

PhD STUDENT HANDBOOK



Department of
**ENGINEERING AND
SCIENCE EDUCATION**

ENGINEERING AND SCIENCE EDUCATION PHD PROGRAM

**Sirrine Hall
Clemson University Clemson, SC 29634
ESEgradinquiries@clemson.edu**

**Updated August 23, 2023
Approved by the ESED faculty August 29, 2023**

INTRODUCTION	3
Welcome and Purpose of this Handbook.....	3
Contact Information	3
Program Overview.....	4
ESED Community Principles	3
ENTERING THE PROGRAM	4
Admission Requirements.....	4
Admission Procedures.....	5
Tuition Costs and Fees.....	5
Financial Assistance	5
Employment Paperwork	6
Registration	6
Graduate School Orientation	6
COMPLETING THE PROGRAM	7
Student Responsibilities.....	7
Requirements for the ESED Doctoral Degree	7
Engineering & Science Education PhD Courses	9
Readiness Portfolio.....	10
Comprehensive Examination (Defense of Research Proposal).....	13
Doctoral Dissertation	15
Final Check-Out/Exit Interview	17
ADVISORY COMMITTEE	17
PROFESSIONAL DEVELOPMENT.....	19
Departmental Seminars.....	19
Writing Week	19
ESED Graduate Teaching Scholar/Instructional Scholar.....	19
Leadership Positions	20
ASSISTANTSHIPS AND FINANCIAL SUPPORT	22
Description of Assistance Available	22
Assistantship Funding	22
Employment-related Information.....	23
ADMINISTRATIVE POLICIES AND PROCEDURES	24
RUBRIC FOR PH.D. EXAMINATIONS.....	25

INTRODUCTION

Welcome and Purpose of this Handbook

Welcome to the Department of Engineering and Science Education (ESED) at Clemson University. We wish you success at every stage of your academic journey.

This handbook is intended to familiarize you, as a graduate student in ESED, with the requirements, policies, and procedures involved with your graduate experience. The rules and regulations provided in this handbook, together with those provided in the *Graduate School Policy Handbook*, found at <https://www.clemson.edu/graduate/students/policies-procedures/index.html>, govern our academic programs and describe the duties and responsibilities of graduate students in the department. This handbook has been approved by the faculty of ESED. The rules and requirements contained herein are in addition to and subordinate to those described in the *Graduate School Policy Handbook*. Each student is expected to be familiar with the contents of both handbooks. Any inconsistencies within this handbook or between this handbook and the *Graduate School Announcements* or *Graduate School Policy Handbook* should be brought to the attention of the Graduate Coordinator.

Contact Information

The Graduate Affairs Committee (GAC) oversees the regulations and procedures of the program, coordinates curriculum updates and interacts with the Graduate School on matters such as student status, assistantships and fellowships. The chair of the GAC is the Graduate Coordinator. The Graduate Coordinator is your first contact should any issue arise regarding your academic progress or the program curriculum. The current Graduate Coordinator is:

Dr. Eliza Gallagher, ESED Graduate Coordinator
Office location: 262C Sirrine Hall
Office phone: 864-656-7148
Email: egallag@clemson.edu

Students in the program are also supported by a Student Services Coordinator (SSC), who also serves as the first point of contact for application inquiries. The current SSC is Barbara Smith. She can be reached at ESEgradinquiries@clemson.edu. A current list of all GAC members and their contact information is available from the Graduate Coordinator or the Student Services Coordinator upon request.

Program Overview

The PhD program in ESED is a nationally-unique graduate program in science, technology, engineering, and mathematics (STEM) education research. The Department of Engineering & Science Education, in the College of Engineering, Computing and Applied Sciences (CECAS) at Clemson University, is the only department in the country that includes engineering education, science education and mathematics education in a college of science/engineering. As such, it includes faculty who are experts in engineering education, science education and mathematics education, and who have active research programs in these areas. Students in this program will be exposed to the wide breadth of STEM education research under current investigation and will be prepared to interface between the development of new theory in STEM education and the implementation of new research findings in practice. This field is also referred to as Discipline-Based Education Research (DBER), which combines research on teaching and learning with deep knowledge of discipline-specific science, math, or engineering content. It describes research into the discipline-specific difficulties learners face and the specialized intellectual and instructional resources that can facilitate student understanding.

The objective of the ESED PhD program is to prepare students for academic careers in STEM education, STEM education policy in higher education, informal education entities, and a range of other careers that require a deep disciplinary knowledge coupled with understanding of the factors that affect student learning, retention, and inclusion in STEM. Graduates from this program will be prepared to become faculty in traditional STEM departments and/or in STEM education departments. They will be prepared to lead curricular and pedagogical reform at the post-secondary level as well as conduct research in the burgeoning field of STEM education research.

ESED Community Principles

To foster a productive and equitable learning and working environment ESED faculty and staff are committed to practicing the following principles:

- We value each member of the ESED community for their individual and unique talents, and we recognize that each person's effort is vital to achieving the goals of the ESED program.
- We affirm each individual's right to dignity and strive to maintain a climate of justice marked by mutual respect for each other.
- We value the cultural diversity of ESED, Clemson, and our community because it enriches our lives and the program. We celebrate this diversity and support respect for all cultures, by both individuals and the program.
- We are a program that adapts responsibly to cultural differences among the faculty, staff, students, and community.
- We acknowledge that our society carries historical and divisive biases based on race, ethnicity, sex, gender identity, age, disability, sexual orientation, religion, and political beliefs. Therefore, we seek to foster understanding among individuals and groups, and we promote awareness through education and constructive strategies for resolving conflict.
- We reject acts of discrimination based on race, ethnicity, sex, gender identity, age, disability, sexual orientation, religion, and political beliefs, and, we will confront and appropriately respond to such acts.
- We affirm the right to freedom of expression in ESED. We promote open expression of our individuality and our diversity within the bounds of courtesy, sensitivity, confidentiality, and respect.
- We are committed to the highest standards of civility and decency toward all. We are committed to promoting and supporting a community where all people can work and learn together in an atmosphere free of abusive or demeaning treatment.
- We are committed to the enforcement of policies that promote the fulfillment of these principles.

ENTERING THE PROGRAM

Admission Requirements

Minimum requirements to be considered for admission to graduate study in ESED generally follow those of the Graduate School (see the *Graduate School Policy Handbook* at <https://www.clemson.edu/graduate/students/policies-procedures/index.html>) In addition to the requirements of the Graduate School, all students admitted into the program must have at least a Bachelor of Science (BS) or Bachelor of Arts (BA) degree in a science, technology, engineering, and mathematics (STEM) discipline from an accredited program, with preference being given to those who have completed graduate studies in a STEM discipline.

Admission to ESED is only offered to applicants whose academic record indicates a high potential to be successful in graduate studies. This determination is made through a holistic review process by the faculty of ESED and is affirmed by the Graduate School. The various indicators used to arrive at this determination may include, but are not limited to: previous academic performance, letters of recommendation, personal interviews, a writing sample, and statements of interest.

Admission to graduate studies in ESED begins with your submission of an official application to the Clemson University Graduate School via their website at <https://www.clemson.edu/graduate/admissions/>. Upon receipt of all admission materials through the online application process, the Graduate School will forward your application to the ESED department for review. Applicants must meet all admission requirements of the Graduate School and the ESED department before official acceptance will be granted.

Prerequisites

The program is designed for students who are content specialists in a STEM discipline and who seek to pursue discipline-based education research. Thus, preference is given to applicants already holding a Master's in a STEM discipline. If you are enrolled in a Master's program in a science or engineering discipline, you may be accepted directly into the ESED PhD program prior to completion of your Master's degree with the consent of your Major Advisor of your Master's program.

Applicants entering directly from a Bachelor's degree program, or who have not completed a Master's in a STEM discipline, must successfully complete 18 credit hours at the graduate level in a single STEM discipline (e.g., mechanical engineering, physics, chemistry, math, etc.) The purpose of this requirement is to ensure that students meet accreditation requirements for teaching in a STEM discipline and are thus eligible for faculty roles in STEM disciplinary departments.

Admission Procedures

1. Prospective students obtain information about our program primarily through the website, professional conferences, and through direct contact.
2. The Student Services Coordinator (SSC) emails a response to inquiries and applications.
3. The graduate student applies to the program through the Graduate School website <https://www.clemson.edu/graduate/admissions/apply/>
4. Upon your completion of the online application, your application is reviewed by the Graduate Affairs Committee (GAC) to verify that the application is complete and meets the admission requirements described above.
5. The GAC and interested faculty member(s) arrange a video conference interview that includes the interested faculty member and at least one member of the GAC.
6. The GAC and the interested faculty member(s) individually complete the “Department of Engineering & Science Education Holistic Graduate Applicant Review” rubric with a recommendation on admittance. The rubric is available upon request from the Graduate Coordinator.
7. The GAC decides to recommend admission or to not recommend admission.
8. The application is processed accordingly in the online application system by the Graduate Coordinator.
9. The Graduate School reviews the application materials and the GAC recommendation to decide whether to accept or deny admission.
10. The Graduate School sends the student information regarding the admissions decision.
11. Accepted students receive an offer letter and information about their assistantship from the Graduate Coordinator.
12. Students are paired with an initial Major Advisor who will guide them through the first year of study.

If you are not accepted for admission, the Graduate Curriculum Committee will indicate this in the admissions database and the Graduate School will then send you a letter of rejection. You may appeal the rejection to the Graduate School.

Tuition Costs and Fees

For current tuition and fees, see <https://www.clemson.edu/graduate/finance-tuition/index.html>. For more information about academic costs, financial aid and making payments, contact Student Financial Services (studentbillquestions@clemson.edu).

Financial Assistance

We aim to support all admitted full-time students through research, teaching or other forms of assistantships, which include tuition reduction. Eligibility for assistantships is governed by the policies in the Graduate School Policy Handbook. Financial support through assistantships is awarded to ESED graduate students on a competitive basis to

qualified students, both domestic and international. All qualified students are considered for assistantships when applications are processed. Award decisions are based on academic record, statement of purpose, and letters of recommendation. They are also based on availability of funds in the area of desired study. If you change your subject area after support has been extended, support eligibility is reviewed, and funding may or may not be provided.

Employment Paperwork

If you have been awarded an assistantship, you must report to the departmental staff prior to the beginning of your assistantship and complete required forms.

Registration

Prior to registration for your first semester of study, you must report to your assigned Major Advisor or the Graduate Coordinator.

Graduate School Orientation

All graduate students are required to attend the Graduate School orientation. Orientation information is available at <https://www.clemson.edu/graduate/students/new-student-to-do.html>.

COMPLETING THE PROGRAM

Student Responsibilities

The ESED department expects you to approach your graduate study in a serious and focused manner. Students on assistantship will have a weekly time commitment for work obligations stated in their letter of appointment (typically 20 hours per week). Coursework and dissertation research or professional activities will occupy an **additional** 20-30 hours per week for satisfactory progress to degree.

Requirements for the ESED Doctoral Degree

Students in the ESED doctoral program will be exposed to the wide breadth of current STEM education research as well as be prepared to interface between the development of new theory in STEM education and the implementation of new research findings in practice.

Students will be required to complete a minimum of 39 credit hours for the ESED PhD program (described below) which includes: eighteen (18) required core credit hours (these core courses are taught every year), three (3) elective hours (in ESED or outside of ESED), and eighteen (18) doctoral research hours. In addition, students must meet the STEM disciplinary expertise requirement through 18 graduate credit hours in a STEM discipline and successfully complete program milestones: Readiness Portfolio, comprehensive exam (also known as the proposal defense), and dissertation defense.

Component	Course	Credits
ESED Core Credit Hours (18 credits)	ESED 8100 – Orientation to Engineering, Science and Mathematics Education Research (required for students admitted in Fall 2020 or later)	1 cr.
	ESED 8000: Seminar in Engineering, Science and Mathematics Education	1 cr.
	ESED 8200 Teaching Undergraduate Engineering or ESED 8210 Teaching Undergraduate Science or ESED 8220 Teaching Undergraduate Mathematics	3 cr.
	ESED 8400 Diversity, Equity and Inclusion in STEM	3 cr.
	ESED 8700 –Theories of STEM Learning or ESED 8730 – Theoretical Frameworks in STEM Ed. Research	3 cr.
	ESED 8710 - Foundations of Research Methods in Engineering, Science, and Mathematics Education	3 cr.
	ESED 8620 - Practicum in Engineering, Science and Mathematics Education Research	1 cr.
	ESED 9700 Advanced Research Methods in Engineering, Science and Mathematics Education	3 cr.
Elective (3 credits)	ESED 8240 – Teaching Postsecondary STEM Through E-Learning or ESED 8250 – Student Strategies in Engineering, Science and Mathematics Education or ESED 8750 - Current Issues in STEM Education Research or ESED 8790 - Current Topics in STEM Education Policy or As directed and approved by each student's doctoral committee, supporting areas outside of ESED including (but are not limited to) education, psychology, sociology, or statistics	3 cr.
Doctoral research	ESED 9910 – Doctoral Thesis Research and Writing	18 cr.
Program milestones	Readiness Portfolio, Comprehensive Exam (Proposal Defense) and Dissertation Defense	
STEM Disciplinary Expertise	18 credit hours at the graduate level in a single STEM discipline, unless a student holds a Master of Science (M.S.), Master of Engineering (M.E.), or higher in a STEM discipline.	
Total (minimum) credits earned:		39 cr.

Engineering & Science Education PhD Courses

A list of courses and descriptions are available in Clemson's Graduate Catalog available through the following direct hyperlink

(https://catalog.clemson.edu/content.php?filter%5B27%5D=ESED&filter%5B29%5D=&filter%5Bcourse_type%5D=-1&filter%5Bkeyword%5D=&filter%5B32%5D=1&filter%5Bcpage%5D=1&cur_cat_oid=36&expand=&navoid=1121&search_database=Filter#acalog_template_course_filter) or available upon request from the student services coordinator.

ESED required courses counted towards a prior degree

In the case where a student has completed ESED courses that were listed on the Plan of Study for a previous degree, the course requirement is considered to be satisfied. However, the ESED PhD Plan of Study (GS-2) must include the minimum credits required for the degree and each course can only count towards one degree. Thus, for each required ESED course that was counted toward a previous degree, the student should take a different ESED course approved by their committee. This is not a substitution, so the course need not match the specific topic of the required course.

Withdrawing from Courses

As an ESED graduate student, you will be permitted to drop courses in which you are enrolled only in exceptional cases **and** with the prior approval of your Major Advisor and the course instructor. If you have an assistantship and your course load drops below nine credit hours, your assistantship may be revoked.

Continuous Enrollment

All graduate students in the ESED program are expected to maintain continuous enrollment during fall-and spring semesters. Students on assistantship over the summer are required by University policy to be enrolled during the summer semester for a minimum of 6 credit hours. The ESED Department makes every effort to schedule relevant courses so that students can easily maintain their enrollment.

Readiness Portfolio

The ESED program requires that each student demonstrate an understanding of scholarly literature and theoretical knowledge in conducting STEM education research. The purpose of the ESED PhD program Readiness Portfolio (referred to hereafter as “portfolio”) is to verify that you have the prerequisite skills and knowledge to develop a proposal for your dissertation study. In addition, the Portfolio serves as a checkpoint to identify areas of strengths that you have and develop a plan for addressing any identified areas for needed growth as you progress toward the PhD.

A recommended reading list is provided on the shared ESED Grad Program Canvas site under “Readiness Portfolio” to help students prepare their portfolios.

The portfolio comprises four major areas of proficiency that are important categories of knowledge in STEM education research: (1) STEM Education Research Methodology; (2) Diversity, Equity, and Inclusion in STEM; (3) STEM Educational Theories; and (4) Research to Practice.

Required Portfolio Content

- Current Curriculum Vitae (CV)
- Prospectus (also known as a “one-pager”) outlining your intended research area, including relevant literature and theories (up to two pages, including references)
- Executive summary of your forms of evidence for each of the proficiency areas with a self-reflection on your strengths and areas for improvement (up to two pages)
- For each area of proficiency: one to three items to showcase your breadth and depth of knowledge and your ability to proceed to the dissertation proposal milestone.

Forms of evidence (in consultation with your major advisor) may include:

- Signature assignments from core courses (with revisions or incorporation of feedback)
- Peer-reviewed conference or journal articles (If multiple authors, provide details on your contribution to the article, referring to the Contributor Roles Taxonomy (CRediT) at <https://credit.niso.org/>)
- Literature reviews
- Alternative modes of delivery can be considered, such as a video summary, as one form of evidence
- Responses to prompts given by major advisor
- Analysis and synthesis of articles from the reading list

Portfolio Assessment

The Graduate Coordinator will make a preliminary review of your portfolio and assign the portfolio assessment to a group of ESED faculty members (primarily the onboarding committee members plus additional individuals with appropriate expertise as needed), who will comprise your Portfolio Review Committee (PRC). Each section of the portfolio will be independently evaluated by two members of your PRC, with both members also providing written feedback specific to that section. Based on those evaluations and the written feedback, your PRC will collaboratively determine if your portfolio is accepted or requires major revisions to one or more sections. A determination of major revisions is a

student-centered determination recommended by the review committee to prepare the student to be successful in progress to the dissertation proposal milestone. If your PRC recommends major revisions, you will have a minimum of three calendar months and a maximum of five calendar months (as determined by the Graduate Coordinator) to make revisions and resubmit your portfolio. If your PRC determines that the resubmitted portfolio does not demonstrate readiness in all the major areas of proficiency, your major advisor and the Graduate Coordinator will discuss with you the best course of action, which may include taking additional courses or leaving the program with a graduate certificate.

Preparing and Submitting Your Readiness Portfolio

We strongly recommend that you submit your Portfolio in your second or third year of enrollment, after you complete the required core courses for the ESED PhD. You should consider selecting course assignments and preparing other artifacts throughout your first year in the ESED PhD program. Here is a timeline of expected development and review of the portfolio:

When?	What Happens?	Who Initiates?
1 st Spring in program	Identify all elements of the portfolio in consultation with your major advisor	Student
1 st Summer in program	Develop drafts of all elements of the portfolio	Student
Mid-August of 1 st summer in program	Share your portfolio draft with one or more peers and gather feedback	Student
	Share your portfolio draft with the Graduate Coordinator to allow for planning review committee assignments	Students
September of 2 nd Fall in program	Provide feedback to peers using the Portfolio Assessment Rubric	Student
	Revise portfolio draft in response to peer feedback	Student
	Portfolio Review Committees formed	Grad. Coord.
Early October of 2 nd Fall in program	Submit portfolio to Graduate Coordinator	Student
November of 2 nd Fall in program	Portfolio assessments completed	Portfolio Review Committee
Early December of 2 nd Fall in program	Portfolio acceptance/revision decisions communicated to you	Graduate Coordinator
Mid-March of 2 nd year in program	Resubmit portfolio with revisions, if requested	Student
April of 2 nd year in program	Review and assessment of resubmitted portfolios	Portfolio Review Committee
Early March of 2 nd year in program	Portfolio decision communicated to you	Graduate Coordinator

Internal Appeal Procedure

The student may appeal the result of their portfolio assessment in writing to the department chair within 10 business days of the review committee's decision. The chair, at their discretion, may request that the Graduate Affairs Committee review the process for procedural errors. If errors are evident, the department chair will recommend a remedy to the Graduate Affairs Committee. If the department chair is in the review committee, they will appoint an ESED faculty member that is not on the review committee to serve in this capacity. The department chair will present the student with a decision within 30 calendar days from the date the appeal is received.

Comprehensive Examination (Defense of Research Proposal)

The Comprehensive examination (both written and oral portion) must occur within 12 months of successfully completing the Readiness Portfolio. Students may request a variance on the timing of the exam. The variance must be approved in writing by your Major Advisor and the Graduate Coordinator.

Many of the policies surrounding the comprehensive examination are set by the Graduate School and consistent across all departments. The information in this section is intended to describe the particular form that the comprehensive examination takes in ESED.

The comprehensive examination will serve to examine your ability to apply the knowledge assimilated through coursework and preliminary research projects to design a STEM education research study. The examination comprises all of the following:

- a written doctoral dissertation proposal,
- a public presentation of the proposal,
- an oral examination by your committee, and
- revisions to your proposed research as recommended by your committee during the oral examination.

Written Proposal

You must complete a final draft of your written proposal for your Major Advisor's approval at least 20 working days before your proposal defense. You must provide a copy of your proposal approved by your Major Advisor to your committee members at least 15 working days prior to your oral proposal defense. The written proposal should contain all the following components organized into a logical and coherent flow.

1. One-page summary that includes a project overview and addresses intellectual merit and broader impacts of the proposed study. For definitions and guidelines regarding intellectual merit and broader impacts, see the National Science Foundation Proposal Guidelines (PAPPG) (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf19001). The one-page summary does not count in the 15-page narrative limit.
2. 15-page maximum project narrative. The narrative must include one or more clearly stated research questions. It must also address context and significance, literature review, theoretical framework, methodology, specific plans for data collection and analysis, quality considerations within the proposed study, a plan for dissemination, and a brief statement about your prior experiences relevant to the proposed research. Additional content within the narrative may be required by the Major Advisor or may be added at the discretion of the student. The addition of content, whether required by the Major Advisor or not, does not alter the 15-page limit for the project narrative.
3. A complete list of references cited in the narrative. The list of references does not count in the 15-page narrative limit.

4. Appendices for all data collection instruments, e.g. surveys, interview protocols, reflection prompts, etc. The appendices do not count in the 15-page narrative limit.
5. Optional materials can be included as additional appendices, e.g. a quality analysis table, annotated bibliography, expanded contextual data, etc. Note that the proposal should stand alone without this additional material.

Public Presentation

After your advisor reviews the proposal and consents to going forward, you should schedule a three-hour uninterrupted block of time for the comprehensive examination. The comprehensive examination will include a public presentation of your proposed research (30 to 45 minutes), a public question-and-answer period (15 to 30 minutes) and an oral examination by your committee. Your major advisor will end the public question-and-answer-period at the appropriate time to transition directly into the oral examination.

If the University closes for any reason, the exam will be rescheduled for the next available time for the student and the committee. You will schedule this based on the availability of your committee and will arrange location with the ESED Student Services Coordinator.

Oral Examination

Immediately following the public question and answer period, the audience will be excused and the oral examination by your committee will begin. After the committee has completed the oral examination (typically one hour), your major advisor will excuse you for a closed-door discussion with the committee. You will be called back in following the committee deliberation. At this time, the committee will tell you what revisions, if any, you are required to make to the written proposal, as well as a time limit for completing those revisions. It is strongly recommended that you audio-record the post-deliberation discussion for your own benefit in satisfying any revision requirements. If you are not required to make revisions, your comprehensive examination is considered complete at the end of the oral examination. Otherwise, your exam continues to the revision stage.

Revisions

After addressing all revision requirements in the written proposal, write a summary response indicating how you addressed the committee's requested revisions and email both the summary and the revised proposal to your committee. Once you email these documents to your committee, the comprehensive doctoral examination is concluded. The committee will consider your revisions and vote within five business days of receipt to determine the outcome of your doctoral comprehensive examination.

Formative Assessment

Members of the advisory committee will assess your performance on the written proposal and oral defense using the rubric in the table at the end of this document, "Item 2 – Comprehensive Examination (Research Proposal Defense)". The first four items in the rubric are intended to assess knowledge, information and insights that

would be expected in a competitive research proposal. They are:

- Research topic knowledge
- Theoretical knowledge
- Research design and methods, and
- Data analysis

The names of these items are subject to change at the discretion of the student's Major Advisor. Writing skills will be assessed with the understanding that the written responses were constructed within a page limit (15 pages, not including summary, references, and appendices). Oral presentation skills will reflect the student's ability to elaborate on written work and communicate well-reasoned responses to other questions posed during the oral part of the exam. These results are used to guide your further professional development and are not reported directly to the Graduate School.

Summative Assessment

After completion of the comprehensive examination, your committee will determine a grade of either "Pass" or "Fail" in accordance with Graduate School guidelines. The next steps after a decision of "Fail" are determined by the *Graduate School Policy Handbook*. Results will be reported to the Graduate School and to Enrolled Student Services by your Major Advisor using Form GS5D and Form GS- Research Approval.

Doctoral Dissertation

The purpose of a dissertation is to demonstrate your capability to:

- Formulate a research problem;
- Demonstrate knowledge relevant to a meaningful resolution of a specific problem;
- Effectively plan the work leading to the completion of the problem;
- Report the results of your research in concise, precise professional style.

Writing the dissertation

The writing process may begin at any point in the research process; the earlier, the better. Deadlines are described in the *Graduate School Announcements* or *Graduate School Policy Handbook*.

As you near completion of your dissertation, you must present your work to your advisory committee in a formal, public setting. This will include a public oral presentation and a closed-door oral examination. Your committee will typically ask questions relevant to your dissertation topic and provide comments about and/or edits to the dissertation.

As a result of their review of the written document and your oral examination/defense, your advisory committee may require that you do more work. After completion of that work and a successful final oral examination, your advisory committee will provide any

comments or corrections that you must make to your manuscript. After you make the corrections, you must submit your dissertation electronically to the Graduate School for formatting review.

Supporting information and documents related to dissertation research

All graduate students should keep a formal notebook for recording research procedures and results. Under the [Clemson University Intellectual Property Policy](#), all data, research notebooks and related materials (slides, pictures, graphs, publication reprints, etc.) generated by any graduate student within the department are the property of the University. Graduate students own the copyright to their dissertation and, as Creators of research data or results related to the dissertation, “shall have a nonexclusive, perpetual license to use such data for nonprofit educational research and scholarly purposes.”

PhD Dissertation Defense

You are required to provide a broad context and focused interpretation of your research project and conclusions. This examination will be conducted under the authority of your advisory committee. All ESED faculty members will be invited to participate in the examination and to provide comments to your advisory committee.

Members of the advisory Committee will assess your performance on the written dissertation and oral defense using the rubric in the table on page 31, “Item 3 – Dissertation Defense.” The first four items in the rubric (Research topic knowledge, Research design and methods, Interpretation of results, and Conclusions supported by evidence) are intended to assess knowledge, information and insights that would be expected in a publication-ready manuscript; the names of these items are subject to change at the discretion of the student’s Major Advisor. Writing skills will be assessed based on the quality of the manuscript in terms of being publication-ready. Oral presentation skills will reflect the student’s ability to elaborate on written work and communicate well-reasoned responses to other questions posed during the oral part of the exam. Results will be reported to your Major Advisor. Successful completion of this examination and your dissertation will result in a recommendation (GS7 Form) by your advisory committee to the Graduate School that the PhD degree be awarded.

Unsatisfactory performance on the final examination will result in a requirement for complete re-examination (with or without recommendations for additional work) or, in rare cases, dismissal.

Expectations

The oral exam is based on:

1. An oral defense of your research
2. General questions related to your research
3. Basic questions about STEM education research beyond your area of specialization.

You will be expected to have an in-depth knowledge in your selected research area. In addition, you are also expected to be ready to answer all pertinent questions in the area based on all courses completed prior to the time of the examination that the panel deems relevant to the area of the proposed area of research. You must also be able to critique/defend approaches and methodologies you used and others cited in the literature.

Final Check-Out/Exit Interview

When you leave the University due to graduation or any other reason, you must do the following pertaining to the department:

1. Turn in all keys to your Major Advisor or their designee.
2. Be sure that any portion of the graduate student office that you occupied is clean and ready for another occupant.
3. Return all borrowed materials (books, journals, etc.) to their appropriate location.
4. Inform the Graduate Affairs Committee that you are leaving and have complied with all regulations.
5. Schedule an exit interview with the Department Chair.

ADVISORY COMMITTEE

Each graduate student must have a faculty advisor (Major Advisor) who will also be the chair of the student's advisory committee. The Major Advisor must be a regular member of the ESED faculty or, in special circumstances only by approval of the Graduate Curriculum Committee, an adjunct faculty of ESED. Students need to fill out the GS2 form to select their committee. More information about the GS2 can be found in the *Graduate School Policy Handbook* at <https://www.clemson.edu/graduate/students/policies-procedures/index.html>.

Your Major Advisor

The selection of your Major Advisor is one of the most important decisions you will face as a graduate student. Your Major Advisor supports you in your academic journey, helps plan your curriculum, guides your research activities, and scaffolds the preparation of your dissertation. You will be assigned an initial onboarding advisor to guide your studies in the first year and factors associated with selecting a Major Advisor for the duration of your studies will be addressed in ESED 8100 Orientation to ESED. During each semester, you should meet with your Major Advisor to discuss your research project on a regular basis.

Onboarding and Advisory Committees

You will form an onboarding committee during your first semester as part of the ESED 8100 Orientation to ESED course activity. Your onboarding advisor will be the chair of your onboarding committee. The onboarding committee will sign off on your plan of study for your masters degree (if you are earning a masters en route) and your PhD in ESED. After your portfolio is approved, you will form an advisory committee in consultation with your Major Advisor. Your advisory committee will approve any

changes to your PhD plan of study, supervise your graduate program, administer your comprehensive examination, and initiate the recommendation for awarding your PhD. The chair, co-chair, or at least half of the committee must have a primary appointment in ESED. Your Major Advisor will serve as the chair of your advisory committee.

A majority of your advisory committee (50% or more) must be regular, joint or adjunct members of the ESED faculty. Committee membership must total at least four. Members of the committee external to Clemson University must be approved by the ESED department chair prior to officially forming your committee. The external member's CV and a brief description of their role on your committee should be sent via email to the ESED department chair, allowing two weeks for the approval process.

You are responsible for forming your advisory committee and keeping them apprised of your progress. Committee formation should typically occur once your Readiness Portfolio has been approved, and generally no later than the fourth semester of your doctoral program. Appointment is made via [form GS2 for your PhD plan of study](#) by the department chair, subject to the approval of the deans of the college and the Graduate School.

Sample Timeline for Program of Study

The following table lays out a typical progression through the ESED program.

A Sample PhD Program of Study	
Year 1 – 1 st Semester	Form an onboarding committee, choose a Major Advisor, take 3 graduate courses, attend seminars, attend faculty research presentations, begin work on research projects within your research group.
Year 1 – 2 nd Semester	Take 3 graduate courses, attend seminars, continue to work on research projects within your research group. Compile artifacts and components of your Readiness Portfolio.
Year 2	Take graduate courses (as needed/desired), attend seminars. Continue work on research projects within your research group. Complete your Readiness Portfolio. Form advisory committee and file GS2 form for your PhD plan of study. Develop your research proposal for your comprehensive exam.
Year 3 and beyond	Complete the comprehensive exam and advance to candidacy. File the GS5 form. Continue working on research projects within your research group, including your dissertation research. Present a student seminar. Take more graduate courses as needed/desired, attend seminars. Write and defend your dissertation when research is completed.

* See specific deadline dates for Graduate School forms at <https://www.clemson.edu/graduate/students/deadlines.html>

PROFESSIONAL DEVELOPMENT

Departmental Seminars

All graduate students should enroll in ESED 8000 during their first semester in residence and attend on a regular basis thereafter while in enrolled in the PhD program. Time and place may vary from the schedule to suit outside speakers.

Writing Week

Writing Week is an important tradition for the department and provides students and faculty with an opportunity to dedicate time to completing work at the end of each term in a relaxed and communal environment. Writing Week typically occurs the week following Final Exam Week in the Spring and Fall semesters. Students should consult their advisors for specific expectations for Writing Week.

ESED Graduate Teaching Scholar/Instructional Scholar

Funded teaching experience is possible through the ESED Graduate Teaching Scholar and Instructional Scholar positions. The Graduate Teaching Scholar is akin to a graduate teaching assistantship (GTA), while the ESED Instructional Scholar allows students to serve as an instructor of record. Faculty advising ESED PhD students are eligible to nominate ESED PhD students for either position (both positions are available each year). The teaching terms begin August 15th. The chart below outlines the submission materials required for each position. Questions about these positions can be directed to the Department Chair.

Position	Qualifications	Nomination Package
ESED Graduate Teaching Scholar (GTA)	Served as a GTA or equivalent in their discipline at Clemson/previous institution with satisfactory performance	<ul style="list-style-type: none"> • Letter from Major advisor (max 2 pgs) • Teaching Statement (1 pg) • Curriculum Vita (CV) • Letter of support by previous instructor of record (max 2 pgs)
	Recommendation from Major advisor describing teaching experience	<ul style="list-style-type: none"> • Letter from Major advisor (max 2 pgs) • Teaching Statement (1 pg) • Curriculum Vita (CV)
ESED Instructional Scholar	At least 18 graduate credit hours in discipline and passed practicum	<ul style="list-style-type: none"> • Letter from Major advisor (max 2 pgs) • Teaching Statement (1 pg) • Curriculum Vita (CV) • Academic Transcript • Observation Report
	At least 18 graduate credit hours in discipline and previously served as an instructor of record	<ul style="list-style-type: none"> • Letter from Major advisor (max 2 pgs) • Teaching Statement (1 pg) • Curriculum Vita (CV) • Academic Transcript • Student evaluation report from previous instructor of record position

Leadership Positions

The following table outlines the leadership opportunities available to ESED graduate students. Most terms are one year in length and self-nominations are typical. The Graduate Affairs Committee Graduate Student Liaison will facilitate the selection of student leaders for positions appointed by the graduate students (appointment mechanism indicated in the last column).

Position	Description	Minimum Time in Program	Term length	Appointment
College of Engineering, Computing, and Applied Sciences Graduate Student Advisory Board (CECAS GSAB) Representative (1)	CECAS GSAB is a group that meets and talks about college issues specific to grad students. They host a mentoring group for new graduate students, game nights and a Discord server throughout the semester and other CECAS graduate student events. The group has monthly one-hour meetings August – May. Attending meetings is the only commitment however you can opt to become more involved.	none	1-year, starting in January	Self-nomination, selected by the graduate students
Graduate Student Government (GSG) Senator (2)	GSG Senators are expected to attend two-hour senate meetings every other week, vote on GSG legislations, disseminate GSG information to ESED, complete senator training in Canvas, and serve on at least one GSG committee. Beyond monthly meetings, time is spent working on committee responsibilities, which varies based on committee.	none	1-year, starting in August	Self-nomination, selected by the graduate students
Social Director (no limit on number of positions)	The Social Director aims to plan at least 1-2 monthly social events to help build community among ESED faculty and students. The types of events may vary to help encourage participation and new opportunities to connect with one another. Events should be aimed to be affordable, inclusive, and advertised. The time commitment fluctuates for each event depending on the amount of prep work involved.	none	1 year, starting in August	Self-nomination

ESED Peer Mentors (based on incoming cohort enrollment)	ESED peer mentors are expected to reach out to their assigned mentees to introduce themselves and attend particular orientation class sessions to share their experiences with the class. On boarding for this position occurs during the summer prior to the Fall orientation course. The time expectation for this position is a few hours during the specified term.	Completion of orientation course	May-December	Self-nomination then selected by Graduate Affairs Committee
Seminar Exchange Coordinator (1)	This position meets with the other seminar exchange coordinators from collaborating universities and plans the seminar exchange including the application process and the visits themselves. This involves coordinating with the faculty member that is teaching seminar that semester and with Administrative Assistant to help plan meetings for the visiting speaker. Responsibilities also include ensuring Clemson has at least one representative participating in the exchange and that the contact is being made between that speaker and the school they are visiting. Typical time requirement is a few hours a semester.	Completion of seminar course	1 year, starting in May	Self-nomination, selected by the graduate students
Representative for the Dept. Chair Graduate Student Advisory Committee (1 from each research group)	The primary role is to be the primary point of communication for other students in your research group. Responsibilities include contributing to the agenda for meetings, discussing issues and taking information back to your research group. Three meetings per academic year.	At least 1 year	1-year starting in August	Nomination by Major Advisor

ASSISTANTSHIPS AND FINANCIAL SUPPORT

Description of Assistance Available

Graduate research assistantships are available through individual faculty members to conduct research on specific projects. These may be either 1/4-time, 1/2-time, or 3/4-time appointments.

Fellowships are available from organizations outside Clemson University. Information on these opportunities is available from the department and from the Graduate School website (www.grad.clemson.edu/fellowships.php).

Your responsibilities and details of your financial support are included in your official offer letter from the department. This letter requires your signature indicating your acceptance of any terms. Teaching assistants will receive a separate communication with more detail as to their specific assignments, such as course sections, etc. To maintain your assistantship, you must complete the duties in a satisfactory manner and make satisfactory progress toward your degree, determined by your supervisor and/or Major Advisor.

Assistantship Funding

The ESED program uses primarily external funding sources for graduate students (research grants and contracts). Students supported by research funds are assigned research duties. All assistantships may be subject to time limits as described below and are contingent upon your satisfactory performance and progress toward your degree.

- Assistantships for doctoral students will normally extend for 3 years beyond the Master's degree.
- Continuation of assistantships is contingent upon satisfactory academic performance, as well as satisfactory performance of assigned duties associated with the assistantship.
- All research contract- and grant-supported graduate assistantships are subject to continued funding by the contracting agency. If a research contract or grant is terminated before you have completed your degree program, your Major Advisor will endeavor (on an individual basis) to provide financial support to allow continuation of your program. This should not be construed as an assurance of funding. You are expected to complete your degree program in a timely fashion.
- All graduate students holding graduate assistantship appointments at Clemson University shall be compensated based on a standard full-time (100%) equivalent (FTE) rate (12-month basis) established by the department. This rate shall also serve as the basis for all rate adjustments described below. Generally, appointments shall be 1/2-time appointments (50% of the standard FTE rate).
- Compensation at a rate exceeding the standard FTE rate is allowed according to the following guidelines:

- Funds for such additional compensation may be derived from a fellowship, traineeship or similar form of award in which the awardee is selected competitively from a group of applicants on the basis of scholarly excellence. In this case, such additional compensation is limited to a maximum of 25% of the standard FTE rate. In the event that such an award exceeds this limit, the assistantship appointment shall be diminished in like proportion such that the total compensation does not exceed 75% of the standard FTE rate.
- Funds for such additional compensation may also be derived from a research grant or contract provided you had a significant intellectual role in preparing the research proposal leading to the grant or contract, as judged by your Major Advisor. In this case, such additional compensation is limited to a maximum of 25% of the standard FTE rate.
- Upon each anniversary of your matriculation, your Major Advisor may, at their discretion, reward you for exceptional performance by increasing your pay rate in an amount not to exceed 15% of the standard FTE rate using either incentive, research contract or other funds. NOTE: You are responsible for submitting the required paperwork to initiate such a raise.
- The maximum compensation limit does not apply to students who do not hold an assistantship appointment at Clemson University.

Employment-related Information

Vacation Policy

Graduate students are expected to work during the time period specified in their offer letter. Your work time frame should not be perceived to be the same as the semester class schedule in that you are expected to work during exam week and the period before classes start. Graduate assistants do not accrue paid vacation time. Students who must interrupt their graduate studies may request a leave of absence in accordance with the *Graduate School Policy Handbook* at <https://www.clemson.edu/graduate/students/policies-procedures/index.html>.

With the exception of university holidays, graduate students are expected to work during the week when the university is in session. This includes days during exam week and before and after academic semesters.

Holidays

Graduate students are entitled to take as holidays the days on which the University is officially closed. See the official University holiday schedule at <http://www.clemson.edu/employment/benefits/holiday.html>.

Termination of Pay

Pay for any session will end when you leave Clemson or are no longer available for work assignments. Normal termination dates for the spring and fall semesters for students not continuing into the next session is graduation day. Any deviations from these dates must be approved by your Major Advisor or the department chair.

Outside Employment

One of the purposes of a graduate assistantship is to support you during your graduate studies. Therefore it is the policy of the department to disallow you from outside employment if you hold at least a ½-time assistantship. Exceptions to this policy include temporary consulting and/or tutoring jobs, which you may undertake if you receive prior approval from your Major Advisor.

ADMINISTRATIVE POLICIES AND PROCEDURES

Student offices/desks

The ESED department will provide a desk for each graduate student, contingent on available space. New students should meet with the ESED office manager concerning a desk assignment.

Student travel

Clemson University travel information and guidelines are available at www.clemson.edu/procurement/travel. Before you travel, complete a “Request to Travel” form, obtain appropriate signatures (PI or faculty member responsible for the account number to which it will be charged) and submit to your Major Advisor. If your travel is self-funded, you still need to complete a “Request for Travel” for insurance and workers’ compensation purposes.

Travel awards

The Graduate Student Government (GSG) awards amounts of up to \$750 to full-time graduate students toward their attendance at conferences and other professional development events on a competitive application basis. See the GSG website for application information (people.clemson.edu/~gsg/GTGS).

RUBRIC FOR PH.D. EXAMINATIONS

The Major Advisor, in consultation with the graduate committee, shall use the examination results to evaluate specific strengths and weaknesses of the candidate and his/her graduate program in the areas indicated below. **Circle one score, using a 5-pt. scale (1=Unsatisfactory, 2=Fair, 3=Good, 4=Very Good, 5=Excellent).**

Student Name: _____ ID# _____

Item 1 - Readiness Portfolio

Date: _____

1. Methodologies	1	2	3	4	5
2. Diversity, equity and inclusion in STEM	1	2	3	4	5
3. STEM educational theories	1	2	3	4	5
4. Application of research to practice	1	2	3	4	5
5. Writing skills	1	2	3	4	5

Item 2 - Comprehensive Examination (Research Proposal Defense)

Date: _____

1. Research topic knowledge	1	2	3	4	5
2. Theoretical knowledge	1	2	3	4	5
3. Research design and methods	1	2	3	4	5
4. Data analysis	1	2	3	4	5
5. Writing skills	1	2	3	4	5
6. Oral presentation skills	1	2	3	4	5

Item 3 - Dissertation Defense

Date: _____

1. Research topic knowledge	1	2	3	4	5
2. Research design and methods	1	2	3	4	5
3. Interpretation of results	1	2	3	4	5
4. Conclusions supported by evidence	1	2	3	4	5
5. Writing skills	1	2	3	4	5
6. Oral presentation skills	1	2	3	4	5