

October 19, 3:30 in SST 301

Undergraduate Research = Work Experience

Examples include a lab project, professional shadowing, internship, field experience, related employment.

This workshop covers **Why to?** **When to?** **How to?** **Where to?**

Why do research? – Develop Technical and Non-technical Skills

- Exposes one to new experiences.
- Reveals that one needs more than a bunch of scientific facts.
- Reinforces your passion or helps you recognize an alternate path.
- Helps one learn who you are and what you want.
- Gives you a competitive advantage for applications to graduate school or industry.
- Develops good lab technique
- Illustrates the necessity of accuracy of measurements & data analysis
- Develops team building skills *and* independent motivation
- Requires time management
- Improves written and oral communication - Ability to speak your craft clearly and confidently
- Helps you recognize which are right questions to ask and the right notes to make
- Teaches one how to persist.

When to do research? - Start now!

Regardless of your rank – freshman, sophomore, junior, senior... *don't wait!*

"Object in motion stays in motion."

"Start where you are with what you have."

Great value of investing in yourself and using time well.

Example: Summers

- 10 weeks (average summer program)
- 40 hour weeks (typical work schedule)
- 400 hours invested to the summer program
- 3 Summer college experiences (sophomore, junior, senior)
- **1200** hours spent in summer program
- This is probably going to be the only time in your life where you can invest **1200** hours into yourself over the summer during college

How to get started? – Specific Action items

1. Obviously, do well academically.
2. Figure out what you are truly interested in and what you are willing to work hard to understand.
3. Inform yourself
 - Explore faculty web pages
 - Keep a broad perspective when searching for opportunities. Don't limit yourself to just research within your major.
 - Read journal papers
 - Attend seminars
 - Be alert to opportunities in local industry (Career Services)
 - Check-in with our Academic Advisors.

4. Be known for the right reasons. This means you're going to have to **speak up!**

- Join organizations
- Express your curiosity
- Connect with others students who are doing research.
- Participate in class
- **Talk to professors** – express your interest

Remember, professors actually enjoy teaching you. They want you to succeed. They enjoy getting to know you. And you'll reap the benefits:

- Helps when they are grading your work
- Helps get your foot in the door of a research opportunity
- Eventually you'll need someone to write a **letter of recommendation** for jobs or grad school applications.
- Another important conversation to have is with your department chair and/or the faculty assigned to senior capstone....

Where to do research?

Each department offers a capstone or research experience. You can look for descriptions of each on catalog.uah.edu

- **ESS UG Research (2-4 cr)** For advanced Earth System Science students. Individual investigations into Earth systems science problems under direct supervision of a research mentor. Research is conducted and thesis-style paper is written and orally presented.
- **BYS 490 (2 cr)** Discussions, readings, and presentations of topical biological subjects using scientific literature. Capstone course emphasizing refinement of oral and written communication skills and critical thinking. All students will take ETS Major Field Test in Biology as part of the course grade.
- **CH 191, 192, 193 FUNDAMENTALS OF CHEMICAL RES** Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.
- **CH 491, 492, 493 Intro to Chemical Research** Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit.
- **CS 499 Sr. Project: Team Software Design (3cr)** A combination of lectures on proven software engineering approaches, and team working sessions. Each student will participate in a sizable, complex, software development project based on a team approach
- **MA -299, 399, 400 Mathematics Project (1cr)** Individualized special projects in mathematics and its applications. Students with a specific interest or research topic may take these courses with the approval of a professor. The student will work with the professor throughout the semester on the research topic.
- **PH- Practicum (3cr)** Capstone course designed to provide real-world research experience for graduation seniors. Students work individually with faculty members on projects. Requires oral presentation and final research report.

Acknowledge limitations on our campus. 1500 CoS undergrads. 73 tenure track faculty = more than 20 students each!

Broaden the search – **summer REU** or industry or research centers.

Before you start any research opportunity, what are some good **Questions to Ask?**

- What is expected of you? Is it achievable? Does it fit what you want to do?
- Are resources available? Lab, library, computer, instrumentation?
- Is there a history of working with undergrads? What/how did they do? Where did they go next?
- Who are current group members?
- Is it a positive, nurturing, compatible environment?
- Are you self-directed, assigned a lab mentor, or is PI hands-on?
- What blocks of time are required to do the project – how many hours and days by week or semester?
- Is it expected that undergrad presents during regular lab group meetings?
- Have undergrads presented research at conferences? Has undergrad research been published? Are undergrads credited w/ authorship?

Positive working relationship w/ Mentor:

- Be proactive – initiate communication
- Set short term and long term goals
- Read articles or recommended books
- Lab rules for safety, etiquette.

Timeline and Resources - Activity: develop your timeline for UG Research

The timeline should reflect each student's remaining time at UAH.

Might be a

- 'year-by-year' timeline or
- 'semester-by-semester' or
- 'month-by-month' or
- 'during fall break'-'during winter break'-'during spring break' version.

1. What's your end goal? (In which semester are you finishing B.S.?)
2. What are some non-negotiable deadlines*? e.g., application due for grad school
3. Then, work backwards to now.

**e.g., During Thanksgiving break, work on your applications - RCEU deadline – Nov-Dec*

During winter break finalize your REU applications - REU deadlines are typically Jan-Mar

Suggestions to plug into your timeline:

Gain basic knowledge through coursework – identify projects that could be applied to a research project.

Investigate the research being done by faculty teaching your classes.

Investigate the work of local industry.

Become familiar with RCEU site, sample posters, etc.

Read Perpetua

Meet w/ Dave Cook

UAH Student Research Facebook Page (<https://www.facebook.com/UAHResearch>)

Attend seminars.

Investigate UAH Research Centers.

Attend the career fair.

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Pay attention to faculty course assignments when registering for classes. If you've identified a potential mentor, take their section if possible.

Develop a quality (science) resume.

Talk directly with a faculty member about doing an independent research project.

Attend seminars. Read journal papers.

Apply for summer research – RCEU, REU, etc.

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Submit abstract for Research Horizons, etc.

Refine resume. Practice speaking your science.

Identify conferences to attend spring, summer, early fall from these experiences, you'll connect with possible research/job opportunities.

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Before Senior Capstone, identify topic & mentor.

Submit abstract to conference, prepare poster, seek travel support.

Apply for graduate school fellowships (e.g., GRFP due Oct.)

Identify writers and request letters of recommendation

Develop Personal Statement and Research Statement for Graduate School / Industry applications, interviews

Tools:

Check out the search results for "#OnTheComeUpOctober" at

<https://twitter.com/hashtag/OnTheComeUpOctober?s=03>

Using the **Library to access journal papers:**

[ScienceDirect](#) [This link opens in a new window](#)

Popular

This opens a pop-up window to share the URL for this database

Provides access to the full text of more than 1,800 Elsevier electronic journals in chemistry and chemical engineering; clinical medicine; computer science; earth and planetary sciences; economics, business, and management science; engineering, energy, and technology; environmental science and technology; life sciences; materials science; mathematics; physics and astronomy; and social science; as well as indexing and abstracting for electronic journals from other publishers.

[NSF REU Search](#)

The Research Experiences for Undergraduates (REU) program supports active research participation by undergraduate students in any of the areas of research funded by the National Science Foundation. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program. Undergraduate student participants in either REU Sites or REU Supplements must be U.S. citizens, U.S. nationals, or permanent residents of the United States. Students do not apply to NSF to participate in REU activities. Students apply directly to REU Sites or to NSF-funded investigators who receive REU Supplements.

* [Pathways to Science](#) – Summer Research Opportunities Database

A variety of resources for students and educators looking for summer research opportunities in many academic fields of study.

This website has links to “what makes a good REU proposal”.

* [American Mathematical Society](#) – listing of Summer Programs for Undergraduate Research

A list of REU programs active during the summer season maintained by the American Mathematical Society. Applicants should note that most application deadlines fall in February – March.

YEAR-ROUND RESEARCH OPPORTUNITIES

* [NASA's One Stop Shopping Initiative \(OSSI\)](#) for NASA Interns, Fellows and Scholars

NASA Internships are educational hands-on traineeships that provide unique NASA-related research and operational experiences for high school, undergraduate, and graduate students as well as educators. These internships integrate participants with career professionals emphasizing mentor-directed, degree-related, real-world task completion.

NASA Student Programs

For the convenience of students, post-doctoral fellows, young career researchers, and their mentors, this page contains a [growing] list of opportunities. The current list includes summer programs and scholarships for undergraduates and graduate students, post-doctoral fellowships, special programs for early career researchers, faculty members, and senior scientists. Some of these programs occur only at NASA centers, but others are designed to support students or scientists at universities.

PUBLICATION & PRESENTATION OPPORTUNITIES

Research Horizons

Current UAH graduate and undergraduate students from all disciplines and majors who have completed research or creative projects under the mentorship of faculty or research staff between Spring Semester 2018 through the deadline (January 25, 2019) are eligible and encouraged to apply. Selected posters/creative projects will be judged and prizes will be awarded by each respective college.

The research or creative project can have been done outside of UAH, but the abstract and poster must be endorsed by a UAH faculty member or research staff.

All abstract or poster (if already physically existing from a prior event) submissions must be received by Friday, **January 25, 2019**, 12PM (noon) CST. The Call for Submissions can also be found at the UAH Student Research website (<https://www.uah.edu/undergraduate-research>) under the "Annual Events and Outreach" tab.

***National Student Conference on Undergraduate Research**

The mission of the National Conference on Undergraduate Research (NCUR) is to promote undergraduate research scholarship and creative activity done in partnership with faculty or other mentors as a vital component of higher education. Search "NCUR" on the main CUR website for latest details.

***Posters on the Hill**

In the Spring of every year the Council on Undergraduate Research (CUR) will host its annual undergraduate poster session on Capitol Hill. There is an evening poster session and reception where students will have the opportunity to speak directly to member of Congress and demonstrate how they have been impacted by these programs. The Call for Abstracts opens in September and closes in November. Search "CUR Posters on the Hill" on the main CUR website for the latest information.

***Council on Undergraduate Research (CUR) List of Undergraduate Journals**

***CUR list of Presentation Opportunities**