

MESc & MFS

Student Handbook

2020-2021



Rain-out shelter over experimental mesocosms. This experiment was designed to test hypotheses about the interplay between environmental warming (bagged mesocosm) and drought on insect dominant meadow food webs. Photo Credit: Adam Rosenblatt



Adjua, a farmer and cook, educates Colin Korst, MESc '20, on some of the challenges, motivations, and strategies for entering the cashew sector in Ghana. Photo Credit: Mercy Kumah

Acknowledgements

This handbook was adapted from the 2012 version written by Tara Ursell (MEd, 2013) and Sarah Federman (MEd, 2012). This version's development was completed thanks to the persistence and enthusiasm of Madeline O'Brien (MEd, 2020).

Contents

1.	Welcome.....	3
2.	Overview.....	4
3.	Suggested Progression.....	4
4.	Course of Study.....	7
5.	Advising.....	9
	A. Building a Strong Foundation	
	B. Optional Committee	
	C. Other Sources of Scholarly Advice	
6.	Conducting Research.....	11
	A. Getting Started	
	B. Planning with Resilience in Mind	
7.	Final Thesis Guidelines.....	14

1. Welcome

The MEdSc and MFS Programs at F&ES are fast-paced and intensive experiences. As a student, your challenge is to conceive, plan, execute, and write up original research. The requirement of accomplishing substantial research distinguishes the MEdSc and MFS degrees from the School's management degrees. Because of the two-year timeframe, it is important to start work on your research early and progress steadily under the guidance of your advisor. While conducting research, you will also be taking classes, requiring you to be thoughtful and intentional about all of your commitments. This handbook is intended to improve the quality of your experience as a research student at F&ES by providing guidance on key topics and timelines for your progress.

We look forward to working with you!

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2. Overview

The Master of Environmental Science (MESc) and Master of Forest Science (MFS) programs are designed for students wishing to conduct scientific research that contributes to basic and applied knowledge. Applicants are encouraged to work with potential advisors to determine which degree best suits their academic and career goals.

These science degrees are intended to provide students with a deeper disciplinary focus than the School's management degrees, while holding to the core value of the School that students should be allowed flexibility in course selection in order to meet their educational goals. The course of study includes formalized training in the philosophy and practice of science. Training is provided through key courses in combination with extended research.

The scientific research required for this degree is conducted in close collaboration with an F&ES faculty advisor. Applicants must connect with potential advisors before applying, and formal confirmation of advising commitment are provided at the time of admission.

3. Suggested Progression

Every student's pathway through the MESc and MFS Programs is unique, and students should consult their advisors to arrive at a common understanding of key landmarks and milestones of achievement. However, the timeline below can serve as a general guide, providing students with some sense of the progression experienced by most students.

Fall One

- Take the research methods class appropriate for your area of research.
- Meet with your advisor to discuss your research plans, publication goals, and any ambitions for further study.
- Complete a draft of your research proposal by the end of the term.

Spring One

- Enroll in courses that will provide new knowledge and skills to augment your proposed research plan, this might include data analysis courses, skills based courses, or courses that can build your understanding of the literature in your field of research.
- Craft and submit funding applications.
- Continue to refine your research proposal in consultation with your advisor.
- Discuss possible committee members with your advisor and begin reaching out to them to gain their agreement to serve in this role.
- Pursue human subjects research approvals or animal care protocol approvals (and associated training) if needed, and consult any collaborators to ensure you understand any applicable regulatory structures with their institutions. Note: This should be initiated in January of the spring term.
- If you are doing international work, research which visas and import, export, or research permits you may need as well as other various permissions. Understand and plan for the timelines needed to secure these documents.
- Attend the field research safety session if you are doing field research.
- Register your summer travel with Yale, if you will be traveling off campus: <https://world-toolkit.yale.edu/yale-travel-registry-instructions>
- Complete the MEdSc and MFS Thesis Proposal form (<https://bit.ly/2StqjPP>) by April 1st; to do this, you must have

identified your thesis committee members and gained their agreement to participate.

- If you are traveling to conduct your research, be sure to meet with your advisor prior to departure to discuss your research plan and ensure a common vision.

Summer

- Conduct independent research, keeping excellent notes and ensuring data are backed up.

Fall Two

- Meet with your advisor early in the term to discuss your summer research, and plan for the coming year.
- Consider additional data analysis courses to inform your work.
- Build a timeline for data analysis and writing; Gantt charts are one common planning tool that might be of use.
- Plan to complete a full draft by the end of the term.

Spring Two

- As you refine your full draft, seek feedback from your advisor and visit the Graduate Writing Lab (<https://poorvucenter.yale.edu/writing/graduate>) for additional writing support.
- Produce a nearly final draft before F&ES Research Day in April so that you can provide a complete and high impact presentation. Note: A poster or oral presentation at F&ES Research Day is a graduation requirement for MEd and MFS students.
- Submit your final thesis to your advisor, committee members, and the F&ES Dean's Office by the final day of spring semester classes; be sure to name the file First Name_Last Name_Degree Type_Class Year

4. Course of Study

The MEdSc and MFS Programs require 48-credits, with formal coursework comprising at least 24 credits and thesis research comprising at least 12 credits. In collaboration with their advisor, students will determine how to distribute their remaining 12 credits between courses and research in alignment with their academic and research goals. Courses may be distributed evenly over two years, or a greater course load may be carried in Year 1 to accommodate research-related travel, fieldwork, and writing in Year 2.

The MEdSc and MFS Programs have only one course requirement: Research Methods. Students are required to complete Natural Science Research Methods (F&ES 550a) or Mixed Methods for Social Science Research (F&ES 551a) in their first semester. Another research methods course may be substituted when appropriate and approved by your advisor.

Students are encouraged to build a two-year plan for their course work during their first semester. Your faculty advisor can provide excellent guidance in this effort, helping you to select courses that will support the design, execution, and communication of your Master's research that are consistent with your research and career goals. Students can find two years of course offerings on the F&ES website (<http://environment.yale.edu/courses/>) but are also encouraged to explore courses across Yale that can augment the F&ES offerings.

As noted, students are required to complete at least 12 credits of Thesis Research, in which they are specifically engaged in the design, execution, analysis of data and reporting of their research project. Students may register for a maximum of six credits per semester of Thesis Research during their first year and up to 12 credits per semester in their second year, provided the 24-credit coursework requirement is satisfied. Thesis Research is graded as Credit/Fail. While for many students Thesis

Research is conducted using specific Thesis Research credits, some advisors prefer to count specific courses toward the research credits of their students. These distinctions must be communicated to the Registrar to ensure they are counted toward this specific requirement.

Students should also consider the benefit of participating in the Professional Skills Modules (PSM) at F&ES. These short learning experiences can help you build skills in data communication, data visualization, or working in teams, to name only a few examples. Consult the PSM website (<https://environment.yale.edu/academics/professional-practice/skills/>) each semester to take advantage of these opportunities.

Suggestions from recent students:

- Read course evaluations to better understand offerings: <https://oce.app.yale.edu/oce-viewer/studentViewer>.
- Talk to second year students, PhD students, and alumni to gather course recommendations.
- Take a statistics course in your first year, which may inform your future research plan (data collection methods, sampling plans, survey design, etc.). This will help to ensure that you have effective analytical tools at your disposal once you have data in hand.
- Don't shy away from advanced readings and methods courses, they will push you in helpful ways and you will learn a great deal from working with your peers.
- Consider a Project Course (independent study) if you want to go into greater depth on a topic than offered courses will allow; but if doing one, be sure to have a concrete idea with a well-defined learning plan and deliverables. The forms for these courses are due to the Registrar early in the term, so advanced planning is required.
- Don't hesitate to reach out to instructors to learn more about their course.

5. Advising

5A. Building a Strong Foundation Establishing a positive working relationship with your advisor should be an early priority, and one that you should begin work on before and during the admissions process. These relationships require effort from both participants, advisor and advisee, and setting norms for your engagement early is critical. Students are encouraged to discuss with their advisor what their expectations are for progress, timelines, and any other issues of concern.

Advising styles vary widely, with some advisors engaging students in labs or research groups with consistent meetings and feedback, while others meet less frequently with students as individuals. As a student, you should consider which structure best fits your needs, and work with your advisor to come up with a plan. In extreme circumstances, an advisor change may be needed, however, often a frank conversation can help to elevate any issues and spark remedies.

Suggestions from recent students:

- When you initially contact your advisor, gauge the level of your mutual interests and be sure to ask how often they meet with their advisees.
- Learn if your advisor holds regular lab meetings because these can be a helpful forum for discussion and gathering feedback on your ideas.
- Discover how many students your advisor typically works with and, similarly, how many research projects your advisor is leading.
- Contact your potential advisor's current students; their first-hand experiences can give you valuable insight.
- Ask whether students are encouraged to work on the advisor's ongoing projects or on projects conceived independently by the students.

5B. Optional Committee: While students should be working with their advisors primarily, developing a faculty committee is an option, though not a requirement. For some students, having a committee of additional faculty advisors to inform the development of their research project can provide significant benefit. Students who would like to form a committee should discuss the selection of committee members with their primary advisor early in their first year as their ideas are developing. It is the student's responsibility to ask potential committee member to serve in this role and gain their agreement.

If a student decides to pursue a committee, it will be formally assembled at the time of proposal submission, April 1st of the first year using the MESC and MFS Thesis Proposal Form: <https://bit.ly/2StqjPP>. The committee should consist of the student's faculty research advisor, who serves as the committee chair, and at least one, but not more than two, other members. Committee members should hold doctorates or professional terminal degrees. The committee chair must be on the F&ES faculty, and at least one other committee member should belong to the F&ES faculty, unless otherwise approved by the MESC and MFS Program Committee

5C. Other Sources of Scholarly Advice Your faculty advisor should be your primary source of counsel on academic and research matters, but there are many other sources of supplemental guidance available to you across the University. Explore these resources early to take most effective advantage of all they have to offer; they can be impactful in every phase of your research.

Suggestions from recent students:

- *Senior members of your lab or your advisor's other advisees:* They are frequently available, and they can help you with lab techniques or computer programs and by pointing you towards relevant

literature. PhD students, post-docs, and second-year MEd and MEd students are often eager to help.

- *The Yale StatLab*: Staff and student consultants can work with you on data analysis and statistical programming. Visit their website here to learn more: <http://statlab.stat.yale.edu/>.
- *Faculty from Other Departments*: Students have developed successful advising arrangements with faculty from departments and programs outside F&ES with faculty from Geology & Geophysics, Ecology and Evolutionary Biology, Chemical Engineering, and many other units. Your F&ES advisor is your primary advisor, but these individual from outside of F&ES can provide valuable additional expertise and can also serve as potential committee members.
- *The Graduate Writing Lab at the Poorvu Center*: The GWL frequently runs workshops for dissertation or master's thesis writers from across the university, and has organized informal peer review and accountability groups. It can be incredibly valuable to receive feedback on your research ideas or written drafts from peers outside of your discipline that you may meet through these venues. Learn more about their offerings here: <https://poorvucenter.yale.edu/writing/graduate>
- *F&ES Learning Communities*: These groups are set up to support any F&ES student interested in the umbrella topic. They align specifically with MEM specializations, but are in no way limited to MEM participants. Join these email lists to learn more about students and faculty interested in the same topic area, relevant lectures or workshops, or social events (such as coffee hours and potlucks).

6. Conducting Research

6A. Getting started All good research starts with a clear problem statement and well-defined research question(s) that, in turn, informs the approaches and methods necessary to carry out the study. Discussions

with your advisor and your experience in your research methods course should be your primary means of building this foundation. However, there are many strategies you can employ to help support this process. Please familiarize yourself with the [University's Responsible Conduct of Research page](#) to ensure that you are well informed about scientifically responsible and ethical research practices.

Suggestions from recent students:

- *Read:* Even before you arrive at F&ES, stay up-to-date with the latest research in your field of interest and try to get a sense of what your contribution may be. You may not pin down a specific research question until you arrive, but you'll become better informed about what interests you. Furthermore, you need to be familiar with the relevant literature or you risk duplicating past work or missing good suggestions of established scientists on ways to advance your field.
- *Speak with your advisor and other F&ES Faculty frequently:* Your advisor likely has several research projects in play, some of which are focused on questions that could be addressed within the context of a master's student project. Do not hesitate to reach out to faculty, in addition to your advisor, for guidance.
- *Seek Advice from Professionals:* If you have worked with an NGO, government agency, or some other group that does research, you may want to work on a related project for your master's degree. This is an especially good idea if you plan on pursuing a non-academic career path. It also may make you eligible for funding that is more professionally-oriented. Be sure to keep your advisor well informed about such discussions.

6B. Building Resilience into your Research Plans As you develop the intellectual framework for your project through your research methods course and throughout your first year, it is also important to develop skills that will help you with successful implementation. Discuss with your

advisor strategies to gain experience with the methods you hope to implement.

Suggestions from recent students:

- Hone your skills in preparation for research. If you don't already have experience with your methods and protocols, consider working in your advisor's lab in your first or second semester. Alternatively, consider a project course or independent study that is targeted specifically to the data collection-and-analysis techniques that you intend to employ in your research.
- Ensure that your plan for data collection is feasible given your time constraints as well as the timing of the research questions that you intend to explore. You don't have much time to collect data – one summer and those parts of the fall, winter, and spring that you are not devoting to classes, homework, and other academic pursuits. Furthermore, the questions you are seeking to answer may exhibit time-sensitive patterns that are unsympathetic to your classroom schedule, and there may be seasonal restrictions on access to your field sites. Determine your temporal research constraints as early as possible so that you can plan out your research schedule on a calendar, leaving ample room for adjustments.
- Have a clear sense of your project's logistical challenges (and strategies for overcoming them), especially if you are doing international work. You may, for example, need to plan for visas and import, export, or research permits and apply for various other permissions.
- Your research plan should be very carefully thought out. In some instances, you may be forced to adapt due to unexpected circumstances. Have contingency plans that will enable you to complete your work, while retaining a valid experimental design and preserving the meaningfulness of your study.

- There's more to your research than data collection. Leave yourself sufficient time for thoughtful interpretation of your data, reflection upon your results, writing, and re-writing.

7. Final Thesis Guidelines

Final theses at F&ES can take many different forms. Students should discuss with their faculty advisor what structure and length best fits their disciplinary expectations. Theses at F&ES can comprise one or more papers suitable for publication in a peer-reviewed journal, or mirror the style of a chapter in an edited book. F&ES theses should also include an abstract. All theses must be submitted to the F&ES Dean's Office by the final day of classes in the Spring term of your second year. Files should be saved as PDFs with the following naming convention: First Name_Last Name_Degree Type_Class Year