

# Designing Effective Undergraduate Research Projects



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# Overview

- Questions to consider
- Different types of projects
- Research contracts, proposals, and deliverables
- Funding
- Tips from past workshop leaders and participants



# Reflection

What do you want students to gain from the research experience?



# Who is the student?

- **Who is the student?**
  - What type of research questions interest her?
  - What courses has she taken?
  - What outside interests does she have?
  - Does she work better independently or in a small group?
  - Would she work better with more direction or more freedom?
  - Has she done a summer or class project previously?
  - What's her motivation for doing a research project?



# Who are you?

- Do you see yourself as a mentor, supervisor, employer...?
- Do you prefer to guide a team of students on one problem or to work with one or more students on separate problems?
- Is there an institutional expectation that you advise a certain number of students on research projects?
- What other time commitments do you have?
- Will the project complement your own research program?



# Many ways to design undergraduate projects

Individual project	Group project
Taught within a regular course	Research or independent study credits
Question designed by professor	Question designed by student
Project relates to professor's research specialty	Project does not relate to professor's research specialty
Senior research	Honors thesis research
Fall/Winter/Spring	Summer

# Key question for any undergraduate project

Is the research project "do-able" in the allotted time given the student's ability and motivation level and his/her other responsibilities?



# Research Proposals

## *Benefits*

- Student gains ownership
- Student and advisor work together to focus project
- May be used to secure funds (internal or external)
- May be used to determine if a student should be allowed to do a project or be considered for honors



## *Suggestions for proposal*

- Clearly state thesis
- Explain the significance
- Outline the methods, timetable, and expected results
- Indicate needed materials and funds
- Cite relevant references

# Research Contracts

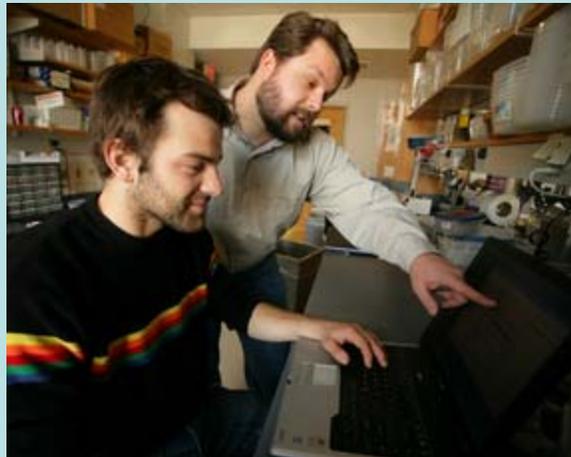
- Makes explicit expectations for both student and advisor
- May include:
  - Project title and overall goal
  - Research and learning objectives
  - Start and end date of project
  - Dates to accomplish specific objectives
  - Dates for training, material acquisition, field work, instrument time
  - Safety considerations
  - Responsibilities of student and advisor
  - Deliverables (map, paper, presentation...)
  - Evaluation plan



# Guidelines for Co-authorship

As a rule of thumb, to merit co-authorship on a peer-reviewed paper, participants (undergraduate or otherwise) should have contributed *significantly* to **at least 2** of the following project components:

1. idea for and design of the project
2. data collection
3. data interpretation and writing



# Tips

- What have you found to work well when working with undergraduate researchers?
- What questions do you have about designing projects with undergraduates?



## Project Design Tip

One approach to group or multi-year projects is to have students work on different pieces of a larger project.

### Example: Characterizing a particular formation

- Measuring stratigraphic section
- Tracing marker horizons
- Analyzing textures
- Doing pebble counts
- Identifying fossils



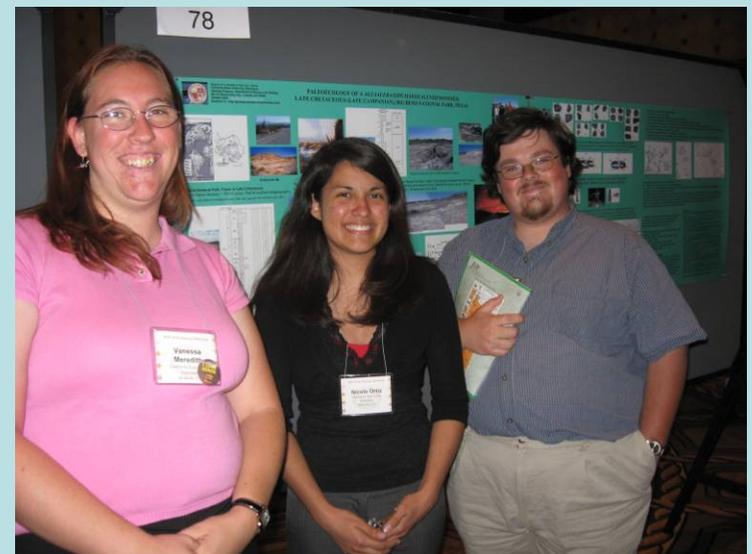
## Project DesignTip

Consider adapting some of your research to questions that can be addressed in local field areas or using in-house instrumentation.



# Advising Tips

- Everything takes longer than you think when working with undergraduates.
- Weekly check-ins & interim deadlines
- Quality control checks
- Require students to read background primary literature early and often.
- Bring current and potential research students to professional meetings.
- Mentoring and managing will not be the same for each student researcher. Be flexible and responsive.



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