Syllabus

ISC 4943: Practicum in Computational Science Spring 2020

Instructor: Dr. Anke Meyer-Baese
email: ameyerbase@fsu.edu
Office: 476 Dirac Science Library

Mentor: Chosen by the student

Course Catalogue Description:

This practicum allows students to work individually with a faculty member throughout the semester and meet with the course instructor periodically to provide progress reports. Written reports and an oral presentation of work are required. May be repeated to a maximum of six semester hours, with a maximum of only three semester hour credits allowed to be applied to the Computational Science degree.

Course Description:

The practicum prepares students for the workforce where many will be conducting research in academia, industry, or the national laboratories.

Students in the practicum course are expected to build on the knowledge and abilities developed over their first seven semesters through the setup and execution of an ambitious project in computational science, with the results presented both as a formal written report, an oral presentation, and a course journal. The course will end with an interview during which the student will have the chance to discuss their experiences in the course.

The practicum is required for graduation in the department and is usually taken in the spring semester of the senior year.

For this course, the instructor of record plays a supervisory role. The student should meet with the instructor to discuss the purpose of the practicum, and to consider appropriate faculty mentors. Once a mentor is selected, the instructor should ensure adherence to the practicum timeline and should receive copies of the proposal, drafts, and final report from the mentor.

The mentor guides the student in the choice of a project, helps to develop a solution strategy, and reviews and grades the written work of the student to ensure professional writing standards.

Together, the student and mentor agree on a suitable project, a series of intermediate goals, and a timeline. The student is responsible for writing the proposal as a formal document. After that, the student works independently except for regularly scheduled meetings with the mentor. At these meetings, the mentor helps the student with any difficulties that arise during the project phase. Over the period of the course, the student submits two drafts and a final report, which the mentor reviews, edits, and returns to the student for revision.

Completing the practicum requires the delivery of the project proposal in written form, the execution of the proposed project work, submission of two drafts and a final report, and finally an oral presentation.

Students may repeat the course for a maximum of six semester hours, with a maximum of three semester hours of credit applicable to the Computational Science degree.

Prerequisites: Senior standing (90+ hours).
Text Book: Students will utilize internet and other resources as deemed appropriate by their faculty mentor and the course instructor.

Course Objectives (including upper writing division requirements):

By the end of this course, students will demonstrate the ability to:

- adhere to the timeline stated in their proposal;
- complete a substantive project in computational science;
- write a report summarizing the research completed;
- present their results orally, similarly to a short conference talk;
- apply evidence from multiple sources to illustrate how a chosen topic is relevant to a particular field;
- utilize words, imagery, citations to compose within that field;
- compose as a process, including drafts, revision, and editing;
- convey ideas clearly, coherently, and effectively for a particular purpose, occasion, or audience as appropriate to the field of study;
- track a research project with the help of a journal.

Course Schedule (this includes only formal due dates; students are expected to work throughout the semester):

- Week1: Introduction and syllabus
- Week 2: Return of Proposal draft
- Week 3: Return of Proposal updates
- Week 6: Return of Report Draft 1
- Week 7: Return of Report Draft 1 updates
- Week 10: Return of Report Draft 2
- Week 11: Return of Report Draft 2 updates
- Week 14: Oral Presentation and return of Final Report
- Week 15: Final Interview

Final Grade Determination:

The grade for the course will be determined as follows:

- Project Proposal - 10%
- Report Draft 1 - 15%
- Report Draft 2 - 10%
- Final Report - 25%
- Journal – 10%
- Oral Presentation - 20%

- Final Interview – 10%

The scale for the grades will be A (93-100%), A- (90-92%), B+ (87-89%), B (83-86%), B- (77-82%), C+ (73-76%), C (69-72%), C- (63-68%), D+ (59-62%), D (55-58%), D- (50-54%), and F (<50%). Numeric grades are rounded to the nearest integer.

Project Work Assessment:

Several factors combine to determine the project grade: the extent to which the student has exhibited a professional approach to the project proposal, documentation as the project evolves from inception to completion, project implementation in software, and a clear and convincing presentation of the results, both in written form as a final report and through an oral presentation. For this portion of the grade, the draft and final reports are judged in terms of their content, that is, the extent to which they succeed in describing the background of the problem area, the purpose and methods of the project, the algorithms and implementation, the numerical results and the conclusions drawn from those results. These criteria match those used when judging any scientific project; further details change on a per-project basis.

Written Work:

A significant portion of the practicum involves the development of professional writing skills. Those skills are measured via the following rubrics: thesis/main message, organization and structure, quality of evidence, paragraph skills, sentence skills, grammar/mechanics, and documentation. The proposal, drafts, and final report provide evidence of these skills, and the ability of the student to attain the professional level of writing that will serve them in future endeavors.

All reports (proposal, drafts, final report) should include a compelling, memorable, and original thesis/main message. The repo should be well organized and easy to follow. Evidence should be highly credible and used logically. Appropriate evidence includes logical reasoning, charts with descriptions, mathematical proofs, or the generation of experimental data. Each paragraph should be well developed and organized around a single main idea, ideally with a topic sentence; sentences follow logically, with signal/transition phrases. Desired sentences are elegant and grammatically perfect. References and sources are to be used ethically with well-placed citations.

By default, the students write all the documents in Times New Roman 11 pt font, double spaced.

The project proposal should be between five and eight pages long (without tables, figures, references). It should begin with an overview of the area of study, followed by a statement about the student's proposed project, discussing the computational and scientific aspects of the problem, and the goal of the project. Since this is partly a planning document, there should also be a section that analyzes the project as a sequence of milestones, that is, tasks to be carried out, with an approximate timeline for the completion of each. This project proposal is submitted to the mentor by the end of the second week of the practicum for review, and a revised version a week after that.

The two draft reports should be between 15 and 25 pages (without tables, figures, references). The central portion of the report should develop, perhaps in greater detail than the initial proposal, the area of study, the student's project, and note the details of the algorithms to be implemented, issues of verification and efficiency, as well as benchmarking on test cases. An auxiliary part of the report should detail the student's progress in completing milestones, and any adjustments to the research plan. These reports are submitted to the mentor by the sixth and tenth weeks of the semester. The mentor reviews the reports and returns them to the student for revisions resubmitted within a week.

The final report is due one week before the last day of classes for the semester and is between 18 and 30 pages (without counting tables, figures, and references). This report is a self-contained document that does not refer to the previous proposal or drafts. It should be written in a professional style and format and present an introduction to the area of scientific computing in which the student's work is carried out. It should describe the class of problems addressed, lay out the student's thesis including a solution procedure, present a solution analysis in terms of algorithms, and discuss the issues encountered when translating the solution procedure into a specific computer language. In addition, the report should contain a set of test cases used to verify the solution procedure. The output of

numerical simulations is described via plots, tables or other means. Finally, the final document should present some concluding remarks derived from the results, followed by a bibliography of works cited during the project.

Journal:

Each student will maintain a journal during the duration of the practicum updated at least twice a week. This journal will be written in blog form on the computer either in Latex or with software that allows for mathematics, illustrations and tables in addition to text. Python (Jupyter) notebooks are an example of software that satisfies these constraints. The student will take notes on day to day experiences, ideas generated through conversations or on their own, or problems encountered. Milestones achieved or tasks to be done should be included. Journal entries should also include experiences related to the course, tips and lessons learned.

Oral presentation:

Students are required to make a 10 to 15 minute oral presentation of the completed research project, including the time for a Questions/Answers period. Students will provide attendees copies of their slides on a handout sheet on the day of the presentation. The audience will include the instructor and enrolled students. The presentation will be open to all faculty and students in the department.

Final interview:

At the end of the course, all students will participate in an interview conducted by the instructor and the student mentor. In this free-form interview, the student will be quizzed as to their experience in the class, what they learned, and how they might apply this knowledge and process in future endeavors, either in academia at the graduate level or in the workforce. The student has the opportunity to offer suggestions on how to improve the course, and relate their experience with their mentor. The interview complements the presentation and tests the student skills in an interactive environment, counts for 10% of the overall grade and lasts between 10 and 15 min. How the student answers the questions posed helps determine to what degree they have thought of their experiences, whether positive or negative. Short non-informative answers could lead to a grade drop of 50%. A full grade requires substantive descriptions of their experiences, examples of how the course will serve them in their future, or if the experience was not positive, constructive criticism that would lead to a better course in the following year.

Upper Division Writing Requirement:

In this course, you will compose as a process, including drafts, revision, and editing. The writing cultivated by this process conforms to FSU's definition of "college-level writing", which is writing that:

1. presents a clearly defined central idea or thesis;
2. provides adequate support for that idea;
3. is organized clearly and logically;
4. is presented in a format appropriate to the purpose, occasion, and audience; and
5. utilizes the conventions of a standard language.

As such, this course requires the completion of two or more substantial writing assignments or the equivalent. Instructors will provide criteria for evaluating your performance on writing, feedback on your writing (including instructor response), and opportunities for revision.

This course has been approved as meeting the Liberal Studies requirements for Upper-Division Writing and thus is designed to help you become a flexible and proficient writer for professional purposes. In order to fulfill FSU's Upper-Division Writing requirement, the student must earn a "C-" or higher in the course, and earn at least a "C-" average on the required writing assignments. If the student does not earn a "C-" average or better on the required writing assignments, the student will not earn an overall grade of "C-" or better in the course, no matter how well the student performs in the remaining portion of the course.

Formative Experience

The Liberal Studies for the 21st Century Program at Florida State University builds an educational foundation that will enable FSU graduates to thrive intellectually and materially and to engage critically and effectively in their communities. In this way your Liberal Studies courses provide a comprehensive intellectual foundation and transformative educational experience. This course has been approved to meet FSU's Liberal Studies Formative Experience requirement and is designed to help you use and develop knowledge by engaging in a hands-on experience outside of the classroom. One of the two required Scholarship in Practice courses may be fulfilled with a Formative Experience. In order to fulfill this requirement, the student must earn a "C-" or higher.

University Attendance Policy:

Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy:

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to… be honest and truthful and … [to] strive for personal and institutional integrity at Florida State University. (Florida State University Academic Honor Policy, found at http://fda.fsu.edu/Academics/Academic-Honor-Policy.)

Americans With Disabilities Act:

Students with disabilities needing academic accommodation should:
(1) register with and provide documentation to the Student Disability Resource Center; and
(2) bring a letter to the instructor indicating the need for accommodation and what type.

Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Student Disability Resource Center has been provided.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center
874 Traditions Way
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu
http://www.disabilitycenter.fsu.edu/

Free Tutoring from FSU:

On-campus tutoring and writing assistance is available for many courses at Florida State University. For more information, visit the Academic Center for Excellence (ACE) Tutoring Services' comprehensive list of on-campus tutoring options - see http://ace.fsu.edu/tutoring or contact tutor@fsu.edu. High-quality tutoring is available by appointment and on a walk-in basis. These services are offered by tutors trained to encourage the highest level of individual academic success while upholding personal academic integrity.

Syllabus Change Policy:

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.

Assessment of Student Achievement of Upper-Division Writing Objectives

The Upper-Division Writing objectives require that students become flexible and proficient writers for professional purposes. The stated objectives and their assessment methods include:

1. Use appropriate evidence from multiple sources to illustrate how a chosen topic is relevant to a particular field. (Rubric items: Quality of Evidence, Documentation)

2. Convey ideas clearly, coherently, and effectively for a particular purpose, occasion, or audience representative as appropriate for the field. (Rubric items: Clarity of Thesis/main message, quality of evidence, paragraphs, organization/structure, sentence skills, grammar/mechanics)

Upper Division Writing Rubric

Criteria	90 - 100	80 – 89	70 - 79	60 - 69	< 60
Clarity of Thesis/main message (20%)	Interesting, memorable, exceptionally original thesis/main message. The reader is engaged.	Clear thesis, main message; reader never has to read any paragraphs twice. The reader is engaged.	There is a thesis, but it is vague, too general, or says little. The reader would reread some paragraphs multiple times, or cannot understand some minor points.	There is no thesis, or it is unclear or confusing. The reader cannot understand some of major points.	There is no thesis, or it is very unclear. The reader is confused.
Organization and structure (20%)	Extremely well organized, logical; easy to follow. (1)	Well organized, easy to follow; 1-2 sentences may fall short	Mostly organized, but some points are hard to follow or out of place	Poorly organized, hard to follow; possibly, confusing	Very disorganized, hard to follow; faulty logic or parts missing
Quality of evidence (20%)	Clear hypothesis and evidence to support it via a combination of induction and deductive reasoning, data tables with self-contained descriptions, graphs with self-contained captions, mathematical proofs, or the generation of	Compared to A paper, graph captions or table descriptions are not self-contained, some citations are missing for 1-2 arguments, or some citation sources are of lower quality.	Compared to B paper, some citations are unrelated to the work, some table descriptions or figure captions are missing, some results are posted without logical	Compared to C paper, some of the charts and/or tables are not relevant to the topic, are of poor quality. Author uses opinion rather deductive and	There is no hypothesis, or the hypothesis does not have any supporting reasoning, or the data is not supported by

	experimental numerical data. Evidence is further supported by citations from high quality sources that directly relate to the work presented.	Some arguments are not logically constructed.	support, or some proofs have errors.	inductive reasoning.	either tables or figures.
Paragraph skills (10%)	Well developed & organized around one main idea, ideally with a topic sentence; sentences follow logically, and signal/transition phrases are used	Paragraphs may not be as smooth as the A paper but are generally well organized and developed.	Paragraphs may lack a topic sentence and smooth transitions between sentences	In many cases, paragraphs are poorly structured and arranged.	Paragraph skills are severely lacking or nonexistent
Sentence skills (10%)	Sentences are elegant and grammatically perfect	No grammatical errors; healthy variety of length and structure of sentences	Not much variety in structure or length; a few grammatical errors	Poorly constructed sentences, many grammatical errors	Major problems
Grammar/ mechanics (10%)	Perfect or nearly so	Only a few problems noticeable.	Some problems appear repeatedly.	Many grammar mistakes	Very poor
Documentation (10%)	Reference sources are used ethically and cited perfectly	Falls short in one small way	Falls short in 2-3 small ways	Reference sources are improperly cited	Major problems with citation of sources

Grading standards for Written work
Refers to proposal drafts, reports drafts, and final report

Late submission:

One day late: 5 points deduction
Three days late: 10 points deduction
A week late: 20 points deduction
More than one week late: 40 points deduction

Grading standards for the Oral Presentation

Criteria	90 - 100	80 – 89	70 - 79	60 - 69	< 60
Audience Awareness (15%)	Shows awareness of audience's needs & values	May fall short in 1 or 2 minor ways	Shows some lack of awareness or audience	Not much regard for the audience	No sense or audience
Tone (15%)	Voice tone is perfect	May fall short in 1 or 2 minor ways	Voice tone may be off the mark somewhat	Voice tone may be off the mark	Low voice that cannot be heard
Clarity of Slides (20%)	Evidence is highly credible and used logically	Evidence is highly credible and used logically but may fall short in 1-2 ways	Evidence is not as credible as an A or B paper or may not be used as logically; author offers opinions with little evidence.	Evidence is lacking, of poor quality, or not used well; author supplies opinions instead.	There is little evidence tied to the thesis
Oral delivery (20%)	Presents the slides clearly	May fall short in 1 or 2 minor ways	Reading from slides	Audience can hardly understand the slides	No sense
Q/A (15%)	Answer questions exactly and clearly	May fall short in 1 or 2 minor ways	Answered questions, but not clearly.	Confusing answer.	Do not understand questions or totally wrong answer
Time Control (15%)	Good time	3 minutes shorter or 2 minutes longer	5 minutes shorter or 5 minutes longer	8 minutes shorter	10 minutes shorter

NOTES:

- Tone refers to voice loudness, evenness of volume, projection
- If no questions are asked by students or faculty in attendance, the instructor will ask one or two questions