



**Doctor of Philosophy in Geospatial
Science and Engineering
South Dakota State University**

Graduate Program Handbook

**Prepared by Dr. Michael C. Wimberly, Graduate Program
Coordinator**

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1. Introduction

The purpose of this guide is to provide a unified source of information for students and faculty involved in the Ph.D. program in Geospatial Science and Engineering (GSE) at South Dakota State University (SDSU). Specifically, the graduate program handbook outlines the purpose and scope of the program, describes the admissions process, lists the academic requirements for earning a Ph.D. in GSE, and summarizes the necessary administrative steps for progressing through the program. The guide provides general information that should be applicable to most students in the GSE program, but is not intended to address every specific circumstance that might arise. For further guidance, please contact the graduate program coordinator (Dr. Michael Wimberly, Michael.Wimberly@sdstate.edu).

This guide does not provide specific dates or deadlines. These dates are set by the South Dakota State University Graduate School and change from semester to semester. Similarly, this guide does not include the [official graduate school forms](#), which can be obtained from the Graduate School website. To our knowledge, the information provided in this program guide accurately reflects the current SDSU Graduate School regulations and guidelines, and the guide will be updated regularly to reflect changes. However, the [SDSU Graduate Program Catalog](#) should be considered the most up to date source of information on official regulations and procedures.

2. Overview

2.1. *The Program*

The Geospatial Science and Engineering (GSE) Ph.D. is an interdisciplinary program that combines advanced coursework with cutting-edge research to advance the field of geospatial sciences. The focus is on transforming geospatial data into relevant information through acquisition, processing, characterization, analysis, and modeling in order to understand geographic patterns, processes, and relationships at scales ranging from landscapes to the globe. To achieve these aims, the geospatial sciences integrate the geographic disciplines of cartography, geodesy, geographic information systems, and remote sensing with elements of mathematics, statistics, the natural sciences, the social sciences, and engineering. The resulting array of geospatial concepts, methods, technologies, and datasets are used to address a wide range of pertinent questions about the functioning of the biosphere and its implications for sustainability of natural resources, agricultural productivity, biodiversity, environmental quality, and human welfare in a rapidly-changing world.

The core faculty of the GSE doctoral program includes members from multiple research centers at SDSU, including the [Geospatial Sciences Center of Excellence](#) and the [Image](#)

[Processing Laboratory](#) in the department of Electrical Engineering & Computer Science. Participating departments include Agriculture & Biosystems Engineering, Civil & Environmental Engineering, Geography, and Natural Resource Management. It is possible for faculty and students of other departments to participate as well; please contact the graduate program coordinator for more information.

The GSE program is overseen by a coordinating committee consisting of representatives from the participating research centers and departments. The program is administered by the graduate program coordinator, who is responsible for processing admissions, providing information and assistance to students and faculty, tracking the progress of students through the program, and managing program data for periodic reports and assessments.

2.2. The Degree

The Ph.D. is the highest academic degree that can be awarded, and the purpose of a Ph.D. program is to develop the specialized knowledge and research skills that are needed to pursue a successful career as a professional research scientist or academic. To earn a Ph.D., the student must demonstrate academic mastery of their field of study and also expand this body of knowledge by conducting independent research. As a result, a Ph.D. program requires 1-2 years of advanced coursework in the student's field of study followed by several additional years during which the student plans, executes, documents, and disseminates the results of a major research undertaking. To successfully complete a Ph.D. program, the student must have solid academic preparation, a high aptitude for research and scholarship, a strong interest in the field of study, excellent communication skills, and the tenacity to persevere through a long and difficult program.

2.3. Student Outcomes

The program is intended to strengthen, broaden, and deepen the technical and scientific backgrounds of the students by providing advanced study and research experience in one or more of the myriad fields that contribute to the interdisciplinary endeavor that is Geospatial Science & Engineering (GSE). Students that complete the program will gain the ability to make original contributions to these fields by performing scientific or technical research. In terms of specific outcomes, graduates of the GSE Ph.D. program will demonstrate the following capabilities of a research scientist:

- Understand and critically evaluate relevant published literature
- Apply appropriate scientific principles and technical procedures to the recognition, interpretation, and understanding of issues and problems at the frontiers of knowledge spanned by Geospatial Science & Engineering
- Develop approaches to study identified research problems
- Undertake independent research within a supportive environment

- Analyze and evaluate research results in an appropriately rigorous manner
- Make original contributions to the fields of Geospatial Science & Engineering that develop new and useful knowledge
- Effectively communicate relevant scientific and technical ideas, principles, and theories through written, oral, and graphical means
- Follow ethical norms in research, collaborating, reviewing, and mentoring

2.4. Strategies for Achieving Program Objectives

The goals of the program are realized through the following process:

- Admission requirements that ensure the adequacy of the technical background, academic preparation, communication skills, and personal motivation of the prospective students seeking to pursue a doctorate in GSE
- A structured group of required courses to ensure access to appropriate core knowledge
- A plan of study approved by an advisory committee that ensures access to appropriate specialized knowledge
- A written comprehensive examination that assesses the ability of the doctoral student to summarize and synthesize unfamiliar information in a coherent way to address a novel topic
- An oral comprehensive examination that assesses the ability of the doctoral student to command and apply foundational knowledge from coursework and the relevant fields of Geospatial Science & Engineering
- A dissertation prospectus meeting that assesses the ability of the doctoral candidate to set forth a clearly articulated and motivated plan to address her/his dissertation research through a written research proposal and an oral presentation.
- A doctoral dissertation that demonstrates the ability of the doctoral candidate to identify, define, and test an original set of hypotheses and/or research problems and then evaluate critically the significance of these findings to the broader science
- A final dissertation defense that assesses the ability of the doctoral candidate to present in a public forum a clearly articulated synopsis of his/her dissertation research.
- Proper tracking of student progress through the degree program, including exams, evaluation benchmarks, and research products

3. Program Description

3.1. Degree Plan

Students may declare one of the two specializations in (1) ***Remote Sensing Geography*** or (2) ***Remote Sensing Engineering***; or they may elect to pursue a degree in interdisciplinary geospatial science without a specialization. This latter option provides flexibility to customize an interdisciplinary course of study.

3.2. Total Credits Required

A minimum of 60 semester credits beyond the Master's degree (60-Credit Plan) or 90 semester credits beyond the Bachelor's degree (90-Credit Plan) are required for the Doctor of Philosophy degree. For consideration to be given to an earned master's degree, that degree must be in the area of the major, minor or a related area; from an academic program at a regionally accredited institution; and declared at the time the Plan of Study is submitted. The Advisory Committee may require more credits than the minimum listed above if it believes the extra courses are in the best interests of the student.

In accordance with the program admission standards, students are generally expected to have earned a relevant master's degree before they are admitted to the GSE Ph.D. program. Thus, most students will pursue the 60-credit plan. The 90-credit plan may be used in rare situations where a student does not hold a master's degree, but has gained extensive disciplinary expertise through their work or other activities. However, because of the large amount of required coursework, the 90-credit plan is generally not recommended.

3.3. Graduate Credit Requirement

At least 50 percent of the credits on a Plan of Study must be in courses open only to graduate students (600-series or above).

3.4. Required Courses

All three degree plans are required to take six credits in required courses as follows: (1) GSE 740 *Introduction to Geospatial Science and Engineering* (3 cr.) and (2) GSE 790 *Seminar in GSE* (1 cr. x 3). GSE 740 provides an introduction to GSE, professional skills development, research ethics, and a brief introduction to tools and techniques appropriate for scientific research. Three credits of the one-credit seminar course GSE 790 are required, but attendance at this program-wide speaker series is strongly encouraged throughout the degree program.

The **Remote Sensing Geography** specialization further requires six credits in two core courses:

- a. GSE/GEOG 741 *Quantitative Remote Sensing for Terrestrial Monitoring*

b. GSE/GEOG/ 743 *Geospatial Analysis*

The **Remote Sensing Engineering** specialization further requires six credits chosen from among the following courses:

- a. GSE/EE 751 *Remote Sensing Engineering*
- b. GSE/EE 753 *Advanced Image Processing*
- c. GSE/EE 754 *Active Sensor Systems*

Additional multidisciplinary coursework is required: a minimum of 12 credits for the 60-credit Plan (15 credits, if pursuing the interdisciplinary geospatial science option), or 15 credits for the 90-credit Plan (18 credits, if pursuing the interdisciplinary geospatial science option), This additional coursework must be selected from an approved list of supporting courses or courses approved and directed by the student's advisory committee.

In addition, at least 36 credit hours of dissertation research (GSE 898D) are required.

3.5. Registration and Status

To maintain active status, graduate students must be registered each semester of the academic year (excluding summer). All graduate assistants must register for a minimum of one (1) credit (including summer) in order to maintain an assistantship. Students who are not registered will be moved to inactive status. Inactive students must apply for readmission and be accepted before continuing their graduate studies.

International students are required to maintain full-time student status by registering for 9 or more credit hours per semester during the Fall and Spring Terms. International students on graduate assistantships are also required to register for a minimum of one (1) credit during the summer semester to maintain their assistantship. If an international student wishes to take less than 9 credits in fall or spring semester, he or she must submit a reduced course load form to International Student Affairs by the appropriate deadline and provide a documented reason for the request. It is the academic advisor's responsibility, not the student's, to specify the reason for the RCL request. International students should consult the International Student Affairs office for up-to-date information on reduced course loads.

4. Application and Admissions

The GSE program seeks highly motivated students with strong backgrounds in the geospatial sciences or a closely-related field. Admission to the GSE program is competitive and limited by the availability of personnel, facilities, and funding necessary to provide quality graduate education. GSE is an interdisciplinary program with

participating faculty members from several departments. The scope of the geospatial sciences is broad, and individual faculty members will only advise students within their particular area of specialization. Financial support for students is provided by individual faculty members through their research grants or other funding sources. For these reasons, the application process is highly competitive, and meeting the minimum standards does not guarantee admission. In particular, a key criterion for admission into the Ph.D. program is for a GSE faculty member to agree to serve as the student's major advisor. See the section on graduate advising, below, for further discussion of the role of the major advisor.

Current faculty research interests cover a broad range of topics, including quantitative remote sensing, sensor design and calibration, land cover and land use change, geography, hydrology, landscape ecology, climate change, and fire science as well as applications of geospatial technologies in natural resource management, public health, agriculture, and other fields. Before applying to the program, prospective students are strongly encouraged to contact individual faculty members in their area of specialization to identify prospective advisors, discuss their research interests and educational goals, and determine if graduate assistantships are available. Prospective students can also contact the graduate program coordinator for general information. All applications must meet the admission criteria of the Graduate School before being accepted into the GSE program, and formal offers of graduate assistantships will not be made until students have been officially accepted by the Graduate School.

4.1. Application Procedure:

The major steps and requirements for applying the Ph.D. program in Geospatial Sciences & Engineering are highlighted below. For complete details, consult the [Admission Information](#) section of the SDSU Graduate Catalog.

Application Form - The applicant must complete and submit the application form supplied by the Graduate School. The electronic application form is accessible via the following webpage:

[SDSU Graduate School Application Website](#)

Application Fee - The applicant must pay a non-refundable application fee of \$35 (U.S. Dollars). Applicants can pay via credit card as part of the electronic application process, or they can mail a personal check or money order to SDSU after completing the electronic application. International students may either submit a demand draft or make payment via credit card. Contact the SDSU Graduate School for additional information.

Official Transcripts – A GPA of 3.0 is required to receive unconditional acceptance into the program. Applicants must provide official transcripts from all post-secondary

institutions. The Graduate School will access all South Dakota regental transcripts, but the student must furnish all those from non-regental institutions.

A professional credential evaluation must be completed for all academic transcripts of higher education from institutions outside of the USA. Evaluations must include transcript authenticity, GPA calculation, and U.S. degree equivalency and be sent directly from the evaluation service. Transcript evaluation must be performed by a [National Association of Credential Evaluation Services \(NACES\)](#) accredited evaluation service member.

Letters of Recommendation - Two letters of recommendation from persons acquainted with the academic ability and professional competency of the applicant should be sent directly to the Graduate School. Requests for letters of recommendation can be sent as part of the electronic application process.

Statement of Purpose - Applicants must provide written statement describing their research interests and academic goals in pursuing a Ph.D. In this document, applicants should specify one or more faculty members whom they have identified as potential advisors. The statement of purpose can be uploaded as part of the electronic admissions process.

Graduate Record Examination (GRE) - The Graduate Record Examination (GRE) is required of all applicants to the GSE program. The scores should not be more than four (4) years old and an official copy must be sent to the Graduate School directly from the Educational Testing Service. The institution code for SDSU is 6653.

TOEFL Score - The TOEFL or IELTS score is required of all students from countries in which English is not the official language. A score of 527 paper-based, 197 computer-based, or 71 Internet-based or above is required by the Graduate School. The scores should be less than two years old and an official copy must be sent to the Graduate School directly from the Educational Testing Service. The institution code for SDSU is 6653.

Immunizations - All university students (domestic and international) must provide documentation proving two (2) properly administered measles (rubeola), mumps, rubella (MMR) immunizations OR immune titers for measles, mumps and rubella. Furthermore, all international students are required to submit to a tuberculosis skin test upon arrival. For more information contact: [Student Health Clinic and Counseling Services](#) or the [Office of International Affairs & Outreach](#).

Contact Information - Consult the [Graduate School](#) webpage for more information on applying to graduate school at SDSU. Additional information pertaining to international students can be found on the [International Student and Scholars Services](#) website. For specific questions about the Ph.D. program in Geospatial Science and Engineering, contact the graduate program coordinator:

Michael C. Wimberly
Geospatial Sciences Center of Excellence
Wecota Hall, Box506B
South Dakota State University
Brookings, SD 57007-3510
Phone: 605-688-5350
Fax: 605-688-5227
Email: michael.wimberly@sdstate.edu

5. Financial Support

Students will typically require financial support to fund their graduate studies and support their research activities. This support can be provided through graduate research assistantships (GRAs) which are funded through research grants to the student's major advisor. Some departments may also offer graduate teaching assistantships (GTAs), which involve teaching laboratory sections, grading coursework, or other activities in support of teaching. Students can also bring their own funding, which could be obtained through a fellowship program or through the support of their employer.

Because the GSE program spans multiple centers and colleges, there is no central pool of funding available to graduate students. In most cases, funding will come through the home department of the student's major advisor. Each department sets its own policies and salary levels for assistantships, and students will need to consult with prospective advisors to obtain information about funding opportunities.

6. Graduate Advising

6.1. Major Advisor

The major advisor plays a critical role in the student's Ph.D. program. The primary responsibility of the major advisor is to serve as a mentor who guides the student's research from the developmental stages through to the completion of the dissertation. The major advisor directs the student in the selection of a research project and development of research objectives and hypotheses; provides support in the technical and analytical aspects of the research; and mentors the student through the process of writing research papers, submitting them to journals, and responding to reviewers.

The major advisor also guides the student in the development of their program of study to ensure that they have sufficient academic preparation to carry out their dissertation research and supports the student in the pursuit of other professional development opportunities, including proposal writing, presentations at professional meetings, and teaching and service opportunities. In addition, the major advisor often provides financial support to full-time students through graduate assistantships and facilitates

access to physical space, computers, and other resources required for the student to pursue their research program.

6.2. Advisory Committee

Each student will have a Ph.D. advisory committee composed as follows:

A. The major advisor, who officiates as committee chair and must hold full graduate faculty status at SDSU.

B. At least three additional members who have appropriate expertise in the relevant fields of Geospatial Science & Engineering. These committee members must hold either full or associate graduate faculty status at SDSU.

C. A representative of the Graduate Faculty who is appointed by the Dean of the Graduate School.

Advisory committee members are responsible for approving the plan of study, assessing the student's competency in the oral, written, and final exams, and evaluating the dissertation prospectus and dissertation. They frequently also provide input and guidance throughout the student's dissertation research. Therefore, the members of the advisory committee should be selected to have a range of knowledge and skills relevant to the student's academic focus and proposed dissertation topic. The advisory committee should be assigned during the student's first semester or prior to completing 12 credit hours or coursework.

7. Plan of Study

During the first semester or prior to the completion of 12 credit hours of coursework, the student will schedule a meeting with the advisory committee to approve a plan of study and to consider a research area for the dissertation. The Plan of Study must be prepared using the form provided by the Graduate School and approved by the advisory committee and the Dean of the Graduate School. Delay in submitting a plan of study may result in disapproval of courses taken prior to approval. The student cannot take the comprehensive written examination prior to approval of the plan of study. Changes in the approved plan of study must be requested using the form provided by Graduate School, and must be approved by the advisory committee and the Dean of the Graduate School. When developing the plan of study, students and advisors should refer to the preceding Program Description section for information on required courses.

8. Program Milestones

8.1. Interim Evaluation

Prior to completing 12 hours of the coursework on the plan of study, the Advisory Committee will meet to evaluate the progress of the student, provide advice and counsel, and recommend continuance or termination of the program. The interim evaluation can take place at the same time as the plan of study meeting. Because the Doctor of Philosophy is a terminal academic degree, student performance includes an evaluation of progress in the program and academic performance. The Advisory Committee may recommend to the Dean of the Graduate School termination of the student in the program.

8.2. Comprehensive Examination

The intent of the Comprehensive Examination is to assess the breadth of knowledge in Geospatial Science and Engineering. The student becomes a candidate for the Ph.D. degree only upon successful completion of all portions of the examination. Students taking the Comprehensive Examination must have successfully completed all required courses on the plan of study, and the exam should be taken as soon as possible following the completion of coursework.

Both parts of the Comprehensive Examination (written and oral) will normally be completed in one semester. Failure to pass either part of the Comprehensive Examination (written or oral) on the second attempt will result in a recommendation by the Advisory Committee to the Dean of the Graduate School that the student should be dismissed from the program. A written explanation of the failure will be provided to the student by the Advisory Committee and the Dean of the Graduate School.

The comprehensive examinations must be completed at least two (2) months before the final oral examination. Upon satisfactory completion of the comprehensive examinations, the student is formally admitted to candidacy for the PhD degree. If the student does not receive the PhD degree within three (3) years after becoming a candidate, the comprehensive examinations must be repeated.

Written Comprehensive Examination - The written portion of the exam can be delivered in one of two formats (A or B). The Advisory Committee determines which format is appropriate for the student.

Format A is composed of a written synthesis paper. The process is designed to provide professional training in literature research, synthetic thinking, and effective communication of ideas and knowledge. The written synthesis paper is to provide an inclusive treatment of the published literature on a topic assigned by the Advisory Committee. Because the synthesis paper is intended to develop the student's breadth of knowledge, it should not directly address the student's intended research topic and

should not be incorporated into the student's dissertation. The length, content, and format of the synthesis paper should be suitable for publication in the **Annual Review** series (e.g., **AR of Environment and Resources** or **Earth and Planetary Sciences** or **Ecology, Evolution, and Systematics**). This synthesis paper should clearly indicate the relevance of the topic to the appropriate broader field(s) of study and also indicate potential directions for future research on the topic.

There are three distinct outcomes following the submission of the synthesis paper: (1) the advisory committee approves the synthesis paper without conditions (**Unconditional Pass**); or (2) the advisory committee requires minor revisions that can be tasked at the next meeting of the committee (**Conditional Pass**); or (3) the advisory committee rejects the synthesis paper as unsatisfactory (**Fail**). The Conditional Pass outcome mimics the situation often encountered when trying to publish in the peer-reviewed literature: revisions required.

Format B is composed of a written examination. It consists of a series of examination questions submitted by the Advisory Committee that are answered in accordance with the directions of the Advisory Committee.

Scheduling the comprehensive written examination requires the approval of the major advisor and submission of the *Ph.D. Comprehensive Written Request Form* to the graduate school at least 10 days prior to the start of the examination. The written examination (either format) must be satisfactorily completed before the student is allowed to sit for the oral examination. If any part of the written portion of the examination is failed, the student will be notified in writing of the need to repeat that part of the Comprehensive Examination the following semester, and the oral examination will be postponed. The student will be given one opportunity to repeat any single part of the written portion of the examination (oral or written) that was deemed unsatisfactory.

Oral Comprehensive Examination - The oral portion of the Comprehensive Examination is administered after the Committee has evaluated the written portion of the Comprehensive Examination, whether in format A or B. The oral examination is administered to doctoral students individually and will assess breadth of knowledge in the fields of geospatial science and engineering related to the student's intended field of specialization. **Students are expected to possess the breadth and depth of knowledge equivalent to that presented in standard textbooks on introductory remote sensing and spatial analysis, as well as the knowledge obtained in advanced undergraduate courses in a relevant set of related fields.** Because of the interdisciplinary nature of GSE, the specific topics covered in the oral examination will vary depending on the student's research emphasis. Students

should consult with their major advisor and committee members well in advance of the oral examination to clarify expectations.

Scheduling the comprehensive oral examination requires the approval of the major advisor and submission of the *Ph.D. Comprehensive Oral Request Form* to the graduate school at least 10 days prior to the examination. In the event that a student does not pass the oral examination, she or he will be advised in writing of the area(s) of perceived deficiency and recommendations will be included concerning the coursework and/or individual study needed to rectify the deficiency. The oral examination may be repeated once and should be administered the semester following the first attempt.

8.3. Dissertation Prospectus Meeting

The intent of the Dissertation Prospectus Meeting is to assess the depth of knowledge in the intended field of research specialization and to provide professional training in the preparation and presentation of a research proposal. The Dissertation Prospectus Meeting is scheduled individually for each student and consists of three parts, namely, a written research proposal, a research seminar, and an oral examination. The research proposal serves as a dissertation prospectus and should be written in the format of a NASA Earth Systems Science Fellowship or an NSF Doctoral Dissertation Improvement Grant (or a similar format approved by the Advisory Committee).

The Dissertation Prospectus Meeting should be arranged no later than the end of the third year in the program, and all three parts of the Dissertation Prospectus Meeting are coordinated around the research seminar. The research proposal must be submitted at least ten working days prior to the scheduled date for the research seminar and oral examination. The research seminar must be publicized as open to the public and should be scheduled during early morning or early afternoon. It is followed immediately by an oral examination that is closed to the public. The three parts of the Dissertation Prospectus Meeting will be used to assess the student's ability to conceive, design, execute, and communicate the purpose of a suitable research project.

In the event that the research proposal, the seminar, or performance on the oral examination is deemed unsatisfactory, the Dissertation Prospectus Meeting must be repeated. After successful completion of the Dissertation Prospectus Meeting, the Program Coordinator will be notified of the result in writing by the Advisory Committee and the student will continue research until he or she is ready to defend the Dissertation of the research. During this period, the Advisory Committee should meet with the student at least once every six months. The meeting dates will be recorded and kept on file by the Program Coordinator.

8.4. Final Oral Examination (Dissertation Defense)

The final examination consists of a public presentation of the dissertation research immediately followed by a final oral examination conducted by the major advisor and

the advisory committee. Scheduling the final oral examination requires the approval of the major advisor and submission of the *Ph.D. Final Oral Examination Form* to the graduate school at least 10 days prior to the defense date. A copy of the completed dissertation must also be provided to the major advisor and the advisory committee at least 10 working days prior to the defense date. The public presentation should be publically advertised via departmental email lists, posters displayed in public areas, and/or other methods as appropriate. The final examination cannot be taken earlier than two months after the comprehensive examinations have been passed and must be completed by the date set by the Graduate School in order to graduate in a given semester.

Although the advisory committee can determine the character and length of the examination, sufficient time should be devoted to a consideration of matters relating to the dissertation to test thoroughly the ability of the candidate to defend her or his work. In addition, questions to test his or her general knowledge, judgment, critical thinking, and coursework may be asked. Passing the final examination requires the approval of the representative of the Graduate Faculty and all but one of the other members of the advisory committee. In the event that the student fails to successfully defend the dissertation, one additional dissertation defense may be attempted only with the approval of the Advisory Committee and the Dean of the Graduate School. Reasons for the failure will be provided by the Advisory Committee to the student in writing. Failure on the second attempt will result in a recommendation by the Advisory Committee to the Dean of the Graduate School that the student be dismissed from the program. A written explanation of the second failure will be provided to the student by the Dean of the Graduate School and the Advisory Committee.

9. Dissertation

The dissertation should represent a program of innovative research that significantly advances the field within a particular sub-discipline of GISc and demonstrates the student's capacity for undertaking creative independent research. The dissertation should be organized as a collection of at least three individual scientific journal articles, along with an introduction and conclusion chapter. The introduction should review the pertinent scientific literature, define the overarching goals of the dissertation research, and describe how the research presented in the subsequent manuscripts will address these goals. The conclusions should review the results of the studies presented, emphasize important linkages between the individual manuscripts, and highlight how the work has advanced the student's field of study.

The student is expected to develop dissertation manuscripts in collaboration with their major advisor and other co-authors as appropriate. Participating in the scientific publication process and learning to respond to criticism and make revisions accordingly

are important components of the training of a professional research scientist. Therefore, students are expected to submit at least two manuscripts to professional journals in their field and to revise and resubmit these publications in response to feedback from reviewers and editors prior to the dissertation defense.

All components of the dissertation, including any published journal articles, must be formatted in accordance with graduate school requirements. Consult the SDSU graduate school website for the most up-to-date formatting guidelines (<http://www.sdstate.edu/graduate/guidelines.cfm>).

10. Program Assessments

The GSE program is assessed using the official plan approved by the graduate school on April 19, 2011. As part of this assessment plan, the faculty advisor and advisory committee members are responsible for completing the appropriate evaluation forms at various milestones during the student's program and returning the completed forms to the graduate program coordinator. These results of these evaluations are summarized and reported to the graduate school to evaluate specific criteria at the program level. The specific assessment forms to be completed during a student's program are listed below.

- Evaluation of Written Comprehensive Examination Format A OR
- Evaluation of Written Comprehensive Examination Format B
- Evaluation of Oral Comprehensive Examination
- Evaluation of Written Dissertation Prospectus
- Evaluation of Oral Presentation of Dissertation Prospectus
- Evaluation of Ph.D. Dissertation
- Evaluation of Oral Defense of the Ph.D.

The timing of these evaluations is listed in the program checklist under Appendix A. Individual assessment forms are provided in Appendix B.

11. Appendix A: Program Checklist

| Program Milestone | Time | Steps |
|-----------------------------------|--|---|
| Designation of Advisory Committee | During the first semester or prior to completing 12 hours of coursework. | The student and major advisor submit the <i>Committee Approval Request and Assignment of Graduate Faculty Member</i> form to the Graduate School |
| | | The Graduate Faculty representative is assigned by the Graduate School |
| Plan of Study | During the first semester or prior to completing 12 hours of coursework. | The student and major advisor schedule the program of study meeting and prepare a draft plan of study |
| | | The major advisor notifies the graduate program coordinator of the program meeting and the members of the advisory committee. |
| | | At the program of study meeting, the major advisor and advisory committee recommend any necessary modifications to the plan of study. |
| | | The major advisor and advisory committee sign the <i>Graduate School Plan of Study, Doctor of Philosophy Degree</i> and return the form to the graduate school. |
| Interim Evaluation | Prior to completing 12 hours of coursework | Major advisor consults with advisory committee to determine whether the student is making satisfactory academic progress (usually done during the plan of study meeting) |
| | | If termination of the student's program is recommended, the major advisor communicates this recommendation to the graduate program coordinator and the Dean of the Graduate School via email |
| Comprehensive Written Examination | As soon as possible following completion of coursework | The student and major advisor schedule the date(s) of the written exam, submit the <i>Ph.D. Comprehensive Written Request Form</i> to the Graduate School, and notify the graduate program coordinator via email. |
| | | The major advisor will receive comprehensive exam paperwork via email from the graduate school |

| | | |
|---------------------------------|--|--|
| | | <p>After the student completes the written exam, the major advisor and advisory committee determine whether or not the student has passed and return the signed form to the graduate school.</p> <p>The major advisor and advisory committee members each complete an <i>Evaluation of Written Comprehensive Examination</i> form and return it to the graduate program coordinator.</p> |
| Comprehensive Oral Examination | As soon as possible following completion of comprehensive written exam | The student and major advisor schedule the date of the oral exam, submit the <i>Ph.D. Comprehensive Oral Request Form</i> to the Graduate School, and notify the graduate program coordinator via email. |
| | | The major advisor will receive comprehensive exam paperwork via email from the graduate school |
| | | After the student completes the oral exam, the major advisor and advisory committee determine whether or not the student has passed and return the signed form to the graduate school. |
| | | The major advisor and advisory committee members each complete an <i>Evaluation of Oral Comprehensive Examination</i> form and return it to the graduate program coordinator. |
| Dissertation Prospectus Meeting | At least one year prior to the expected dissertation defense | The student and major advisor schedule the prospectus meeting and notify the graduate program coordinator via email. |
| | | The student provides the written prospectus to the committee at least ten working days prior to the prospectus meeting |
| | | After the prospectus meeting, the major advisor and advisory committee determine whether or not the student has passed and notify the graduate program coordinator via email. |
| | | The major advisor and advisory committee members each complete an <i>Evaluation of Written Dissertation Prospectus</i> and an <i>Evaluation of Oral Presentation of Dissertation Prospectus</i> form. The major advisor collects the forms and returns them to the graduate program coordinator |

| | | |
|--|---|--|
| Final Oral Exam (Dissertation Defense) | After the student has completed writing the dissertation and at least two months after the comprehensive oral examination | The student and major advisor submit a <i>Graduation Application</i> form at beginning of the semester when the student will defend. This form must be submitted before the Graduate School deadline |
| | | The student and major advisor schedule the date of the dissertation defense and submit the <i>Ph.D. Final Oral Examination Form</i> . The defense must be scheduled on a date prior to the Graduate School deadline |
| | | The major advisor will receive comprehensive exam paperwork via email from the graduate school |
| | | The student provides a completed copy of the dissertation to the committee at least ten working days prior to the dissertation defense |
| | | After the dissertation seminar and subsequent final oral examination, the major advisor and advisory committee determine whether or not the student has passed and return the signed form to the graduate school. |
| | | The major advisor and advisory committee members each complete an <i>Evaluation of Ph.D. Dissertation</i> and an <i>Evaluation of Oral Defense of the Ph.D. Dissertation</i> form. The major advisor collects the forms and returns them to the graduate program coordinator |
| | | The student makes any revisions to the dissertation required by the major advisor and advisory committee and then submits the dissertation to the graduate school. For detailed dissertation submission instructions, consult the Thesis & Dissertation Submission Instructions on the SDSU graduate school website. |

12. Appendix B: Program Assessment Forms

Geospatial Science & Engineering Program

Evaluation of Written Comprehensive Examination Format A

Date:

Ph.D. Student:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|---|----------------|
| 1. Introduction: background, motivation, and objectives are clearly articulated. | O G P U |
| 2. Literature Review: relevant prior work engaged clearly and logically and evaluated critically. | O G P U |
| 3. Synthesis: has brought together distinct lines of thought or inquiry to produce a novel, coherent whole. | O G P U |
| 4. Conclusions: significant findings are described along with the expected impact and the next steps for further research. | O G P U |
| 5. Ethics: appropriate references, credit, and acknowledgements are given. | O G P U |
| 6. Overall Evaluation: engaged the topic assigned clearly and effectively. | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Written Comprehensive Examination Format B

Date:

Ph.D. Student:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|---|----------------|
| 1. Ability to communicate: articulates issues clearly; question(s) answered accurately and thoroughly. | O G P U |
| 2. Ability to analyze and synthesize: understands and analyzes complex/complicated problems; proposes appropriate solutions. | O G P U |
| 3. Quality of responses: responses reflect a depth of understanding of the knowledge base; responses reflect an understanding of the broader context; uses appropriate concepts, statistical tools and/or tests. | O G P U |
| 4. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Oral Comprehensive Examination

Date:

Ph.D. Student:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|--|----------------|
| 1. Ability to communicate: articulates issues clearly; question(s) answered accurately and thoroughly; comfortable making presentation. | O G P U |
| 2. Ability to analyze and synthesize: understands and analyzes complex/complicated problems; proposes appropriate solutions; asks clarifying questions, if needed. | O G P U |
| 3. Quality of responses: responses reflect a depth of understanding of the knowledge base; responses reflect an understanding of the broader context; invokes appropriate scientific principles and technical procedures. | O G P U |
| 4. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Written Dissertation Prospectus

Date:

Ph.D. Candidate:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|--|----------------|
| 1. Introduction: background, motivation, and objectives are clearly articulated. | O G P U |
| 2. Literature Review: relevant prior work engaged clearly and logically and evaluated critically. | O G P U |
| 3. Theory: theoretical basis of the research, building on a clearly articulated understanding of the field of study, is set forth through hypotheses and/or research questions and/or methods development plan. | O G P U |
| 4. Methods: knowledge from course work, prior research, and literature review used to develop coherent solutions to the problems in advancing the subject area with potential pitfalls identified. | O G P U |
| 5. Proposed Workplan: feasibility of tasks and their timing. | O G P U |
| 6. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Oral Presentation of Dissertation Prospectus

Date:

Ph.D. Candidate:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|--|----------------|
| 1. Introduction: background, motivation, and objectives are clearly articulated. | O G P U |
| 2. Literature Review: relevant prior work engaged clearly and logically and evaluated critically. | O G P U |
| 3. Theory: theoretical basis of the research, building on a clearly articulated understanding of the field of study, is set forth through hypotheses and/or research questions and/or methods development plan. | O G P U |
| 4. Methods: knowledge from course work, prior research, and literature review used to develop coherent solutions to the problems in advancing the subject area with potential pitfalls identified. | O G P U |
| 5. Results: analyses of independent research are clearly and thoroughly presented. | O G P U |
| 6. Conclusions: significant findings are described along with the expected impact and the next steps for further research. | O G P U |
| 7. Ethics: appropriate references, credit, and acknowledgements are given. | O G P U |
| 8. Quality of Presentation: ability to communicate clearly in a public forum; graphics are clearly legible and comprehensible. | O G P U |
| 9. Q&A: answers to questions are clear, responsive, accurate, and demonstrate the ability to apply knowledge to different circumstances. | O G P U |
| 10. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Ph.D. Dissertation

Date:

Ph.D. Candidate:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|--|----------------|
| 1. Introduction: background, motivation, objectives, originality and significance of the research are clearly articulated. | O G P U |
| 2. Literature Review: relevant prior work engaged clearly and logically and evaluated critically. | O G P U |
| 3. Theory: theoretical basis of the research, building on a clearly articulated understanding of the field of study, is set forth through hypotheses and/or research questions and/or methods development plan. | O G P U |
| 4. Methods: knowledge from course work, prior research, and literature review used to develop coherent solutions to the problems in advancing the subject area with potential pitfalls identified. | O G P U |
| 5. Results: analyses of independent research are clearly and thoroughly presented. | O G P U |
| 6. Conclusions: significant findings are described along with the expected impact and the next steps for further research. | O G P U |
| 7. Ethics: appropriate references, credit, and acknowledgements are given. | O G P U |
| 8. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.

Geospatial Science & Engineering Program

Evaluation of Oral Defense of the Ph.D. Dissertation

Date:

Ph.D. Candidate:

Committee Member:

Ratings: **O = Outstanding; G = Good; P = Passing; U = Unacceptable**

| EVALUATION CRITERION | RATING |
|--|----------------|
| 1. Introduction: background, motivation, and objectives are clearly articulated. | O G P U |
| 2. Literature Review: relevant prior work engaged clearly and logically and evaluated critically. | O G P U |
| 3. Theory: theoretical basis of the research, building on a clearly articulated understanding of the field of study, is set forth through hypotheses and/or research questions and/or methods development plan. | O G P U |
| 4. Methods: knowledge from course work, prior research, and literature review used to develop coherent solutions to the problems in advancing the subject area with potential pitfalls identified. | O G P U |
| 5. Results: analyses of independent research are clearly and thoroughly presented. | O G P U |
| 6. Conclusions: significant findings are described along with the expected impact and the next steps for further research. | O G P U |
| 7. Ethics: appropriate references, credit, and acknowledgements are given. | O G P U |
| 8. Quality of Presentation: ability to communicate clearly in a public forum; graphics are clearly legible and comprehensible. | O G P U |
| 9. Q&A: answers to questions are clear, responsive, accurate, and demonstrate the ability to apply knowledge to different circumstances | O G P U |
| 10. Overall Evaluation | O G P U |

Comments (strengths & weaknesses; may be continued on reverse):

- **Outstanding** work exhibits exemplary and innovative achievements showing few, if any, shortcomings.
- **Good** work exhibits achievements that exceed basic expectations, but which could be improved.
- **Passing** work exhibits achievements that meet basic expectations, but which retain shortcomings.
- **Unacceptable** work must be redone and does not meet the minimum level of performance for the activity.