Handbook for Internship and Research Experiences

Elon University, Department of Mathematics and Statistics
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1 Choosing a Mathematics or Statistics Capstone

Each of the degrees offered in the Department of Mathematics and Statistics requires a capstone experience. This can be an internship, independent research or Senior Seminar I and II (required for the B.S. in Mathematics or B.S. in Mathematics with teacher licensure). Which option is right for you? Here is a guide:

- **Internships** are designed to let you experience what a career in mathematics or statistics will be like. You will apply the knowledge and skills you have gained in the classroom in a work environment. An internship also allows you to make contacts which may lead to full time employment after graduation.

- **Independent Research** experiences allow you to work closely with a faculty mentor to explore a topic in mathematics or statistics in depth. If you are considering furthering your education in graduate school or want to gain experience applying course content to a particular problem, this would be a good option. Students who do well in this option are intellectually curious and self-directed learners.

- **Senior Seminar** classes require students to do extensive research on topics from mathematics or statistics and present those results both orally and in writing. The experience is similar to independent research but you will be working with other students and the experience is more formalized with presentations in class and outside of class.

You should consult with your academic advisor or another math/stats faculty member to help you determine the option that will best meet your interests and help you achieve your career goals. You should also check out the resources listed below.

**Resources**

- **Math/Stats page on Moodle**: When you declare your major you will be added to the math/stats Moodle page. Internship and career opportunities for math/stats majors are posted there. If you are having trouble accessing the site, check with Bernice Foust, administrative assistant, in Duke 209.

- **Prof. Crista Arangala, Experiential Learning Coordinator (ELC), Duke 307F**: Prof. Arangala can answer questions you have about where to find information about internships, getting credit for your internship/research, and other matters. Watch for e-mails from the ELC which will be sent out periodically to remind you of upcoming opportunities.

- **Student Professional Development Center**: Located on the first floor of Moseley, the SPDC is the clearing house for internships and deadlines for application. Check out their web page at [www.elon.edu/e-web/career_services](http://www.elon.edu/e-web/career_services). You can check the Elon Job and Mentor Network for current postings of internships. They can also help you improve your resume and prepare for interviews.
2 Internships

Internships in the College of Arts and Sciences provide students opportunities to integrate
disciplinary and/or interdisciplinary knowledge with experiences in various work settings.
Through high quality rigorous internships, students test and apply previously acquired knowl-
edge, acquire new knowledge, and develop deeper understanding of disciplinary perspectives.

As a student in mathematics and statistics, you will gain valuable opportunities for ca-
reer exploration and acquire greater insight into the role of mathematics and statistics in
the workplace. Through your internship you may also experience significant personal growth
as you grapple with complex issues, encounter diverse populations, and meet both academic
and workplace challenges.

What does an Internship in Math or Statistics Look Like?

The Department of Mathematics and Statistics has developed the following guidelines for
the kinds of internships that are appropriate for our majors.

• To receive capstone credit, you must have completed your sophomore year.

• Internships must appear to have substantial and collegiate mathematical or statistical
content to qualify for MTH/STS 481 credit. If you are unsure if an internship meets
this requirement, you should consult with a member of the math/stats faculty.

• The internship requirement could be fulfilled by an internship in an allied field if the
math or statistics major is a BA as a second major, provided the student has departmen-
tal approval prior to the internship. The internship must still have significant mathe-
matical or statistical content and be mentored by someone in the Department of Math-
ematics and Statistics.

• The syllabus and/or contract of the internship must require a strong writing/reflection
component as well as a presentation. The student’s presentation must be conducted on
the campus of Elon University.

• Note: In general, tutoring and similar instructional experiences ill not count as intern-
ships.
2.1 Components of an Internship

A For-Credit internship in mathematics or statistics includes the following components:

- At least three parties - the student, a faculty mentor, and the site supervisor.

- An application and approval of the learning experience offered in the placement site with the Experiential Learning Coordinator (ELC) according to the department’s guidelines. This is completed after the internship offer is granted but before the internship begins.

- A syllabus that includes:
  - student preparation.
  - a clear plan for ongoing student-faculty contact.
  - assignments requiring integration/application of mathematical/statistical learning and student reflection.
  - expected student learning outcomes, informed and guided by the learning goals of the department.
  - methods of assessing student learning.
  - required number of onsite work hours.
  - number of semester hour credits.

- Registration of the internship through the Student Professional Development Center with a copy of the syllabus and signatures of the faculty mentor, student, academic advisor, and department chair.

- Presentation at the end of the experience to be shared with math/stats faculty and students. This is coordinated through the ELC. Course credit will not be given until this portion is completed.

- Academic credit awarded for satisfactory completion of the academic assignments (as determined by faculty mentor) and satisfactory completion of onsite work (minimum of 40 onsite hours for each semester hour credit).
2.2 Internship Procedure

1. Before your internship:
   - Find a faculty mentor who will agree to mentor your learning experience and discuss learning goals and outcomes.
   - Utilize the Student Professional Development Center to strategize and prepare for your search for an internship opportunity.

2. After accepting an internship position:
   - Complete the internship application form (found in the appendix) and return to the ELC or complete online: http://tinyurl.com/conuwhl.
   - Access and complete the internship interest form at www.elon.edu/careers. To locate the form go to: Students/Alumni > Job & Internship Search > Register an Internship for Credit
   - Print and use the form to guide your discussion of learning objectives with your faculty mentor and inform your advisor.
   - Register your internship with your Elon Job Network account: http://www.myinterface.com/elon/student. Select the left side link: Register for Internship Credit. This should take 5 - 8 minutes. Finish in one sitting because you cannot save and return. After you have completed the online registration you will receive an email to approve your internship which finalizes your registration.

3. After completing your internship:
   - Complete written assignments as agreed upon with your faculty mentor.
   - Contact the ELC to set up a time for your post-internship presentation.
   - Faculty mentor will assess student work and submit final grade.
3 Independent Research

Independent research is an experience designed to enable you to learn and practice the process of discovering something new, or to examine something from a new perspective. It includes the exercise of techniques appropriate to the study of mathematics and/or statistics. Working in this capacity, you will learn about the complexity and rigor of the research process and experience the faculty/student mentoring relationship.

You may also satisfy the independent research requirement in a structured summer program such as a Research Experience for Undergraduates (REU) or a Summer Institute for Training in Biostatistics (SIBS). These experiences are generally offered on college campuses where you will do research under the direction of the faculty at the host institution.

To be eligible to receive 499 credit, you must hold sophomore, junior, or senior standing and have a minimum 3.0 GPA. Note: a maximum of 8 semester hours of research credit may be applied toward degree requirements.

3.1 Components of Independent Research

A capstone independent research experience in mathematics or statistics includes the following components:

- An agreement between the student and the faculty mentor. If you plan to complete the independent research through an REU or SIBS type program, you still need to have a faculty mentor at Elon.

- A contract that describes:
  - meeting times and duration over the term. A minimum of one contact hour per week is suggested.
  - tasks to be accomplished over the term.
  - a tentative timeline describing when the tasks will be accomplished.
  - methods of assessing student learning. This must include some written product that details the results of the research.
  - number of semester hour credits. A minimum of 3 hours per week of research per semester hour of credit earned is expected.

- In the case of REU/SIBS type experience, the contract should describe:
  - how often the student and Elon mentor will be in contact.
  - writing assignments requiring student reflection on the experience.
  - Note: A presentation at the end of the experience to be conducted on the campus of Elon University is required. This is coordinated through the ELC. The student will receive a grade of "NR" until this portion is completed.

- Registration for 499 credit through the registrar’s office by the deadline. Consult http://www.elon.edu/e-web/academics/undergraduate_research/499.xhtml to find forms and deadlines for receiving credit.

- Academic credit awarded for satisfactory completion of the academic assignments (as determined by faculty mentor).
3.2 Independent Research Procedure

1. Find a faculty mentor who will agree to mentor your research and discuss learning goals and outcomes.

2. Articulate research goals and contract as outlined in Section 3.1.

3. Obtain signatures and submit 499 registration form to the registrar’s office. Forms and deadlines can be found at: http://www.elon.edu/e-web/academics/undergraduate_research/499.xhtml

4. Complete meetings and research as outlined in the contract with your mentor. There must be some written product from the research to satisfy the capstone requirement.

5. Faculty mentor will assess student work and submit final grade.
4 Appendices

4.1 MTH/STS 481 - Internship Application

This form is a request for internship approval from the Department of Mathematics and Statistics. You must have departmental approval to proceed with registering for 481 credit. If your internship is approved by the department, you will still need to register for 481 credit through the registrar’s office and the Student Professional Development Center. For information on how to register, contact Prof. Crista Arangala (Experiential Learning Coordinator, ccoles@elon.edu, Duke 307F).

Student Name: ______________________________

Math/Stats Faculty Mentor: ______________________________

Total credit hours completed: __________ Credit hours In-Progress: __________

Business/organization you will intern with: ______________________________

How did you learn of this internship? ______________________________

Contact person at the organization: ______________________________

Contact phone: ______________________________ Contact email: ______________________________

Location of the internship: ______________________________

Tentative dates for the beginning and end of the internship:

__________________________

Time commitment of the internship (per week): ______________________________

Desired number of credit hours of 481: ____________ MTH or STS? ____________

Attach a separate sheet with a brief description of the internship. Include your expected duties and a description of the mathematical and/or statistical content of the internship.
4.2 MTH/STS 481 - Sample Syllabus

Instructor: Course Info: MTH/STS 481 Credit Hours:

Internship Information
- Company:
- Supervisor:
- Student Job Title:

Learning Goals (will vary depending on job description)
1. To gain experience with and analyzing longitudinal data.
2. To extend statistical (or mathematical) expertise in a corporate setting.
3. To learn or extend programming abilities.
4. To observe and experience the cultural differences in organizational behaviors.

Academic Assignment
1. Weekly reports due by noon the Monday following the reporting week.
2. A final paper addressing the learning goals and additional observations on how the company used data and statistical techniques to make decisions. The paper must also address how your statistics training thus far helped with the internship tasks and you should reflect on the experience as it relates to your future career and personal goals.
3. Final oral presentation of your experience geared towards other majors to be completed the semester after the internship.

Additional Expectations and Policies
1. The instructor will contact the official internship supervisor every two weeks for updates.
2. The student will schedule a phone interview with the instructor at least once per month to discuss any statistical or logistical issues or questions raised during the internship.

Grading

Expectations for a grade of B
- The student must have a consistently good record attending and being prepared for agreed upon meetings.
- The student must make consistent progress from meeting to meeting.
- The student must consistently demonstrate a positive general attitude and serious-minded effort.
- The student must have consistently upheld all aspects of the mentor-student contract with the resulting products being of good quality.

Expectations for a grade of A
- The student must show excellent consistency in meeting all expectations of a grade of B.
- The student must consistently put forth an effort that pushes their ability to the limit.
- The student must consistently take initiative in his/her work.
- A grade of A is not given, it is earned.
4.3 MTH/STS 499 - Sample Syllabus

Instructor:  
Course Info: MTH/STS 499  
Credit Hours:  

Research Title:  

Tentative Timeline of assignments (will vary depending on research)

- Weeks 1-2: Obtain references and provide annotated bibliography for each.
- Weeks 3 - 9: Analyze data using appropriate technology (SAS, R, Mathematica, etc.)
- Weeks 10 - 11: Begin working draft of paper.
- Weeks 12 - 15: Continue revisions of paper.
- Week 16: Submit final paper

Additional Expectations and Policies

1. The student and research mentor will stay in contact frequently through weekly meetings and via email.
2. The student will ask questions of the mentor when necessary.
3. The student will take initiative in making significant progress in their research.
4. The student is expected to complete assignments on time.
5. Work submitted and research conducted should be of collegial quality.

Grading

Expectations for a grade of B

- The student must have a consistently good record attending and being prepared for agreed upon meetings.
- The student must make consistent progress from meeting to meeting.
- The student must consistently demonstrate a positive general attitude and serious-minded effort.
- The student must have consistently upheld all aspects of the mentor-student contract with the resulting products being of good quality.

Expectations for a grade of A

- The student must show excellent consistency in meeting all expectations of a grade of B.
- The student must consistently put forth an effort that pushes their ability to the limit.
- The student must consistently take initiative in his/her work.
- A grade of A is not given, it is earned.