“He [Aristotle] provided a pattern of learning which is among the most difficult of all steps in science. It consists of being able to ask questions in such manner that data can be sought for an answer.”

~Moore, 1993

“That is the essence of science: Ask an impertinent question, and you’re on your way to a pertinent answer.”

~ Bronowski, 1973

Reading: Questions Drive Research

Respond to the following questions:
1. Why is formulating questions essential to the learning process as well as to the process of conducting research?
2. After brainstorming questions, what is the next step in organizing a research project?
3. How do actions follow from generating questions?
Your desk lamp does not turn on when you flick the switch

Generate four questions you might ask as part of problem solving

http://www.heals.co.uk/content/ebiz/heals/invt/636316/636316_l.jpg

Process of doing research

1. **Ask questions** - Don’t censor, just get your ideas out
2. **Organize** questions into categories, priorities, and logical flow
3. **Develop work plan** that directly follows your organized questions
4. **Execute** your work plan.

Thoughts → Words → Actions
Brainstorm Questions

THE WAY TO GET GOOD IDEAS IS TO GET LOTS OF IDEAS AND THROW THE BAD ONES AWAY.

Linus Pauling, Nobel prize winner

http://www.adpr.co.uk/blog/wp-content/uploads/2014/06/Brainstorming.jpg

Organize Ideas

http://i.bnet.com/blogs/brainstorming.jpg

Brainstorm Questions  Organize Thoughts  Create Work Plan  Execute Experiments
Generate a work plan

“A workplan should not be viewed as a formality for documenting the work to be undertaken. Instead, making a workplan is a process of formulating a strategy for carrying out the research in a systematic way”

- The Art of Being a Scientist Ch 5

<table>
<thead>
<tr>
<th>Work Plan Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be sure work plan is consistent with goals of project and include:</td>
</tr>
<tr>
<td>1. An ordered list of activities</td>
</tr>
<tr>
<td>2. Indication of how activities are related (to each other and the goal)</td>
</tr>
<tr>
<td>3. A deliverable and timeline for each activity</td>
</tr>
</tbody>
</table>

Agree or disagree

“Your quality as a researcher depends primarily in your ability to ask the right questions, but that can happen only if you pose lots of questions, many of which will subsequently be disregarded. ”

- The Art of Being a Scientist Ch 5
Project Funding
CHEM 294

THE GRANT CYCLE

HOW IT’S SUPPOSED TO WORK:
WRITE GRANT → GET $ → DO RESEARCH → PUBLISH RESULTS
(REPEAT)

HOW IT REALLY WORKS:
DO RESEARCH → GET RESULTS BUT DON’T PUBLISH THEM YET CALL THEM “PRELIMINARY RESULTS”
WRITE GRANT TO DO WHAT YOU ALREADY DID → GET $ use $ to pay for an unrelated new project


Introduction to Chemistry Research

For UAF Undergraduates

URSA- Undergraduate Research and Scholarly Activity
UAF undergraduate students are invited to apply for one of ten URSA 2015 Spring Project Awards of $2500 to fund student salary, travel, services, tuition and/or supplies. Projects in any UAF discipline will be considered.
Deadline: February 26, 2016
Spring 2016 Request for Proposals (RFP) and proposal format
URSA Award Schedule
Funded examples:
M. Vanagel: Synthesis, purification and molecular recognition with helical molecules
R. Witt: Tellurium speciation and partitioning during Au-Ag extraction,
M. Vanagel: Optimization of the CLARITY technique for implementation in UAF research
D. Knight: Bioaccessibility of metals in Alaska road dust,
D. Emery: Geographic variability of Active Ingredients in Spice within Alaska as an indicator of Distribution Mechanisms.
The Plan

• Finding potential funding targets
• Selecting the right funding target
• What’s next? THE RFP!!!

• Potential sources of funds at UAF
  URSA
  GCG
  INBRE-IDEA
  BLaST
  NASA

Finding potential funding targets

• email listserves
• friends and mentors
• funding agencies websites & emails
• yearly repeaters
• Grants.gov

http://www.cleanwritingservices.com
Selecting a funding target

Goal alignment

Eligibility

Scope of project

Deadlines

Funding Target

You and the target must have aligned goals

“...the science PETA is sponsoring is critical to the elimination of animal use. PETA puts its money where its mouth is and has steadfastly supported better use of science to reduce reliance on animal testing.”

—Dr. Gilman Veitch, Chairman of the Board, International QVAR Foundation

www.peta.org
You must be eligible for funds

Funding: mature white males with wild hair

Project scope ↔ Project resources

Resources
- Man hours/ Labor
- Instrument costs
- Equipment
- Materials/ supplies
- Consumables
- Travel
- Duration
What’s in an RFP?

1. What kind of projects they fund
2. Who is eligible to apply
3. Application format requirements
4. Review criteria
5. Deadlines for submission and notification
6. Contact info

What’s next? The RFP!
Request for proposals

RFP length
URSA- 1 pg
GCG- 9 pgs
NSF- 80 pgs
Required Proposal Elements

Any proposal that exceeds specified page limits or is missing one or more of the required elements will be rejected without further review. Proposals must include the following elements in this order:

1. Proposal Cover Sheet (as a Microsoft Word document)
2. Project Narrative (7 page limit including project summary, figures and tables)
3. References Cited (2 page limit)
4. Project Schedule (1 page limit)
5. Budget, Budget Justification and Other Sources of Project Support (2 pg. limit)
6. Vitae of Student Principal Investigator(s) (1 page limit per investigator)
7. Signed Letter of Support from Student's Advisor(s) or Sponsor(s) (scanned and converted to an Adobe PDF; 1 page limit per advisor or sponsor)

The main proposal text

1. It starts with a good idea
   - You’ve done the background research
   - State how your project is innovative

2. Define your project- Be SMART!
   - Specific, Measurable, Achievable, Relevant, Time-bound
   - Have a feasible plan

3. Demonstrate our project is aligned with funding goals
   - Explicitly tie your project to funding body goals
   - Directly address review criteria

4. Show YOU have the capability to do the work
   - You have the necessary resources and experience
## SMART Objectives

![SMART Objectives Diagram](image)

## Potential UAF Funding Targets

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Undergraduate Research and Scholarly Activity</strong></td>
<td>Any discipline</td>
</tr>
<tr>
<td><strong>Global Change Student Research Grants</strong></td>
<td>Interdisciplinary, global change in the arctic</td>
</tr>
<tr>
<td><strong>INBRE IDeA</strong></td>
<td>Biological and Physical Sciences</td>
</tr>
<tr>
<td><strong>BLaST</strong></td>
<td>Mentoring</td>
</tr>
<tr>
<td></td>
<td>Onehealth research</td>
</tr>
<tr>
<td><strong>NASA</strong></td>
<td>Workforce development</td>
</tr>
</tbody>
</table>
http://www.uaf.edu/ursa/

2015 - 2016 Award Opportunities
Spring Travel Awards will be announced on February 12, 2016.
Summer Undergraduate Awards [students - up to $5,000]
Click here for the Request for Proposals
Click here for the application
Summer Awards will be announced on March 18, 2016

URSA
Undergraduate Research & Scholarly Activity

2016 Summer Undergraduate Awards
Request for Proposals
Undergraduate students planning to conduct research or pursue creative projects during summer 2016 are invited to apply for URSA funding awards of up to $5,000 to fund student salary, tuition, travel and/or supplies.

Deadline to apply is February 26, 2016
Personal Information
Title
Abstract (200 words max)
Provide an introduction to your project including a description of what you are doing, why you are doing it and how you plan to conduct your project.
Goals (200 words max)
Provide a concise listing of your project objectives, creative purpose or research hypothesis.
Background and Significance (300 words max)
Provide a brief background to describe the rationale and significance of the proposed project. If appropriate, use supporting literature, i.e.; primary literature for research projects.
Design and Methodology (300 words max)
Summarize the design of the project and describe the methods, procedures and/or protocols planned to achieve the goals. Describe any equipment or facilities that will be used. Provide a timeline of the project work.
Anticipated Outcomes (300 words max)
Describe the anticipated outcome(s): creative projects or research findings that will result from your project and student learning outcomes that will result from your participation in the project.
Mentoring Plan (200 words max)
Describe the faculty mentor’s role and/or participation in the project. Include a schedule of mentorship (frequency and objectives of meetings between student and mentor).

http://www.cgc.uaf.edu/student_grant/
Support:
Graduate ($10,000) and undergraduate ($7,500) research (evaluated separately)
1 yr duration

Research:
Interdisciplinary
Related to global change in the arctic

Only submit 2 proposals

http://www.cgc.uaf.edu/student_grant/
Undergraduate Research Assistantship (URA)

Request for Applications for 2016 URAs
Announcement Date: February 1, 2016
Application Deadline: February 29, 2016 at 5 p.m. EST
Awards Announced: March 28, 2016
Funding Period: May 15, 2016 - August 15, 2016

Step 1: Read and review the full text of the funding ANNOUNCEMENT. It is critical that applicants read and follow all instructions detailed in this announcement. AFTER reading this announcement, please download the Cover page and Application Instructions.

Step 2: APPLY for an Undergraduate Research Assistantship Award using the forms below.

Research:
Biological and Physical Sciences
Capacity Building
https://www.alaska.edu/inbre/opportunities/undergraduate-research-as/

1. Cover Page
2. Project Description: 4 pages total; 0.5-inch margins; Arial 11pt font
3. References Cited
4. Relevance of the Research to the Focus of Alaska INBRE
5. Unofficial Academic Transcript from UAOnline
6. Faculty Mentor’s Letter of Support
Alaska INBRE

1. Project Description: (4 pages total; 0.5-inch margins; Arial 11pt font)
A) Specific Aims:
B) Significance:
C) Innovation:
D) Approach:
E) Mentoring Plan: (Who is the faculty mentor? Are there technicians or trainees who will also mentor the applicant? How frequently will the applicant meet with her/his mentors? What will be the purpose/activities of those meetings?)

2. References Cited: (this section does not count toward the 4-page project description)

UNIVERSITY OF ALASKA FAIRBANKS

BLaST

Undergraduate Research- Undergraduate training and mentoring in biomedical research
Up to $6,000
March 7, 2016
May 31, 2016
November 16, 2016

Undergraduate scholarships
Tuition, fees, and living expenses
Due June 30, 2016

http://alaska.edu/blast
Components of a BLaST proposal

1. Cover sheet
2. Biomedicine, One Health and/or Subsistence Health
   Relevance of the Proposed Project (200 words)
3. Project Description (500-800 words)
4. References
5. Mentored Experience
6. Biosketch/Resume
7. Budget (up to $6,000)

Components of a BLaST Project Description (500-800 words)

1. Specific aims
2. Significance
3. Innovation
4. Approach
5. References (not in word count)
Undergrad scholarships        Deadlines: Sept 12
Undergrad research            Deadlines: Sept 12

http://spacegrant.alaska.edu/student/undergrad

STEM majors
Research related to NASA interests
Support up to $5,000

http://spacegrant.alaska.edu/student/undergrad
Undergraduate Fellowship Program

- Application Deadline: September 12
  All application materials, including supporting documentation, must be received at the ASGP office by the stated deadline. Applications received after the deadline will be reviewed on a first come first serve basis until all the Fellowship funds have been awarded.

Eligibility and U.S. Citizenship Requirement
Fellowship/Scholarships are open to undergraduate students who meet the following eligibility criteria:
- Enrolled at an Alaskan institution of higher education during the period of the award.
- Good academic standing
- U.S. Citizen

Review Criteria
Applications are ranked based on the following criteria:
- Scholarly achievement
- Strength of recommendations
- Proposed project merit

Space Grant
1. Cover sheet
2. Project synopsis
3. Project description
4. Transcript
5. Letter of collaboration from mentor
Additional Resources

http://www.geosociety.org/grants/ap_tips.htm
Looking Forward

Lab today: Lab rotation 1
Stephanie: Kiersten, Roger
Will: Garrett, Tim

Next Week (Feb 15)
Lecture- Ethics and Record Keeping
• Reading: On being a Scientist, Ch 3-6, pgs 8-23 and other readings on website
• Due CHEM 294: Proposal format- bring printed copy of RFP and template, if available.
• Due CHEM 294: Research topic and mentor preference
• Due CHEM 694: bring a lab notebook
  – Due later: review paper
Lab: Lab rotation 2
Things not to touch wearing gloves

Things you will touch later without gloves
  face or skin, computers, door handles, etc

No door handles!!!!