Secrets of STEM Research Groups - Structure, Function, & Dynamics

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Sponsored by the Divisions of:
Undergraduate Education, Physical & Biological Sciences, Research, and Baskin School of Engineering
Fundamental Questions About Research Groups (RG)

- What are they?
- Where they are?
- Who can be in them?
- What can they do?
- How do groups differ from one another?
- How can I succeed in one?
What is a Research Group?

- Informal group of people investigating topic(s) or theme(s)
- Led by Professor(s)/Principal Investigator(s) (PI)
- Groups are highly variable
  - Number of people
  - Number/range of topics studied
  - Techniques & procedures used
  - Funding availability
  - Undergrads present
  - Culture
Be A Principal Investigator

Post-Doctoral Fellowship
1-5 years

Professional Degrees
Medical, Dental, Pharmacy, etc.

Transfer as a Jr.

LSAT, MCAT, etc.

LSAT’s College Prep Classes

GRE: subject and/or general

Graduate School
2+ years
M.A./M.S., Ph.D.

Four Year Institution
“Undergrad” B.A./B.S.

Community College
A.A., A.S.

High School - Diploma

MARC MBRS CAMP 2008
Where are Research Groups?

- Academic institutions
- Non-Profits
  - Monterey Bay Aquarium Research Institute
  - Nature Conservancy
  - Howard Hughes Medical Foundation
- Government
  - National Labs
  - National Institutes of Health
  - NASA
  - Center for Disease Control
  - US Department of Agriculture

- Industry
  - Biomedical
    - Genentech
    - Santa Cruz Biotech
  - Information Technology
    - IBM Labs
    - Bell Labs
  - Product Development
    - Cosmetics
    - Semiconductors
    - Food
    - Automotive
Who can be in a Research Group?

- Leader(s): Professor(s) or PI(s)
- Research Scientists, often with Ph.D.'s
  - Including industry or international visitors
- Post-doctoral scholars/fellows (with Ph.D.'s)
- Graduate students
  (earning a Masters or Ph.D.)
- Staff and technicians
  (various degrees)
- Undergraduates
  - Can be supervised by any of the above
  - Can be technicians and/or do independent projects or senior theses
The Importance of Titles

“Professional titles are not simply for ‘show.’ A title tells you a great deal of information concerning the level of experience, professional reputation, and the responsibilities that an individual has within an organization.”

(WebGURU, http://www.webguru.neu.edu/lab/research-team)
The Professor/PI can be:

- Mentor
- Career Adviser
- Monarch
- Dictator
- President
- Treasurer
- Coach
- Cheerleader
- Advocate
- Therapist
- Friend
- Foe
Mentoring Style

- Typical manner that a mentor interacts with group member
- Don’t take it personally!
- Mentoring Style Activity

Adapted from Entering Research, 2010
What can Research Groups do?

Professionally

- Meet weekly to provide feedback to members on projects or presentations (Group meeting)
- Read and discuss current scientific literature
- Collaborate with each other on projects
- Apply for grant funding together
- Present results as posters or talks at professional conferences together
What can Research Groups do?
Professionally

- Collaborate on papers for professional journals
- Train/teach more junior members about techniques and topics
- Junior members may act as research assistants to more senior members
- Past members may act as an informal career network
What can Research Groups do?

Socially

- Form a social group
- Provide emotional support to others
- Explain the group’s culture
- Have group related events, like dinners or parties
- Explain how to manage the personality quirks of members
How do Groups Differ From one Another?

- Influenced by institution/department/company culture
- Very dependent on
  - Personality & mentoring style of PI
  - Size of group
  - Academic standing of school/department/group or position of company and research group in the industry
How can I Find a Group to Join?

- Identify a group you are interested in
  - Seminars, talks, classes
  - Network with friends, TAs, professors, clubs
  - List of Professor’s research interests, links on Undergraduate Research (UR) Opportunities webpage

- Contact the professor/group leader
  - E-mails should:
    - Be formal (Dear Dr. or Professor)
    - Be specific to group (refer to paper, webpage, etc.)
    - Explain why research is critical for your goals
    - Have correct spelling and grammar
A Good Email Example

Dear Dr. Professor,

I am a (year, major) at (university) and I am writing to ask about opportunities for undergraduate research in your lab beginning (time period). I am especially interested in your work on (describe a paper or talk). I would appreciate the chance to meet with you to discuss (the topic) and possible opportunities for me to become involved in the project. I am eager to develop my research skills while an undergraduate to help me (career goal).

I have attached my CV and unofficial transcript. Please let me know if I can provide any additional information.

Sincerely,

Ambitious Student
Email address
Hi Joe,
My name is (Name) and I am a major in (name major). Is there space in your lab for an undergraduate? If so, what is the pay rate?
Thanks,
Name
How can I Find a Group to Join?
(cont.)

- Go to office hours
  - Go right after a test
  - Be considerate
  - Show genuine interest
  - Ask about research and for advice
- Ask to go to lab/group meetings
  - Credit may be possible
Join a Lab or Research Group

There are many research opportunities for undergraduates at UCSC, but unfortunately not enough for every student who is interested. You will need to be dedicated and focused to find and keep a position. The advice below can help you, but does not guarantee that you will get into a lab or research group.

If you have any questions or would like to have more information, please contact:

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To find out additional information for your field of study, go to the related webpages for the divisions/school:
Engineering
Humanities
Physical & Biological Sciences
Social Sciences

Frequently Asked Questions:
- Why should I work with a research group?
- When should I start?
- How do I find a research group?
How can I Succeed?

- Listen to instructions, take notes, follow directions, work hard, be punctual
- Follow the group’s experimental procedures (if applicable)
- **ASK QUESTIONS** if you don’t understand something
- Understand who each person is and his/her responsibilities
How can I Succeed?

- Understand the group’s culture
- Understand your mentor’s mentoring style and how you can work with it
- Don’t gossip
- Show respect for the hierarchy
  - Follow the group’s formality norms
  - Don’t interrupt more senior people
  - Don’t act like you know everything
Sticky Situations

- **Situation 1:** Someone in your lab gives you a new protocol or methodology that he or she says is better than the one given to you by your mentor. What do you do?

- **Situation 2:** Your mentor expects you to know everything and you are in over your head. The other students in the group are no help. What do you do?

Adapted from Entering Research, 2010
Suggestions for Success

- Remember that the PI
  - May not remember what it is like to struggle with the topic
  - May always have been the smartest around
  - Has his/her own political relationships
  - May not be responsive because of other responsibilities (grant writing, teaching, committees, reviewing papers, other research projects…and maybe a partner and/or kids)
Suggestions for Success (cont.)

- Find out who has the professor’s ear and/or is his/her right hand
- Find out who is the lab peacemaker/facilitator
- Be very polite to staff and technicians
- Form a student research club (ex. URSA)
- Form a social group online (Linked-In, Google, Facebook, etc.)
- Others?
More Resources

- Informational
  - [WebGURU](#) - Guide to Research for Undergraduates
  - [Pathways to Science](#)

- Amusing
  - [Piled Higher and Deeper (Ph.D.)](#) comics
  - [Saturday Morning Breakfast Cereal](#)
For More Information:

- Visit [UCSC Undergraduate Research Opportunities website, ugr.ucsc.edu](http://ugr.ucsc.edu)
- E-mail: rlanders@ucsc.edu for a meeting
- Join the list-serve on the website
- Come to Drop-in Advising, Baskin 153B
  - Wednesday, 12-2 PM
  - Friday, 10 AM-12 PM
Please fill out the evaluation and leave it up front.

Thanks!