Undergraduate Research in Mathematics and Statistics

Presented by
Dr. Thanh Nguyen
Rowan 12/2/2020
What is student research?

- Collaborate with a mentor (professor or supervisor) on a research project to solve a mathematical/statistical problem of interest to the academic community or motivated by industry.

- Devote a certain number of hours/week to work on the project and meet regularly with their mentor.

- Different types of problems: theoretical, applied (industry), computational (programming)

- Different opportunities: internal/external to Rowan, paid/unpaid, internships, REUs.
Why do research as an Undergrad?

- Educational Benefits
- Professional Benefits
- Personal Benefits
Experience firsthand what research is
Enhance understanding and knowledge of your academic field.
Apply what you learn in class to real-world projects.
Learn new things that aren’t covered in classes
Earn academic credit
Prepare for graduate study
Improve/Acquire Skills:
  - communication (written and oral)
  - critical thinking
  - problem-solving
  - teamwork
  - time management
Professional Benefits

- Explore your interests and clarify your career goals
- Gain academic credentials to build up your resume
- Find a mentor
- Develop strong relationships with faculty (think recommendation letters!!!).
- Network with experts in your field (Future employers).
- Check out potential graduate school programs/Build liaisons (Off Campus)
Personal Benefits

- Build confidence in your skills.
- Sharpen your critical and analytical thinking skills
- Meet new people with common goals and interests
- Travel to a new place (Off Campus research or Conference presentation)
- Earn scholarships, stipends, and/or awards for having conducted research.
- Confront a fear/learn something new
- Life changing experience
Before getting involved consider

- What do you hope to gain from research experience?
- What are your interests?
- What do you know about research in your field?
- How much time can you realistically commit to working on a research project?
  - Consider summer programs
- Are there particular skills you need to aid you in your research project?
- Are there courses you should take before doing a particular research project?
- What type of learning environment do you prefer?
Selecting a Mentor

- What do you expect from a research mentor?
- What are your scholarly interests and career goals?
- Which faculty shares your interests?
- Who do you enjoy working with?
- What is your preferred research environment?
- What type of training do you want?
- What skills do you want to develop?
Where do I find one?

- **On Campus:**
  - Paid or Unpaid options
  - Semester long or Summer (5 or 10 weeks available)
  - Talk to your professors
  - Go to departmental colloquium to get an idea

- **Off campus**
  - Usually over summer
  - Search internet (Key words: Summer undergrad research/internships)
  - Check out Local Businesses (Large companies: Banks, Pharmaceuticals, etc.)
  - National Science Foundation REU program: [https://www.nsf.gov/crssprgm/reu/](https://www.nsf.gov/crssprgm/reu/)
How do you get one?

- Plan in advance (Off campus deadlines from early Dec – April)
- Take courses that will help you be a strong candidate (consider Math 01.390 – Mathematical Research)
- Pick a variety of programs including what might look to be ones that aren’t as “exciting”
- Talk with your faculty advisor about the application
- Don’t underestimate yourself
- Apply on time with a complete application
- Apply! Apply! Apply!
Applications

- List of relevant coursework or transcripts
- Letter(s) of Recommendation
  - Don’t wait until the last minute
  - Try to give all at once with link to program, addresses and deadlines
- Personal Statement (important)
- Resume (write a good one – get help)
- Ask for a second opinion from advisor
Start Now!

• Provide your email address in the chat box to be contacted by a Math professor for opportunities
• Be involved with the Math Team (more discussions about student research)
Dr. Helga Huntley

- Research Interests:
  - Geophysical fluid dynamics.
  - Ocean, atmosphere, climate modeling.
  - State estimation and predictability.

- Potential Projects:
  - Extract flow properties from observed trajectories of drifters.
  - Large vortex spin-off in the Gulf of Mexico.
  - Image analysis of photos of floating objects.

- Time frame: Summer 2021 and thereafter
- Funding possible

- Student Skills required:
  - Curiosity about the ocean.
  - Programming skills in Matlab.
  - Multivariable calculus; differential equations a plus.

- Contact Info:
  - huntleyh@rowan.edu.
Dr. Hieu Nguyen

- Research Interests:
  - Coding Theory, Machine Learning
- Potential Projects:
  - Error-correcting codes: decoding algorithms for insertion/deletion errors
  - Distributed machine learning using error-correcting output codes
  - Image segmentation using deep learning
- Looking for up to 2 students
- Funding: potentially available Fall 2021
- Time frame: Starting spring 2021 semester
- Student Skills required:
  - Discrete math
  - Strong computer programming skills
- Contact Info:
  - nguyen@rowan.edu, Robinson 228N
Dr. Thanh Nguyen

- Research Interests:
  - Ordinary and partial differential equations;
  - Optimization;
  - Applications in engineering and industry
- Potential Projects:
  - Inverse problems in heat transfer & in wave propagation and scattering
  - Using differential equations & machine learning for time series data
  - Using differential equations in water pollution modeling & detection
- Looking for up to 3 students, in particular from underrepresented groups
- Funding: potentially available in fall 2021.
- Time frame: from summer 2021
- Student Skills required:
  - Linear Algebra and Ordinary differential equations.
  - Some knowledge of computer programming (Matlab/Python)
- Contact Info:
  - nguyent@rowan.edu, Robinson 230C
Looking for 2 students, underrepresented minorities are encouraged

Research Interests:
- Statistical Learning
- High-dimensional Data Analysis

Funding available for 2021

Student Skills required:
- Diligent and enthusiastic about research
- Easy to communicate with
- Basic statistics knowledge
- Some experience in programming such as R

Contact Info:
- pan@rowan.edu, Robinson 228 I
Dr. Uma Thayasivam

- **Research Interests:**
  - Statistical Learning, Predictive Modeling in Big Data, Robust Estimation

- **Potential Projects:**
  - Student predictive modeling
  - Telemedicine and Telehealth Statistical learning
  - Advance statistical computing for modeling big data
  - Robust methods for high dimensional data
  - Open to student driven projects on statistical/data mining

- Looking for interesting students who are willing to gain experience

- Initially unfunded with potential for future funding support including summer funding.

- **Time frame:** Spring 2021 and beyond!

- **Student Skills required:**
  - Basic Statistics course
  - Some experience in computing programming
  - Desire to learn and willing to commit some quality time

- **Contact Info:**
  - thayasivam@rowan.edu, Robinson 230 B
Questions?