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INTRODUCTION

Welcome/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 throughout your graduate experience. The rules and regulations provided in this handbook govern our academic programs and describe the duties and responsibilities of graduate students in the department. This handbook is approved by the faculty of ESED. Each student is expected to be familiar with the contents of this handbook and that of the Graduate School. These rules and requirements are in addition to and subordinate to those described in the Graduate School Policy Handbook, found at https://www.clemson.edu/graduate/students/policies-procedures/index.html or through the Graduate School office in E-108 Martin Hall. 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 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 chairperson of the Graduate Curriculum Committee is the Graduate Coordinator. The Graduate Coordinator is your first contact should any issue arise regarding your academic progress or the program curriculum. For 2019-20, the Graduate Coordinator is Dr. Karen High. Contact information for Dr. High:

- Office location: M-15C Holtzendorff Hall
- Office phone: 864-656-4240
- Email: khigh@clemson.edu

A current list of all committee members and their contact information is available from the ESED Office Manager in Holtzendorff M-9 upon request. The handbook is available at https://www.clemson.edu/cecas/departments/ese/.

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 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 objectives of the ESED PhD program are to prepare students for academic careers in STEM education, science education policy in higher education or informal education institutions, 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. Students who enroll in this program will be expected to be content experts in a STEM discipline with at least a Master’s degree or equivalent in their content area of expertise. Graduates from this program will be prepared to become faculty in traditional STEM departments, as well as 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 fields of STEM education research.
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 degree in a science, technology, engineering, and mathematics (STEM) discipline from a college or university that is acceptable to Clemson University, with preference being given to those who have completed graduate studies (Masters level or higher) in a STEM discipline.

Admission to ESED is restricted to applicants whose academic record indicates a high potential to be successful in graduate studies. This determination is made 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, statements of interest, and standardized test scores. In reviewing transcripts, both the difficulty of the courses taken and the grade point ratio are considered.

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 (https://www.applyweb.com/clemsong/), 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 BS 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, etc.)

Admission Procedures

Upon your completion of the online application, your application is reviewed by the Graduate Affairs Committee. Your application status can be checked at
The Graduate Affairs Committee uses the following approach for recruitment and application review.

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 prospective student contacts at least one faculty member to explore research and assistantship opportunities.
4) Faculty express their interest in working with the student and identify potential sources of funding through an email to the SSC and Graduate Coordinator.
5) The faculty member and the Graduate Coordinator review the application to verify that the application is complete and meets the admission criteria.
6) The Graduate Affairs Committee (GAC) and the interested faculty member(s) arrange a video conference interview that includes the interested faculty member and at least one member of the GAC.
7) 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 GAC committee makes a decision to recommend admission or to not recommend admission.
8) The application is processed accordingly in Admit by the Graduate Coordinator.
9) The Graduate School sends the student information if they are accepted or not.
10) Accepted students receive an offer letter and information about their assistantship from the SSC and the Graduate Coordinator.

If you are not accepted for admission or if a Major Advisor within the department cannot be identified, 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.

Costs

For current tuition and fees, see [https://www.clemson.edu/graduate/finance-tuition/index.html](https://www.clemson.edu/graduate/finance-tuition/index.html).

For more information about academic costs, financial aid and making payments, contact the Office of Student Financial Aid (G-01 Sikes Hall, (864) 656-2280) or the Bursar’s Office (G-08 Sikes Hall, (864) 656-2321).

Financial Assistance

Financial support through assistantships is awarded 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, test scores, statement of purpose, and letters of recommendation.
Assistantships are awarded based on availability of funds in the area of desired study and academic merit. If you change your subject area after support has been extended, support eligibility is reviewed and funding may or may not be provided.

Eligibility for assistantships is governed by the policies in the Graduate School Policy Handbook.

**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.

**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](https://www.clemson.edu/graduate/students/new-student-to-do.html).
GETTING THROUGH THE PROGRAM

Student Responsibilities

The ESED department expects you to approach your graduate study in a professional manner. We expect all full-time graduate students to put in (on average) at least five eight-hour workdays per week.

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 who enter the degree with either a Master’s degree or equivalent expertise (18 credit hours at the graduate level) in a STEM discipline must meet the following minimum requirements to complete the ESED PhD.

<table>
<thead>
<tr>
<th>Minimum degree requirements for the ESED PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total hours of ESED coursework:</td>
</tr>
<tr>
<td>Total hours of courses outside ESED:</td>
</tr>
<tr>
<td>Doctoral research credit hours (ESED 9910):</td>
</tr>
<tr>
<td>Total credit hours earned:</td>
</tr>
</tbody>
</table>

Exams: Qualifying, Comprehensive and Dissertation Defense

Engineering & Science Education PhD Curriculum

Students will be required to take a minimum of eleven (11) credits from ESED courses, which include the following eight (8) required core credit hours:

- **ESED 8000 - Seminar in Engineering and Science Education 1(1,0).** Brings contemporary issues in engineering and science education research into the classroom. Experts from academia, industry and the corporate world give presentations on various issues, including recruitment of minorities, retention issues, technology integration into engineering curricula, distance learning, engineering content into K-12 curriculum, learning theories and education policy issues.

- **ESED 8200 OR 8210 - Teaching Undergraduate Engineering OR Science 3(3,0).**
  - ESED 8200 - Designed for engineering graduate students seeking a career in academe. Includes both discussion and practice of effective
teaching techniques, assessments and technologies, as well as an overview of current engineering education research.

- ESED 8210 - Graduate students in the sciences who are interested in an academic career learn to improve their teaching by incorporating results of modern science education research, including effective teaching techniques, assessment issues and the use of technology. Students are expected to be enrolled in a science, technology, engineering or mathematics graduate program when enrolling in this course.

- ESED 8710 Engineering and Science Education Research Methods 3(3,0). Introduces methods and tools available for conducting pedagogically sound engineering and science education research. Quantitative, qualitative and mixed methods are discussed and practiced.

- ESED 8610 - Practicum in Engineering and Science Education 1(1,0). Practicum that includes teaching or mentoring undergraduates in Engineering and Science (General Engineering or student’s home department). May be repeated for a maximum of three credits. Note: The goal of the class is to provide a means to reflect, engage others, and critically examine the role of teacher and mentor in the learning process. Each student should be engaged in a concurrent teaching or mentoring experience that equates to roughly 25-30 hours of contact time with undergraduate students over the semester.

Plus a minimum of three (3) credit hours from the following elective ESED courses:

- ESED 8250 – Engineering and Science Student Strategies 3(3,0). Elucidates relationships between students’ prior knowledge, problem solving skills and cognitive processes in undergraduate engineering and science courses. Focuses on steps involved in problem solving, how misconceptions are manifested in students’ work and how instruction can be structured to address those misconceptions.

- ESED 8700 – Theories of Engineering and Science Learning 3(3,0); Provides graduate students in engineering and sciences a foundation of theories of learning with a particular focus on their application to the teaching and learning of science, technology, engineering, or mathematics.

- ESED 8750 - Current Issues in STEM Education Research 3(3,0). Designed for doctoral students interested in STEM education research. Covers research issues of current relevance to a breadth of STEM education fields. Students have the opportunity to investigate a current topic of their choosing.

- ESED 8880 - Preparing for the Professoriate 3(3,0). Prepares students for obtaining a faculty position and achieving tenure in science and engineering
disciplines. Students develop a professional portfolio, prepare for the application/interview process and write a mini-proposal.

- **ESED 8790 - Current Topics in STEM Education Policy 3(3,0).** Provides a foundation for doctoral students in engineering and science to critically analyze current topics and pertinent historical precedence in United States policy affecting STEM education at multiple levels of the educational system. Students learn to communicate issues related to STEM education policy to various audiences and stakeholders.

**Additional Requirements**

- As directed and approved by each student’s doctoral committee, students will take a minimum of three (3) additional credit hours in supporting areas outside of ESED which include (but are not limited to): education, psychology, sociology, or statistics.

- Enrollment in ESED 9910 – Doctoral Thesis Research and Writing (18 credit hours)

- Disciplinary requirement – 18 credit hours at the graduate level in a single STEM discipline (i.e., mechanical engineering, physics, chemistry, etc.), unless a student holds an M.S., M.E., or higher in a STEM discipline.

- Qualifying and Comprehensive Examinations - In addition to the regular course requirements detailed above, students in the ESED PhD program will be required to pass a qualifying examination as well as a comprehensive dissertation examination before undertaking their dissertation research. The qualifying examination must be scheduled within 12 months after completing required coursework. Upon successfully passing the qualifying examination, the comprehensive dissertation examination will follow within another 12 months.

- All graduate students will generally be required to make at least one presentation at the ESED seminar course.

**Additional Program Expectations**

**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.
**Lunch and Learn**

The department holds “Lunch and Learn” every Friday. This is an opportunity for faculty and students to discuss current research. On days when the department is hosting a seminar speaker, this is an opportunity to interact in a less formal environment with our department guest. It is expected that students and faculty will attend the Lunch and Learn on a regular basis.

**Doctoral Qualifying Examination**

**Overview**

The ESED program requires that each student pass a qualifying examination given by your advisory committee testing understanding of scholarly literature and theoretical knowledge in the discipline of STEM education research no later than 12 months after you complete the required coursework. Part-time students may request a variance on the timing of the exam. Variances must be approved by your Major Advisor and the Graduate Coordinator.

The purpose of the qualifying exam is to verify that you have the prerequisite skills and knowledge to develop a proposal for your dissertation study. In addition, the qualifying exam serves as a checkpoint to identify areas of weakness to be addressed as you progress toward the PhD.

The exam topics may include theoretical frameworks appropriate for STEM education research, qualitative research methods, quantitative research methods, mixed research methods, and implications (theory to practice) of the research topics. At the discretion of the advisory committee, the qualifying exam may also include topics from the student’s STEM discipline, depending on the student’s background and research focus areas. Your Major Advisor will coordinate all aspects of your qualifying exam.

The qualifying exam will consist of both written and oral parts. The written part will contain four questions written by the advisory committee. Students will have an allotted time of four hours (roughly one hour per question) to write responses to the questions, which may be broken up into more than one session. Students may use a computer to compose responses, and are allowed to use external sources such as the internet, textbooks or journal articles in composing their responses. The responses must be written in paragraph form. Clarifying figures/tables/lists, etc. can be added as needed. The oral part will be given 5 to 9 business days after the written exam and will expand on topics from the written exam. It may also include other STEM education topics at the discretion of the advisory committee.

**Timing for the Qualifying Exam**

1) Constitute your advisory committee (see page 18).
2) Prepare a summary (1-2 pages) that describes in brief your research interests and relevant theory or background. References must be included and do not count in the page limit.

3) Send your summary to the Graduate Coordinator to approve. Once approved, your Major Advisor will send the summary out to your committee.

4) After the Graduate Coordinator has approved your summary you may schedule your qualifying exam (both the written and oral part). The scheduling for the oral part of the exam should be done at the same time as the scheduling for the written part.
   a. The written part of the exam should be scheduled at least 4 weeks after the project summary is sent to the committee.
   b. The oral part of the exam must be scheduled 5-9 business days (when the university is in session) after the written part of the exam is to be completed. The oral part of the exam must be scheduled at a time when all members of the committee are available.

5) The Major Advisor will work with the committee at this point to develop the exam. Typically, each member of the committee will write one question. General knowledge of the topics will be expected and assessed as ESED graduate students are expected to be education generalists.

6) It is possible and appropriate to discuss your research with your committee at any point in the process. However, it is not appropriate to ask the committee members what type of question they will ask during the exam.

7) After the written part of the exam is completed, the Major Advisor will send the responses to the committee members.

8) The format of the oral part of the exam is at the discretion of the student and the Major Advisor (which could include a PowerPoint presentation/handouts/etc.).

Assessing the Qualifying Examination

Members of the advisory committee will assess your performance on the written and oral parts of the exam using the rubric in the table on page 23, “Item 1 – Qualifying Exam.” The first four items in the rubric (Theoretical frameworks, Quantitative and/or mixed research methods, Qualitative and/or mixed research methods, and Application of research to practice) are intended to assess your responses to the questions on the written part of the exam, including any elaboration made during the oral part of the exam. The descriptors of these items are subject to change at the discretion of the student’s Major Advisor to be in keeping with the specific topics covered on the exam. Writing skills will be assessed with the understanding that the written responses were constructed within a limited time period (roughly 1 hour per question). Oral presentation skills will reflect the student’s ability to elaborate on their written responses and communicate well-reasoned responses to other questions posed during the oral part of the exam.

Summary grades of Pass, Conditional Pass and Fail for the qualifying exam will be based on the consensus of the committee.
• If you receive a Pass, you may continue in the PhD program.
• If you receive a Conditional Pass, your committee will determine stipulations such as taking additional graduate level courses selected by the committee and achieving an A in those courses, redoing portions of the written or oral exams, or other tasks as deemed appropriate by the committee. The committee will determine the timeline for completion and your Major Advisor will inform the Graduate Coordinator of the Conditional Pass by email cc’ed to you and to your committee, along with a list of the conditions and timeline for completion to the Graduate Coordinator. Upon completion of the conditions, the Conditional Pass converts to a Pass. If you do not complete the stipulations within the timeline, or do not meet the quality determined by the committee, the Conditional Pass converts to a Fail.
• If you receive a Fail grade on your first attempt, the committee will determine if a second attempt is allowed. If you are not allowed a second attempt you will not be permitted to continue in the PhD program, and the Graduate Coordinator will recommend to the Graduate School that you should be dismissed from Graduate School. The Graduate School will make the final determination. Appeals to this determination must be made to the Graduate School as outlined in Graduate School Policy Handbook.
• If you receive a Fail grade on a second attempt you will not be permitted to continue in the PhD program, and the Graduate Coordinator will recommend to the Graduate School that you should be dismissed from the Graduate School. The Graduate School will make the final determination. Appeals to this determination must be made to the Graduate School as outlined in Graduate School Policy Handbook.

Internal Appeal Procedure

The student may appeal the result of a qualifying exam in writing to the department chair within 10 business days of the committee 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 advisory committee, they will appoint an ESED faculty member that is not on the advisory 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.

Doctoral Comprehensive Examination (Defense of Research Proposal)

You should take this examination (both written and oral portion) within 12 months of successfully completing the qualifying exam. Part-time 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 doctoral 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 doctoral 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 manuscript 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 of 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.
Public Presentation

You should schedule a three-hour uninterrupted block of time for the public presentation and oral examination after the advisor has reviewed the proposal and has consented to the public presentation and oral examination going forward. 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. The public presentation should last 30-45 minutes, followed by a public question and answer period. Your major advisor will end the question and answer period at the appropriate time to transition directly into the oral examination.

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 a period of time, 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 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 on page 23, “Item 2 – Proposal Defense/Comprehensive Exam”. 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 doctoral 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-ResearchApproval.

**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 defend 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 manuscript 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. 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 department and will remain in the department after your graduation/departure. You must collect these materials and submit them to your Major Advisor before you graduate/depart. The Major Advisor will have final authority on the disposition of any or all of these materials.

PhD Dissertation Defense

You are required to provide a broad and penetrating 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 23, “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:

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

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 drop a course when 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, spring and summer semesters. The ESED Department makes every effort to schedule relevant courses so that students can easily maintain their enrollment.

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 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 helps plan your curriculum and guides your research activities and the preparation of your dissertation.

During each semester, you should meet with your Major Advisor to discuss your research project on a regular basis.

Advisory Committee

You will form an advisory committee in consultation with your Major Advisor. Your advisory Committee will approve your curriculum, supervise your graduate program, administer your qualifying and comprehensive examinations, 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.

You are responsible for forming your advisory committee and keeping them apprised of your progress. You should form your advisory committee no later than the fourth semester of your doctoral program. Appointment is made via form GS2 by the department chair, subject to the approval of the deans of the college and the Graduate School.

Process and Procedures

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

<table>
<thead>
<tr>
<th>Year 1 – 1st Semester</th>
<th>Choose a Major Advisor, take 3 graduate courses, attend seminars, attend faculty research presentations, begin work on research projects within your research group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1 – 2nd Semester</td>
<td>Take 3 graduate courses, attend seminars, continue to work on research projects within your research group. Form advisory committee and file GS2 form.</td>
</tr>
<tr>
<td>Year 2</td>
<td>Take graduate courses (as needed/desired), attend seminars. Continue work on research projects within your research group. Take qualifying exam. Develop your research proposal for your comprehensive exam.</td>
</tr>
<tr>
<td>Year 3 and beyond</td>
<td>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.</td>
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</tbody>
</table>

* See specific deadline dates for Graduate School forms at [https://www.clemson.edu/graduate/students/deadlines.html](https://www.clemson.edu/graduate/students/deadlines.html)
ASSISTANTSHIPS/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 ¼-time, ½-time, or ¾-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 ½-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 his/her 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. In the event of a death in your immediate family, illness of a close family member or personal illness or hardship, you may request up to four weeks leave without pay per semester and one week of leave without pay per summer session from your immediate supervisor. More information can be found in the [Graduate School Policy Handbook](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](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](http://www.clemson.edu/procurement/travel). Before you travel, complete "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](http://people.clemson.edu/~gsg/GTGS)).
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 - Qualifying Exam

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<td>4. Application of research to practice</td>
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<td>6. Oral presentation skills:</td>
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### Item 2 - Proposal Defense/Comprehensive Exam

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<td>3. Research design and methods:</td>
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<td>4. Data analysis:</td>
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<td>6. Oral presentation skills:</td>
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### Item 3 - Dissertation Defense

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<td>2. Research design and methods:</td>
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<td>3. Interpretation of results:</td>
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<td>4. Conclusions supported by evidence:</td>
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<td>5. Writing skills:</td>
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