Overview

ME EN 497R is a research course that may be applied toward the technical elective requirement for the Mechanical Engineering program (and occasionally other programs, e.g. Applied Physics). The overall goal of the 497R course is to give undergraduates research experiences typically reserved for graduate students, albeit in an format accessible to the abilities and time constraints of an undergraduate student. In the FLOW Lab, under the direction of Dr. Ning, we have somewhat formalized this course while also allowing a great deal of student-lead learning. This syllabus document is the beginning of that process, wherein the undergraduate and graduate mentor work together to develop a customized syllabus for the undergraduate. This document is a template to be filled out and submitted to Dr. Ning for final approval and an add code for ME EN 497R.

Prerequisites

It is assumed that the student has completed the FLOW Lab Introductory Project, which includes a basic familiarity with the following concepts:

- The Julia language, including using packages, functions, loops, doctstrings, comments, etc.
- LaTeX, including basic document creation, section headers, including figures, etc.
- Creating a github repository and using git for basic add, commit, pull, and push commands.

Learning Outcomes

Technical

1. [Technical Outcomes Here]
   - [futher details as needed]

Auxiliary

The following auxiliary learning outcomes are based on those tools and methods of communication that are *universal* in the FLOW Lab. Note that there are other auxiliary skills that may be gained depending on your approach to your chosen course design.

1. Coding: The student, utilizing the Julia language, will learn the follwing:
   - Docstring usage
   - Good commenting practice
2. Version Control: Using git, the student will gain familiarity with the following concepts:

- Using github Projects
- Submitting and responding to github Issues
- Opening and reviewing github Pull Requests

3. Technical Writing: The student will gain introductory experience in the following areas:

- Reading and reviewing technical papers and creating a bibliography
- Writing technical memos, a research proposal, and a technical report
- Presenting technical information in well designed figures
- Receiving and applying critical feedback

Grade Rubric

We have set up the semester schedule to resemble an approximation of a graduate student's timeline, but obviously condensed into a single semester time frame. There are 8 major deliverables due throughout the semester. Table 1 shows the grade breakdown for those deliverables. The following section provides detailed descriptions of the various deliverable contents and formats.

Table 1: Proposed grade division for ME 497R.

Points	**Deliverable**
5	Orientation
5	Intro Project Revision
10	Paper 1
15	Prospectus
10	Paper 2
10	Paper 3
20	Thesis and Defense
75	Time Log
150	**Total**

Deliverable Details

Project Orientation

[date start - date end (Week 1)]

Often, planning 497R projects gets pushed off until the first week of classes, so we'll formalize that here. (If you already completed this docuement before the start of classes, you can use this time to gather resources for later assignments.)

Your deliverables for this assignment are:

1. Completing this syllabus and receiving an add-code from Dr. Ning if you haven't already
2. Scheduling a weekly meeting time with your graduate student mentor.
3. Setting up your repository for developing, storing, and submitting your assignments for this semester.

Repository Setup: You should have already used github to submit your Intro Project report and code. You will use that same method throughout this semester. It will be very helpful to get your repository organized now. Complete the following:

1. Rename your Intro Project repository on github something along the lines of "497R Project" or something similar.
2. If you haven't already, add your graduate mentor as a collaborator so they can view your submissions throughout the semester
3. Organize your repository in a way that makes sense for your course design. For example, you may consider moving all the intro project files to their own directory and adding a directory for memos/reports, a directory for code, etc. Keep in mind that you need files in directories before git will recognize them.
4. Initialize a README.md file in the root directory of your repository
5. In the README, write a brief summary what your repository will be used for. You can use this syllabus for ideas of what to include. Make sure to include section headers and any other organizational elements to make it easy to read. (Think about how you could use this project as part of a portfolio.) You may also consider including a description of what your various directories include for easy reference later.

TIP: Remember that you can change any of this later, so don't worry about getting things perfect. More often than not, you'll update as you go and figure out better ways to organize, etc.

Intro Project Revision

[date start - date end (Week 2)]

Before enrolling in 497R, you should have finished and submitted your Intro Project to your assigned graduate student mentor for approval to move on to 497R. If you haven't already, meet with your graduate mentor as soon as possible to receive feedback on your report and code. Then take that feedback and revise your Introductory Project code and report. Your revised code and report are your delivarables for this week.

As part of your report revisions deliverable, you should update your LaTeX document such that it can be used as a template for your written deliverables during this semester. Your template should resemble the example document that can be found in the MEEN497R directory in the undergrad-onboarding repository.

Paper 1

[date start - date end (Weeks 3-5)]
Version Control: For this, and every subsequent assignment, you will submit your deliverables using github. Thus, for every assignment from now on, you should do the following: (note that this seems involved, but it's really very simple in practice)

1. BEFORE you start coding, etc. create a github issue with a comment describing the problem description and any other information you want to include.
2. Make sure to add any assignments (assign yourself...) and labels (you may need to create custom labels) that make sense for your issue. Also add the issue to the relevant project. You may consider using multiple issues in a single assignment, depending on how you've designed your course. The Project Kanban boards can be helpful for organization.
3. Create a branch for what you're working on for this assignment.
4. Throughout the assignment period, feel free to add comments and questions in your issue (this is a good way to write things down that you want to ask your graduate mentor in your weekly meetings).
5. When you are ready to submit your assignment deliverables, create a pull request for your branch (this assumes you've been adding, committing, and pushing along the way as well). Request your graduate mentor as a reviewer.
6. Upon approval of your pull request, merge with a comment that closes the issue for that assignment, and delete your branch (unless you need it for something else).

REMEMBER: Do steps 1-3 before you start *this* assignment.

LaTeX: As you will be required to submit a memo, proposal, or report for this and each of the following assignments, so you will need to put together a LaTeX template for this assignment. Your template should include at a minimum:

1. A well commented preamble with any packages you might need (for things like math, figures, hyperlinks, etc.)
2. A header with the assignment name/number, your name, and the date completed.
3. A footer with the page number.
4. Sections (with labels) for Introduction, Methods, Results, and Discussion/Conclusion.

5. Templates for basic figures and tables.

NOTE: This is a minimal template for this assignment. You will likely add to it later as your needs increase. If you do this well, you should be able to use your template for your other course assignments, especially final reports. Anecdotal evidence indicates that well formatted final reports (specifically in the 2-column peer-reviewed journal style format) such as those you can produce with LaTeX often lead to significant grade increases.

You can obviously use this document as a reference for your template, but make sure you understand what everything does, and feel free to add your own personal flair.

Prospectus

[date start - date end (Weeks 6-8)]

As stated on the Wichita State University Website A prospectus is a formal proposal of a research project developed to convince a reader (a professor or research committee, or later in life, a project coordinator, funding agency, or the like) that the research can be carried out and will yield worthwhile results. It should provide:

– a working title for your project,

– a statement of your research question or issue,

– an overview of scholarship related to this topic or to the this author,

– a brief summary of your research methods and/or your theoretical approach.

Your deliverables for this assignment are first, a written prospectus. As you prepare your written prospectus, you may find the ME department prospectus infographic helpful.

The second deliverable is a review and revision of your prospectus. You should complete your review-ready draft of your prospectus by the end of the second week of this assignment and submit it to your graduate mentor and another graduate student in the FLOW Lab (you will have to ask around in the FLOW Lab to see who has the time and experience to provide a review). Using their feedback, revise your prospectus.

The format of your deliverable should be 3 documents:

– Your review-ready draft, submitted by the 2-week mark for this assignment

– Your revised prospectus, submitted at the end of the assignment window

– A “Diff” document that highlights the changes you made between drafts.

To create your “Diff” document, you can either utilize multiple branches, or commits to save the versions of your prospectus. You can then use a LaTeX diff tool (e.g. latexdiff) to highlight the changes you have made to your document.

Paper 2

[date start - date end (Weeks 9-10)]

"Paper 3"

[date start - date end (Weeks 11-13)]

Thesis and Defense

[date start - date end (Weeks 14-16)]

The Final Report is a culmination of the bi-weekly memos produced thus far, revised according to mentor feedback, as well as any additional material necessary to produce a technical report that is both complete and well executed. A final report template is available in the undergraduate-onboarding repository

The Final Code Submission is similarly the final, cumulative state of the code produced as part of the bi-weekly assignments, revised according to mentor feedback, as well as any additional material necessary to understand and use the code produced.

Both submissions will be due to the graduate mentor for review/grading on the last day of Finals.

Student/Mentor Acknowledgement

I, [the student], have helped write, and have read, and I understand the above proposed syllabus and accept it as my desired 497R experience.

Student Signature Date

I, [the mentor], have read the above proposed syllabus and accept resposibility for providing guidance, feedback, and grades as required by this course plan.

Mentor Signature Date