. Our masters (M.A. and M.S.) programs in Geography reflect a tradition of breadth and flexibility, with the advice of and close supervision by a primary adviser and a thesis committee. A required, original research thesis is the capstone achievement of every degree program. The goal of our masters program has been to prepare our graduate students for admittance to Ph.D. programs here and elsewhere, or for meaningful employment in the private or public sector and in K–12 education. The goal of our Ph.D. program has been primarily to prepare students for academic careers in higher education and research, but this has not been the only career track chosen by our graduates.

Typically, our M.A. students study one of several aspects of human, cultural, or environmental geography, while our M.S. students pursue topics in physical geography: climatology, land-surface processes, cryospheric studies, and especially in the interactions

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<sup>2</sup> The early history can be read in Mather, 2004: History of Geography, University of Delaware.

among those areas. Our students have always learned analysis techniques in addition to geographic content, so courses (inside and outside the department) in remote sensing, Geographic Information Science (GIS), cartography, statistical and numerical methods, and computer programming are a significant part of the training received by our students, particularly at the masters level. In recent years, some students have come to the program with a primary interest in a technical area, such as GIS, and a secondary interest in climate, physical geography, or other systematic field within geography. We have been able to accommodate such interests within the M.S. program, but we primarily regard this as a program in physical geography, and a topical thesis is required.

Our Ph.D. degree in Geography must be focused within one of two concentrations: Climatology or Land-Surface Processes. We interpret those concentration names broadly, with dissertation topics ranging through meteorological analysis of weather patterns through soil and geomorphic processes and every physical geographic topic in between, including impacts of and effects on human activity.

**Entrance requirements.** Nominally, admission to the masters degree programs requires an undergraduate grade-point-average of 2.75 or more and combined (verbal plus quantitative) GRE scores of at least 1050. Admission is selective and competitive based on the number of well-qualified applicants and the limits of available faculty and facilities. Those who meet stated minimum academic requirements are not guaranteed admission, nor are those who fail to meet those requirements necessarily precluded from admission if they offer other appropriate strengths. The department will consider qualified applicants without previous background in geography, although additional preliminary work may be required.

Students are only considered for the Ph.D. with a completed master's degree that includes a thesis requirement. Admissions decisions based on a pending master's degree are always considered probationary until the master's degree is completed. A combined GRE score of at least 1100 is also expected, and the undergraduate record will be examined, but the focus in Ph.D. admissions is on the quality of work at the master's level. This program does not allow a direct track to the Ph.D. following the bachelor's degree. Most Ph.D. students enter from master's programs in geography or closely related fields, but students from other sciences, engineering, and social sciences have been admitted. In evaluating applications, besides evidence of overall intellectual capability and topical compatibility of the applicant's research interest with the department, the faculty will be looking for specific mathematical background (calculus through ordinary differential equations) and for evidence of significant computer analysis and programming skills, normally including facility with a general-purpose programming language. Students applying to the Ph.D. in Geography must also indicate an intended concentration: Climatology or Land-Surface Processes.

Students completing a M.S. degree in this department who wish to continue towards the Ph.D. must submit a Change of Classification Form to the department. The physical geography faculty will evaluate these as they are received, without particular deadlines. Students completing a master's degree in this department who wish to enter a different PhD program at UD, or students completing other masters degrees from UD who wish to enter the Geography Ph.D. program, must complete a regular admission application as if entering the program from outside UD.

**After graduation.** A goal for many M.S. students is to continue into our Ph.D. program—a route taken by roughly one-quarter of our M.S. graduates. Accounting for M.S. and M.A. graduates who enter other Ph.D. programs, over a third of our master's graduates enter a Ph.D. program, usually with an academic career in mind. Our Ph.D. graduates have been particularly successful in the academic sector, many becoming professors in Ph.D.-granting departments at major universities. The list is ever changing, but our Ph.D.s currently hold tenured or tenure-track faculty positions at Arizona State University, Indiana University (Bloomington), Kent State (Ohio), Ball State (Indiana), Texas A&M, and the Universities of Delaware, Georgia (Athens), Kansas (Lawrence), Minnesota (Minneapolis), Montana (Missoula), Nebraska (Lincoln), Oklahoma (Norman), and Virginia (Charlottesville). Others are professors in regional universities, such as Northern Illinois University (DeKalb), the University of Colorado at Colorado Springs, and Millersville University (Pennsylvania). A number of Ph.D. graduates have found employment in private industry, including environmental services contracting companies and information technology fields.

Masters students who seek employment directly after graduation instead of further education have found employment with the U.S. Geological Survey (USGS), Scripps Institute of Oceanography, Princeton's Geophysical Fluids Dynamics Laboratory (GFDL), W. L. Gore and Associates Inc., Environmental Systems Research Institute (ESRI), Lockheed-Martin, and the Southeast Regional Climate Center in South Carolina, among many other employers. With growing demand for both the topical and computer skills our students acquire (including GIS), we anticipate that the number and quality of employment opportunities for our graduates will continue to increase.

## Requirements for the master's degrees

**Course requirements.** Students in either the Master of Arts or Master of Science program complete at least 24 course credits. Graduate courses at the University of Delaware include any courses numbered 600 or above in any discipline. In addition, students may take 500-level courses from other departments for graduate credit. (The special thesis research courses, 868 and 869, are not counted in these 24 credits.) All of these courses must be taken for a letter grade unless the course is only offered on a pass/fail basis. Courses applied to a graduate program must be completed with a Grade Point Average of 3.00 (B average) or better, and only courses in which a grade of C– or better is received will count towards a degree. A maximum of nine credits may be transferred into the program with the permission of the department. These transferred courses may include courses taken at another university, Continuing Education courses taken at the University of Delaware before admission to the graduate program, or courses that qualified for graduate credit but taken while still an undergraduate, so long as those courses exceeded the requirements of the undergraduate degree.

Students regularly take undergraduate courses while enrolled in a graduate program, particularly to improve their skills in mathematics and computer programming. Undergraduate courses do not count in the student's graduate GPA, nor do they count toward the minimum full-time requirements that are attached to various funding sources. Any such courses taken as a master's student in order to fulfill the requirements for later admission to our Ph.D. program in Climatology should be taken for letter-grade credit.

Some undergraduate courses at the 300 or 400 level may be taken for graduate credit under GEOG 666 Special Problems, so long as arrangements have been made with the instructor for additional work appropriate for receiving graduate credit.

**Thesis Credits.** Each student must enroll in at least six credits of GEOG 869 Master's Thesis. These credits are over and above the 24 credits of regular courses required. All six credits may be taken at once or, more commonly, they may be taken a few credits at a time during more than one semester. During the thesis research, the student's adviser will assign a grade of S or U at the end of each semester, and then will change these to a letter grade at the completion of the thesis.

Once a student has completed all course credits and Master's Thesis credits required for the degree, the student should typically change to sustaining status. If a student is still taking some classes and needs additional credits to maintain full-time status, GEOG 868 Research may be taken for up to nine credits per semester. GEOG 868 is graded pass/fail only.

**Required Courses.** Graduate students entering any of our graduate degree programs for the first time are expected to take a one-credit course, GEOG 600, which primarily serves as an introduction to this department, to the nature of a thesis, and to graduate study and professional geography in general. No other specific courses are required of all students in any of our graduate degree programs. The advisory committee determines whether a given suite of courses sufficiently prepares a student for the master's thesis. The mere completion of 24 graduate credits is not necessarily sufficient. Particularly in those cases where a thesis topic or adviser changes during the program, additional coursework will be required if the advisory committee deems it necessary. Early and regular consultation with an adviser is necessary for planning each student's curriculum.

**The Master's Thesis.** The master's thesis must show ability to conduct scholarly research and to report the results at a publishable quality. A well-crafted master's thesis can be a source for publications that will help obtain Ph.D. admissions and funding, a source of ideas for Ph.D. dissertation topics, an ongoing source of personal pride, and a springboard for a future career. However, none of the characteristics that describe a good master's thesis can be put down in words that apply to all thesis research topics. There is no minimum page limit, no minimum number of references, no standard order of chapters and chapter titles, or any other such specific, quantifiable limitation. Rather, the definition, guidance, and eventual acceptance of a master's thesis rely almost entirely on the judgment of the advisory committee.

**The Committee.** An advisory committee consisting of three members will evaluate the program of courses and the thesis. (The department may approve larger committees, but three members is the most common size.) The most important member of the committee is the adviser, who is a member of the faculty of the department. Usually, the adviser is chosen before a thesis topic is worked out, and the adviser will help refine the topic and choose other members of the committee. The professor in charge of the thesis should have established a record of scholarship in the field of the thesis. The definition of faculty includes professional staff that hold secondary faculty appointments within the department. Faculty who have

retired or resigned from the university may continue to chair committees of students whose work began under their direction before their retirement or departure from the university.

One of the other members of the committee will be another member of the faculty of the department. The third member will be external to the department—most often a faculty member from another department, but occasionally a faculty member of another university or a qualified professional who is not on the faculty. The department must approve the committee, and this approval will include judging whether members who are not on the faculty of the University of Delaware are appropriate for this role.

All three members of the committee should be able to serve both as advisers during thesis research and evaluators of the quality of the final product. The extent to which committee members other than the primary adviser guide the research varies greatly from project to project, but it is in the student's interest to bring the other committee members into the research as early and as fully as practical.

The committee determines whether and when the thesis has achieved the level of scope, originality, and quality necessary for a master's degree. Acceptance of the thesis requires the signatures of all members of the committee. Additionally, the signature of the Chair of the Geography Department indicates acceptance, on behalf the entire department, of the membership and activities of the advisory committee. The thesis must also be signed by the Dean of the College of Arts and Sciences and by a representative of the Provost. Names and titles of signers above the department level vary regularly but must be correct for the semester in which the degree is actually granted, so please check with the department for assistance regarding the department's signature memo, correct names and titles needed on the signature pages for higher-level administrators, and other forms that may be required to complete the degree.

**The Presentation.** After the adviser and committee members agree that a draft is sufficiently complete, the student will present the results of the thesis to the department. This presentation is in the style of the department's Friday afternoon seminar series (some may be included in the seminar series), in which a presentation of 30 to 50 minutes is followed by questions from the audience. (This is in contrast to the style of a Ph.D. dissertation defense, in which formal questioning follows a presentation led by the advisory committee.)

In some cases, the presentation will be of a thesis that is essentially in its final form and already approved by the committee. In other cases, the committee may use the presentation and the questions that arise during the presentation to guide their advice on completion of the thesis. Whether the thesis presentation should be viewed as a final presentation of a complete work or as a tool for guiding the final work on a nearly complete thesis is up to the adviser and committee.

**Timetable for the Master's degree.** It would be difficult, perhaps impossible, to find a past master's student whose program tracked the following timetable precisely. Individual variation is expected. A goal of most of our students and faculty is that a full-time graduate student should be able to complete the master's degree in two years. The following schedule provides a reasonable way to adhere to that two-year goal, with all in-house activities completed by the end of the fourth semester. Students who take full-time course loads during their first year and who identify an adviser and topic early in that year may find that their second year can be devoted entirely to thesis work, allowing faster completion than this

schedule indicates. Students with teaching or research assistantships who take the minimum six credits per semester will find it difficult to adhere to this schedule.

- First two months: Meet all faculty members; reduce potential advisers to a short list.
- By first winter session: Choose adviser, spend winter session exploring thesis ideas.
- Second semester: prepare preliminary proposal for thesis, choose remaining committee members.
- Summer after first year: Begin thesis research – primary data collection for some field projects may need to be completed during the first summer; finish library research.
- Third semester: Complete regular courses; continue with thesis research.
- Check current regulations and deadlines for submitting an Application for Advanced Degree, which will generally be required a full semester in advance of the intended graduation date.
- Fourth semester: Complete research; complete draft of thesis; prepare presentation of thesis after committee approval of draft.
- Second summer: Complete final editing and changes in response to committee and public suggestions. Prepare clean, final version for graduate office according to current University of Delaware specifications. Submit thesis PDF and signature pages to the Office of Graduate Study.

The university stipulates a time limit of five years from entry into the master's program until completion.

## Requirements for the Ph.D.

**Concentrations.** The Ph.D. in Geography grew out of the Ph.D. in Climatology at Delaware. The primary reason for changing the name and developing concentrations was that dissertation topics in this program had always covered the entire range of physical geography, with often the connection to climatology being via weather and climate data that were applied as boundary conditions to understand a process at the land surface. For example, studies of water flow in the soil and in landfills, dynamics glaciers, and permafrost active layer depths were all done under the title of Ph.D. in Climatology, despite the minimal consideration of atmospheric or climatological processes in these studies.

The name of the Ph.D. program was changed in 2008 to recognize that we have really been engaged in a wide-ranging program in physical geography from nearly the inception of the Ph.D. program. Rather than merely changing the name of the entire program, however, the long-time faculty of the Ph.D. in Climatology strongly felt that honoring the history, founders, alumni, and reputation of the Ph.D. program required keeping the name Climatology attached in some fashion. The Ph.D. in Geography with concentrations in Climatology or Land-Surface Processes characterizes the range of Ph.D. topics that the department can engage in currently while also doing justice to our traditions and history.

The two concentrations have no differences in entrance requirements or specific rules, and neither concentration has any specific course requirements. Students should specify an intended concentration on entering the program, based on their probable research interests. Students whose primary interests will include analysis of weather data, use of atmospheric models, impacts of boundary processes on atmospheric response, or construction of long-term climate records should declare a concentration in Climatology. Students whose primary



interests will include water flow or temperature responses below the ground surface, surface biological processes, sediment flows, landforms, or glacier processes should declare a concentration in Land-Surface Processes. Inevitably some topics will be difficult to classify, especially those including human impacts on and of these physical processes. Therefore, changes in concentration once a dissertation proposal has been prepared, before the comprehensive exams, will normally be approved by the department if supported by the advisory committee.

**Course requirements.** At least three academic years of graduate academic work are normally required for the Ph.D. degree. Students are expected to be in residence (enrolled full-time) at least two continuous years beyond the master's degree. The University requires at least one continuous academic year of full-time study (nine credit hours per semester) in residence at the University of Delaware (see the graduate Catalog for specific requirements). Course credit earned in our M.S. degree will be applied toward the Ph.D. The definitions of graduate courses and limits on transfers discussed at the beginning of the master's degree section also apply to the Ph.D.

Students are expected to acquire general knowledge of physical geography, along with specialized knowledge in two areas, one of which is a subfield covering the research area and the other being in technical methods. Typical technical methods include graduate course work in statistics, mathematics, computer science, GIS, or related sciences that are relevant to the area of research of the dissertation. Roughly half of the courses applied to the Ph.D. program should be in topical areas related to the chosen concentration, and the other half should be in technical, mathematical, and methodological areas needed for research in the chosen area. Determining that a suite of courses adequately fulfills these requirements is one of the roles of the advisory committee. The committee will determine if the student has adequately understood these areas, over and above the evidence of the transcript, during the comprehensive examination.

**Dissertation Credits.** Each student must enroll in at least nine credits of GEOG 969 Doctoral Dissertation. Enrollment for these credits is allowed only after achieving candidacy status (see below). GEOG 969 will be given a temporary grade (usually S for satisfactory progress) at the end of each semester, and a final grade will be submitted for the dissertation after completion of the defense. Precandidacy students needing credits to maintain full-time status for funding purposes may take GEOG 964 Pre-Candidacy Study for a variable number of credits, pass/fail. Following completion of all requirements except the final dissertation, including the comprehensive examination and the dissertation credits, a student may enter sustaining status.

**The Dissertation.** As with the master's thesis, the requirements for a doctoral dissertation are intangible—not based on any quantifiable limits. The most important role of any advisory committee is judging when a body of work has become a sufficient doctoral dissertation. The dissertation must be original research, largely carried out by the candidate. Close collaboration with an adviser is normal, but leadership in research and clear contributions to scientific interpretations by the candidate should be visible. The dissertation must be a contribution to knowledge following the traditions of the scientific method—it will not be based solely on literature review but will include new data collection, data analyses, experimentation, or modeling. A typical understanding of “contribution to knowledge” is

that the dissertation reports on work suitable for publication in high-quality, refereed scientific journals.

Because academic positions are a common goal of Ph.D. students, the dissertation forms an important foundation for the entire career. The Ph.D. dissertation usually provides the core of the first few papers by an assistant professor, the basis for early funding proposals, and the initial research direction that will be taken during the early part of the academic career. A well-chosen dissertation topic that leads to useful, positive, publishable results and to topics for further research is essential to building a successful career. Dissertation research is usually presented as part of an interview for entry-level faculty positions, and the potential for a successful assistant professorship working from the foundation provided by the dissertation research will be an important factor in faculty hiring decisions. A poorly chosen topic or minimal effort towards finding real results will have life-long career consequences.

**The Dissertation Committee.** An advisory committee consisting of four to six members will evaluate the program of courses, the comprehensive examination, and the doctoral dissertation. The adviser, who is usually chosen before a thesis topic is worked out, chairs the committee. The adviser will help refine the topic and choose other members of the committee. The adviser should have established a record of scholarship in the field of the thesis and be a member of the faculty of the Geography Department of the University of Delaware. The definition of faculty includes professional staff holding secondary faculty appointments within the department. Faculty who have retired or resigned from the university may continue to chair committees of students whose work began under their direction before their retirement or departure from the university.

The minimum of three additional members of the committee must fill the following categories: one will be another member of the Geography Department from within the area of concentration, one will represent the secondary area of study, usually the methods or technical area of study, and one will be an external member. The external member may be from outside the University in order to broaden the perspectives of the committee, or the external member may have a primary appointment in a University of Delaware department other than Geography. The external member is a full, voting member of the committee. External members from outside the University of Delaware should be chosen with an eye to the willingness and practicalities of having such a member either present or electronically connected during the oral comprehensive exam and the defense.

The recommendation within our program is to have a committee of five: the adviser, two additional members from within the program, a member from the University of Delaware representing the methods or techniques area, and an external member as defined above. The entire committee, including the external member, evaluates the comprehensive exams and the suitability of the program leading up to those exams, so the committee has responsibilities greater than those defined in the *Catalog*. Specifically, there is no department-wide or concentration-wide comprehensive exam—each examination is created by the committee to adequately test each candidate based on individual interests. Occasionally, during the lapse of time between the comprehensive exam and the final defense, changes in the job status of committee members (including sabbatical leaves) or metamorphosis of the dissertation topic may require or suggest changes in the committee. This will be acceptable, so long as the committee at each stage satisfies the requirements for a dissertation committee.

The Geography Department (usually acting via the Chair) approves the composition of any committee and the suitability for membership of anyone not on the regular faculty of the University of Delaware. The Chair's signature on the final dissertation is taken to mean approval of the committee and its procedures by the department, rather than an acceptance of the dissertation itself based on evaluation by the Chair.

Doctoral committees strive to achieve consensus concerning the student's performance and quality of work. In the case of dissenting votes, the majority opinion rules and a majority vote in favor is needed for successful comprehensive exams and for a successful defense. In a committee with an even number of members, a "majority" required for passing or approval at any stage must include more than half of the members, not just exactly half of the members.

**Comprehensive Examinations.** Two major examinations are required for the PhD. The Comprehensive Examination is normally undertaken after course work is substantially complete and a dissertation topic has been chosen and given some preliminary investigation. The Dissertation Defense includes a public presentation of the final results of the research

*The Written Examination.* The comprehensive examination consists of a written portion and an oral portion. The written portion is undertaken first. The adviser will solicit questions from the rest of the committee to be administered by the department. Normally, these questions will cover the topical area of that committee member, such as information from the graduate courses taken by the student from each committee member, or background information needed for the general area of the dissertation research that the committee member feels is most important. The member who generates a question also sets the conditions of the exam for that question (open book/closed book, use of computers, time limits). Members of the committee other than the adviser will usually each require no more than three hours of writing during the written exam, but more time may be expected with advance warning.

*The Oral Examination.* The oral portion of the comprehensive exam will be scheduled within a month of the written portion. The oral comprehensive exam is private—only the committee and the candidate attend. No formal rules govern the format of this exam, but commonly, a short (20 to 30 minute) presentation of the intended dissertation research by the candidate precedes questioning. Questions from the committee may be on anything relevant to the student's past training and future research plans. The oral exam is sometimes used to follow up on questions from the written examination, seeking clarifications or amplifications. Most of the questions in the oral exam typically focus on the proposed dissertation research. The committee members may use this opportunity to seek clarifications, suggest modifications, or deduce whether the candidate is properly prepared to engage in the proposed research.

Because much of the oral comprehensive exam centers on the proposed dissertation topic, it is normal to have a formally written dissertation proposal circulated to the members of the committee well in advance of the comprehensive examinations. Commonly, this proposal will have a statement of the problem, a literature review that might be taken as an early draft of the dissertation's literature review, a description of research methods and data sources or experiments that will be undertaken for the dissertation, and some hoped-for or expected results.

The timing of the comprehensive exam is often controlled by the readiness of the dissertation proposal. The exam may not be scheduled before the end of first year in residence (but no student in the history of the program has come close to violating that rule). The exam should not be scheduled before a topic has been studied sufficiently to make a defensible proposal. The literature review should be sufficiently advanced to show that a topic is interesting, useful, and plausible. The proposal should show that necessary data will be obtainable and that the research methods are practical. However, the committee should not be presented with a proposal that is nearly a first draft of the dissertation, on which suggestions and input seem too late to be relevant. The ideal time for a comprehensive examination, when ideas for the dissertation are well thought out but not yet ossified, will often need to be compromised by the availability of the committee members to meet at one time and location for the oral exam.

Although the written and oral portions of this exam seem separate and may be weeks apart, they are considered two aspects of the same exam. Each committee member will register a “pass” or “fail” for the entire, combined examination. A passing grade by a majority of the committee admits the student to doctoral candidacy, conferring a change of status and eligibility to take dissertation credits. A committee member may also register a conditional pass in which a passing vote is understood to follow satisfying some additional piece of work, such as studying a particular topic and demonstrating improved understanding.

If a candidate does not receive a majority of passing votes, then permission to retake the exam can be given if approved by a majority of the committee. At that time, the committee may specify that only the written or oral portion need be retaken, or they may specify that the entire exam must be retaken.

An important element of a successful comprehensive exam is communication with the committee members. If possible, discuss potential written examination questions or topic areas months in advance. Committee members may suggest readings or subjects to review and outline the general areas that they will cover with their questions. Provide committee members with a proposal far enough in advance that you can discuss it with them after they have had a chance to read it. Ask for feedback on your written examination answers before the oral exam. Discussions with committee members after the written exam may influence their evaluation of the overall performance. Committee members may choose to give no information whatsoever before exams, but most would rather deal with a prepared candidate than a surprised candidate.

Rules and traditions for the comprehensive exams vary widely among departments and universities. Communication with external members about roles and expectations of the committee members will normally be taken care of by your adviser, but it is in your interests to make sure that communication happens at that level as well.

**The Dissertation Defense.** After the committee has been presented with a complete draft of the dissertation, a defense of the dissertation should be scheduled. The defense includes a public presentation of the dissertation research and an opportunity for public questioning. The committee may also choose to hold some of the questioning in closed session. Students can gain a perspective on the format and tone by attending some defenses during their time in residence.

The committee must have the dissertation in hand at least two weeks before the defense. The degree of collaboration with committee members will vary. Some dissertations are done completely independently, with even the adviser only serving as first editor for completed chapters. More commonly, a considerable degree of collaboration exists among the candidate, the adviser, and one or two of the committee members. Some members will wish to see chapters as they come out, and some will prefer to only see the final dissertation just before the defense. As with the comprehensive exam, communication is important. It is to the candidate's advantage to have more committee members than just the adviser be familiar with the evolution of the project since the comprehensive exams.

The committee will always convey minor editorial suggestions to the candidate at the defense. Committee members can request substantial changes in a dissertation and make the final passing vote contingent on seeing the revised work. Even though minor changes following the defense are inevitable, the dissertation should be complete, with all the elements and quality of a final version, at the defense, including all graphics, tables, references, and preliminary parts.

When a majority of the committee agrees to a passing vote for the dissertation defense, the candidate is responsible for making a final version of the dissertation in the required format (currently, the Graduate Office requires PDF), printing signature pages on the required paper, obtaining signatures from the committee members and the department chair, and getting these to the Graduate Studies office, along with various forms and fees. The UD Bookstore offers thesis binding for additional copies, if desired.

**Timetable for the Ph.D.** Ph.D. programs are necessarily more variable than master's programs. Students moving into the Ph.D. program from our own M.S. program will often have few additional courses to take, whereas students entering from master's programs in related fields may need two years or more of full-time coursework to be properly prepared. Ph.D. students may look over the timetable given for the master's degree, but development of a Ph.D. thesis topic will be a much more substantial effort. The tradition of generating a formal proposal for the comprehensive exams and the overwhelming importance of choosing a dissertation topic well simply require more time. In addition, research on the Ph.D. thesis is at least one year of full-time work. Very roughly, an entering Ph.D. student may expect to spend an additional year taking courses and exploring dissertation ideas, half a year refining the proposal and preparing for the comprehensive examination, and one to two years in the research and writing of the dissertation. The Ph.D. degree is also subject to a university-specified time limit of five years.

## Format of Master's Thesis or Doctoral Dissertation

The Office of Graduate Study regulates the physical characteristics of the final copies of theses, including criteria for margins, page layout, typography, paper stock, and the content of the preliminary pages. The thesis must comply with all of these regulations at the time you submit the final copies. The *Thesis and Dissertation Manual* is available online. The Information Technology User Services group on campus maintains template or macro packages, known as UDThesis, designed to provide thesis-style formatting in a few word-processing or text-formatting packages.

Theses must be in American English and must be literate and well written. Many readers, including perhaps your committee, will equate the quality of your ideas with the quality of their expression—if your prose is jumbled and disorganized, then your ideas and interpretations are probably also suspect. Scientific units and mathematical text have special typographical rules and conventions. Documents summarizing the U.S. National Institute of Standards and Technology views on use of units and mathematical typography may be obtained from <http://physics.nist.gov/cuu/Units/rules.html>

Because of the wide range of topics covered in this department, we do not enforce the citation style and reference style of any particular organization. Commonly, theses will follow the reference style of the *Annals of the Association of American Geographers* or the journals published by the American Meteorological Society, but other styles can and have been used. The adviser will typically suggest either a particular journal or recent thesis to emulate in reference style. The references must be complete and consistent within the thesis.

## Annual Review

Each winter graduate students are asked to provide the department with a summary of their academic activities for the previous year. These reports are reviewed by a small committee of the faculty and, in conjunction with the input of the student's adviser, a response with consensus advice of the faculty is provided to the student. The review serves as an adjunct to the adviser/student relationship and it provides the department with useful information regarding the progress of our students.

## Funding

**Funding types.** The department tries to fund as many as possible of its full-time graduate students at a level that enables reasonable subsistence in the Newark area. Stipends vary slightly with degree level (masters or doctoral student). Stipends do not vary with type (RA, TA, or university-generated fellowship). University-generated fellowships and assistantships are provided with full-time graduate tuition. In addition, the department makes office space available to all funded graduate students.

*Fellowships* carry no departmental work obligation. A few fellowships are controlled by the department to assign as it sees fit. These are most often granted to first-year students. A second source of fellowships is the university's Competitive Fellowship program, for which the department nominates a maximum of two students each year. Only a few dozen Competitive Fellowships are awarded university-wide each year. Some additional competitive fellowships are reserved for highly qualified members of underrepresented minority groups or students overcoming special circumstances, and some are directed specifically at Ph.D. students who have entered candidacy. The department's Awards Committee selects nominees carefully, based on perceived chances of success when compared to students from other disciplines. Nominations for these fellowships must come from the department, not from the individual applicant.

Holders of these university-based fellowships must maintain full-time graduate student status by taking at least nine graduate credits. Although no departmental work obligation is required, holders of fellowships should engage in the usual level of departmental service.

*Teaching Assistants* provide 20 hours per week of work (on average) in the department's educational mission. Assignments each semester are based on departmental needs, student

experience, and student schedules. Under the supervision of a faculty member, TAs may teach labs, prepare exercises, assist in gathering instructional materials, grade assignments and tests, proctor exams, run tutorial and review sessions, and hold office hours. Flexibility on the part of both TA and faculty supervisor is expected, in that assignments may vary greatly from week to week depending on the work being done in a course; TAs also have varying obligations to the courses they are taking for credit. Full-time status for a TA requires taking at least six graduate credits per semester.

*Research Assistants* provide 20 hours per week of work on a funded research project under the supervision of the principal investigator (the faculty member who obtained the grant under which the project is funded). As with TAs, RAs are expected to be flexible about workloads, which may vary greatly from week to week. Under ideal circumstances, the funded research project contains within it the student's thesis research topic, in which case the actual time spent on the project may be much higher than 20 hours per week. Full-time status for an RA requires taking at least six graduate credits per semester.

*Tuition Scholarships* are occasionally available. As the name implies, these scholarships contain sufficient funding to pay full-time tuition, but they contain no subsistence funding. The department is allowed to request 10 hours per week of work in return for a tuition scholarship.

*External fellowships* are in a different category, since they do not come to the student through the University of Delaware. Students have obtained funding from such sources as NASA's Global Change Fellowship program, NASA's Space Grant program, the American Meteorological Society's Fellowship program, the American Association of University Women, and others. Stipends and conditions on these fellowships vary. Obtaining such fellowships is important to the department, so we assist any student applying for them in every way possible. We attempt to find tuition scholarships for externally funded students whose fellowships do not include tuition, and we provide office space for externally funded students.

**Time limits.** Internal funding awards are made at most one academic year at a time, without exception. The department almost universally provides a second year of funding to students admitted with funding, so long as adequate progress has been made during the first year. For students entering the Ph.D. program, three years of funding is the norm, with additional funding highly dependent on progress and availability of resources. An additional year of funding may be applied for and may be granted depending on the merits of the request and of available funding.

**Funding period.** The university considers students who receive internal fellowships or assistantships fully funded for the nine-month academic year. As a condition of receiving these fellowships and assistantships, they agree not to work more than 20 hours per week during the academic year without permission, which effectively eliminates additional outside employment. This restriction exists because the primary goal of these fellowships and assistantships is to help a student obtain a graduate degree. Hence, we wish to maintain a sufficient amount of time for personal coursework and research. The department does not assign TA obligations during winter session. RAs vary with the project, but often expectations continue through winter session.

Summer funding is not automatically included in any of the standard funding packages. Summer offers to first-year graduate students include additional application requirements and are considered a form of RA. Many RA packages and some external fellowships provide additional funding to cover some or all of the summer months.

Graduate students who have TA experience in our introductory courses, and who have approval of the course's primary instructor, handle most of the department's winter and summer session teaching. Besides providing an additional funding source, such teaching is an invaluable experience for students considering an academic career.

**Sustaining status.** Students who have completed every requirement for a degree except presenting or defending and submitting the thesis may consider registering as sustaining, rather than as full-time students. Students who leave full-time student status while still working on a thesis are required to register as sustaining in every regular semester until they graduate (and in their last summer or winter session, if they are going to graduate at the end of that session). However, students are not allowed to register as sustaining, even if they leave the university and full-time student status, unless all course credits, thesis or dissertation credits, and any other requirements for the degree are fulfilled.

## Ethics, Rules, Problems

The University of Delaware expects all faculty and graduate students to maintain high ethical standards in all professional activities. The university provides occasional seminars on research ethics, and attendance at one of these during a graduate career is strongly recommended. Some research is bound by more rules than you may be used to. For example, research involving human subjects requires approval by a university committee, and these restrictions may come into place with such seemingly minor things as surveys and interviews. Restrictions on handling of hazardous materials come into play with such things as anti-freeze used in rain gauges, lead-acid batteries, and mercury-contaminated soil samples. You are expected to be in compliance with all such rules, but the university will provide all necessary training and information, and the department stands ready to direct you to information. Please start by asking your adviser whenever you are in doubt.

Complaints of a more difficult nature arise very rarely but are taken very seriously, such as disputes regarding a grade, accusations of academic misconduct, concerns about sexual harassment or any other kind of harassment. The university has well-defined procedures in place for dealing with most academic grievances, sexual harassment claims, and other problems. The contact offices maintain a strong web presence on the UD web site so that you can find them privately, but feel free to contact department staff or the Chair to help find such resources.

One type of dispute that cannot always be resolved by grievance procedures and moderation is an academic dispute in which a student disagrees with a faculty member regarding a fundamental point about the validity of a scientific result, whether a contribution to a project is worthy of authorship credit, or whether a piece of work constitutes a satisfactory thesis or dissertation. As described above, judgment on such items is placed entirely in the hands of advisers and committees. No level of university administration will ever override a purely academic or scientific judgment of one of the faculty, so a student must be prepared to meet the concerns and standards of the committee. In extreme cases,



late changes of adviser and committee will be permitted, but in such cases the department will seek to make sure that research ideas from one faculty member are not being unfairly credited to another—a form of intellectual property theft.

## Graduate Student Service and Activities

Graduate students engage in variety of activities generally in the category of professional service. None of these activities is required in any formal sense—it is always possible to complete a degree without doing any of these things. However, just as the faculty serve on committees, review papers and grant proposals, and undertake responsibilities within national organizations and within the wider public community, so also service is part of the professional development of graduate students.

**Student Governance.** Within the department, graduate students meet regularly to discuss issues of their concern, including issues that may arise by questions to them from the faculty. These meetings are called and led by an elected graduate student representative. The graduate student representative also attends faculty meetings (except when personnel issues are being discussed) and serves as a communication conduit between faculty and students. Another representative is elected by the students to represent our department at the university's Graduate Student Association.

**Department life.** Graduate student volunteers handle departmental recycling efforts, help plan and take care of logistics for our seminar series (snacks, audiovisual setups, cleanup, etc.), and help plan and execute the department's annual social events, among other things. While seemingly mundane, these activities have a profound effect on the quality of life within the department. Graduate students also provide an important educational service to the department by proctoring exams.

**Professional contacts.** Some activities within the department are undertaken primarily to provide a wider education, as well as contacts with people from other departments and other campuses. The departmental Friday afternoon seminar series provides a regular series of these contacts—attendance at seminars is expected. Many of our outside guests for seminars also spend some time in the department on the day of their presentation, and meeting times are usually set aside for graduate students to get a more informal chance to learn from our visitors. Related seminars from other departments are regularly scheduled, and notices of these are posted in the department.

The department encourages and subsidizes travel of students for professional activities, such presentation of papers or posters at conference and outside training courses. (Attending the national meetings of the Association of American Geographers at least once before one is ready to present a paper may also be subsidized—check with the department office for current rules and amounts.) Women students may obtain a small additional travel subsidy from the university's Office of Women's Affairs. These conferences are an excellent opportunity for students to meet the people whose papers they read. Visibility at the national AAG meetings is important for Ph.D. students who will be seeking an academic career in American geography.

## Resources

**Institutional resources.** Climatological research is supported by a University Center for Climatic Research and the Office of the State Climatologist, both located within the department. Research facilities include extensive computer resources (discussed below) and a collection of microclimatic instrumentation to support field research.

Studies in geographic education are enhanced by the Delaware Geographic Alliance, a coordinated effort by the Department, teachers, school administrators, and the Delaware Department of Public Instruction. Funded by the National Geographic Society and the State of Delaware, its mission is to help bring Geography back into the K-12 curriculum via four goals: to strengthen the ability of teachers to teach geography throughout the curriculum; to establish links with policy makers; to develop curriculum and teaching materials; and to strengthen public awareness of the value of geographic learning.

**Computational resources.** The department strives to provide graduate students with sufficient computing resources for all their course work, thesis research, information gathering, writing, and preparation of graphics, presentations, and thesis drafts. All students entering the University of Delaware immediately receive access to the central Unix systems for general purpose computing, udel.edu email accounts, space on the Copland server to establish a personal web page, and relatively unlimited access to the internet via udel.edu gateways. The department sponsors additional resources to allow graduate students to do research and maintain course files on central Unix services, and on distant supercomputers accessible through SURANet.

The more data-intensive aspects of GIS have motivated the department to maintain several smaller Unix-based application and file servers on which much larger amounts of data-storage space are available than on the central systems. All of the PCs in the department are configured to use the departmental file servers, allowing protected storage of personal files for use from any of the departmental PCs. The department has made an effort to install a minimal PC on every graduate student desk, and some research groups provide better equipment for their students. The best equipment owned by the department will typically be in the shared space, Pearson 218, which serves as a university-wide GIS teaching and research lab. All of the equipment in Pearson 218 is available whenever classes are not in session in that room, and the stations outside the partition are available for quiet work at all times, including when classes are in session behind the partition.

Limitations on our budget and common courtesy require that you be reasonably conservative in your use of the more expensive resources, such as color printing, and that you defer to students with pressing research and coursework problems at times when most of the seats in 218 are full. Some hardware devices and software are only attached to particular PCs, so you may at times be asked to move your work to another machine if one of these specialized resources is needed.

The department's Geographic Systems Analyst, Kenji Matsuura, administers computers owned by the department. Requests for resources on the department's servers, reports of problems with machines in Room 218, and inquiries about what resources we have and where they are located should be directed to him. Requests for resources and questions about access on the central systems should be directed to Brian Hanson, who serves as the liaison to the university's Information Technology division for these requests.

Requests for additional software installations on our departmental machines should be directed to Tracy DeLiberty and Michael O'Neal, who evaluate our licensing costs and needs. The department is strict about maintaining only properly licensed software on the machines it controls.