



# **Implementing a Department- wide Undergraduate Research Program**

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# Undergrad Research

Ugrad Research is a Great Experience!

- Kelly – benefits/barriers
- Vittoria – going deeper
- Gil and Emily – where to find projects



# Considerations for a Departmental Program

- Students had trouble finding faculty and successfully contributing
- Faculty hesitant due to past failures
- More involvement a department/college/university goal

## Goal:

- Build structure and support
- Culminating project or internship for all major students

# Targeted Skills

- Understanding of statistical process
- Programming
  - Reading/Manipulating/Visualizing data
  - Modeling/Statistical learning
- Critical thinking/Problem solving
- Communication and limitations of results

# Guidelines for Projects

Cobb (2015) definition: “using data to study an unanswered real-world question that matters.”

- Application of methods to real data
- Statistical programming
- Write-up/Presentation to technical and non-technical audiences
  - Interactive application or striking visualization
- Reflection on work and relation to coursework/future plans



# Program Goals

- Advertise Opportunities
- Improve Student Skills & Programming
- Support Structure for Students
- Support Faculty

# Advertising Opportunities

- Worked with faculty to find reasonable projects
- Advertisement email sent around advising period
  - Project titles
  - Adviser
  - Abstract
  - Number of students
  - Programming language
- Students filled out web form with courses taken, skills, past experiences, project preference, etc.

# Advertising Opportunities

- Worked with advisers to match students to projects
  - In total around 15-20 projects per semester
  - Difficult process to match!
- Process allowed students to know what was out there and point of contact
- Gave shy, first generation, or otherwise inhibited students more reasonable chance to find a project



# Improve Student Skills & Programming

- Quality projects usually with a collaborator
- Curriculum change to emphasize programming skills
  - 3 credit python course 1<sup>st</sup> semester
  - 1 credit SAS course first year
  - 1 credit R course second year
- Upper level courses utilize programming

# Support Structure for Students

- Expectations and accountability crucial!
- Project syllabus
  - Project goals
  - Student goals
  - Meeting frequency and organization
  - Proposed timeline
  - Planned programming and visualization aspect(s)
  - Final write-up requirements
    - Technical report (adviser chosen)
    - Non-technical report (half page media announcement)
    - Reflection document
  - Presentation Opportunities

# Support Structure for Students

- Expectations and accountability crucial!
- Weekly progress form
  - Filled out by student, shared with advisor
  - Meeting topic
  - Notes/feedback (grade for the week)
  - Next meeting date and to-do list
- Mid-semester check-in

# Support Structure for Students

- Expectations and accountability crucial!
- Common work session
  - All students doing undergrad research meet once a week to work
  - Community building
  - Questions answered (mostly programming issues)
  - Required work time between meetings

# Support Structure for Students

- Expectations and accountability crucial!
- Monthly soft skills dinner
  - Elevator speech
  - 1-2 minute technical and non-technical pitches
  - Struggles and helpful resources
  - Description of conference setting
  - Effective poster talks and short presentations

# Support Faculty

- Finding/Creating projects
- Matching students
- Syllabus creation
  - Independent study paperwork
- Emphasis on providing clear expectations and feedback
- Encouraging students to present things at meetings
- Programming videos from R and SAS courses
  - Data scraping tutorials

# Things That Really Worked

- Emphasis on programming in curriculum
- Once a semester advertisements
- Common work hour
- Monthly soft-skills dinner
- Matching faculty with students

# Recommendations

- Many students want to start early...
  - Two tiers of projects?
- Give outlet to discuss project with someone other than adviser
- Require students to do project for credit with a grade
- Capstone course option for those needing more structure
  - Some students I wouldn't match
- If for pay, add in funding to grant proposals – talk to higher ups!
- Integrate vertically if possible





Thank you!

Questions?