

Guided Research Policies

Mathematics
Applied and Computational Mathematics

Spring 2012

1 What is Guided Research?

Guided Research allows study, typically in the form of a research project, in a particular area of specialization that is not offered by regularly scheduled courses. Each participant must find a member of the faculty as a supervisor, and arrange to work with him or her in a small study group or on a one-on-one basis.

Guided research has three major components: Literature study, research project, and seminar presentation. The relative weight of each will vary according to topic area, the level of preparedness of the participant(s), and the number of students in the study group. Possible research tasks include formulating and proving a conjecture, proving a known theorem in a novel way, investigating a mathematical problem by computer experiments, or studying a problem of practical importance using mathematical methods and/or numerical simulation.

Third year students in Mathematics and ACM are advised to take 1–2 semesters of Guided Research. The Guided Research report in the spring semester will typically be the Bachelor Thesis which is a graduation requirement for every Jacobs undergraduate. Note that the Bachelor's Thesis may also be written as part of any other course by arrangement with the respective instructor of record.

2 Schedule

Please note the following deadlines, which are *strict*.

Fall Semester

Choice of advisor	End of week 4
Semester Plan	End of week 6
Report draft	Before presentations
Project Presentation	Thursday/Friday afternoon of week 14
Report due	Last day of exam period

Spring Semester

Choice of advisor	Add and drop deadline
Semester Plan	End of week 4
Report draft	Before presentation
Project Presentation	Thursday/Friday afternoon of week 13
Report due	One week before grades for graduating students are due

3 Schedule for Spring 2012

For the Spring Semester 2012, the deadlines are as follows.

Choice of advisor	February 22, 2011
Semester Plan	March 1, 2011
Report draft	No hard deadline, but before project presentation
Project Presentation	May 10-11
Report due	May 24, 2011

4 Grading

The final grade is composed of three contributions: Semester plan 10%, project presentation 30%, and final report 60%.

5 Choice of advisor

The choice of advisor is the student's responsibility. It must be announced to the instructor of record (Marcel Oliver for Fall 2011) by email by the deadline given above. *Advisors will not be assigned by the instructor of record.* A change of advisor after the deadline must be discussed with the instructor of record.

6 Semester Plan

The semester plan shall define the goals for the semester at an early stage. It should contain, if applicable to the particular project, a concise formulation

of the scientific question, a motivational example, an easy special case, a brief summary of prior work, a work plan, and an initial list of references. The plan shall typically not exceed 1–3 typeset pages.

It is understood that not all goals may ultimately be attained, or that goals may change. Nonetheless, it is very important that the process of defining goals is initiated early.

A copy of the semester plan must be submitted to the advisor and to the instructor of record; the grade is determined by the advisor in consultation with the instructor of record.

7 Presentation

The presentation is graded by the advisor in consultation with other faculty present according to the following criteria:

- *Clarity.* Is the material presented clearly? Are the mathematical or scientific questions well motivated? Is the core structure of the argument exposed? Can somebody who is not an expert in the field understand what you have done?
- *Competence.* Show that you understand the subject. Answer questions concisely; admit if a question exceeds what you can say on the spot.

You should also take the following points into account.

- *Timing.* The talk is 20 minutes plus 10 minutes for questions. Don't rush, find a good pace that the audience can follow.
- *Presentation material.* Is the writing on the blackboard well organized? Aren't you writing too much or too little? If you use slides, aren't the slides overloaded? Is the text readable?
- *Presentation style.* Does your presentation motivate the audience? Is your oral communication style lively and interactive? Is there even some stretch of suspense in your presentation? Does your oral account give an extra over the written material?

8 Final report

The scientific quality of your work is evaluated as part of your report grade. The evaluation of the report is primarily based on the following.

- *Originality*. Any intellectual “add-on” beyond what the supervisor put in?
- *Soundness*. Mathematical correctness, professional implementation, sound interpretation of results, all claims supported?
- *Completeness*. Given the time constraints, did the project work exhaust the possibilities to be explored?

Grading will also take the following formal requirements into account.

- *Organization*. Is the report logically structured? Are summary, introduction, conclusions, and references adequate? Meaningful sectioning?
- *Writing style*. Clear formulations? Good text flow? Appropriate language (not sloppy in technical sections, not too dry in motivation sections)? Correct English?
- *Layout*. Length, general visual appearance, good quality symbols, figures, captions?
- *Timeliness*. Was the draft of the report delivered on time (on the day of the presentation)? Final submission on time?

The final report is graded by the advisor. For Bachelor Theses, student and/or advisor must find a second reader.

9 External advisors

Students may do their Guided Research work with an advisor in a different field, provided the topic is suitable. When choosing an external advisor,

- the deadlines and policies above must be followed;
- a faculty member from Mathematics or Applied and Computational Mathematics must be designated as a co-advisor *before* the choice-of-advisor deadline.