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Welcome to the Undergraduate Research Community at UW-Whitewater

• If you have an interest in mentoring undergraduate researchers, UW-Whitewater is an excellent place to be.
• Our campus is fortunate to have both a strong tradition of undergraduate research and a well-developed research infrastructure.
• UW-W views undergraduate research as a vital component of a well balanced liberal arts education.

Financial support, guidance, and cooperative mentoring resources are provided by the Chancellor, the Dean of Letters & Science, the Office of Sponsored Programs, and the Undergraduate Research Program.
What do your colleagues like about the UR at UW-W?

What is Undergraduate Research?

- Undergraduate research (UR) can take many forms.
- Essentially it is a guided mentoring experience for students who have an interest in pursuing intensive out-of-class learning opportunities.
- Across our campus, there is a great deal of variation in how mentors guide undergraduate researchers.

The experience of a particular undergraduate researcher will be shaped by the demands of a given project and by the personal preferences of that student and her or his mentor.
What Do You Need to Get Started?

• Because UR can take many forms, the list of necessary “ingredients” can vary widely, but here are a few items you will likely need.

- One (or more) interested student(s)
- One (or more) potential project(s)
- Time
- Equipment
- Reagents
- Financial support
- Safety clearances (as applicable)

If you lack any of these items, you may wonder how you can get them.

Where do I find interested students?

• Potential researchers are all around you!
• Some are already aware of the value of UR.
• Others would need to have an interest in UR awakened in them.
• Potential ways to find students include:

  - Ask your colleagues for suggestions
  - Ask colleagues to send interested students your way
  - Make an announcement to student organizations
  - Post flyers on message boards in your building
  - Make an announcement in your classes
  - Keep your office door open

Should you accept every interested student into your research group?
Where did your colleagues find their students?

How many students do your colleagues mentor?
Selecting the most suitable students

• Once some interested students are identified, you may want to reflect on which ones would be the most suitable for you to work with.
• Mentors can only pay attention to a finite number of students at a given time.
• Since you can only accommodate a limited number of students, it makes sense to be somewhat selective.
• Several criteria can be used to identify the most suitable members of your research team.

What criteria have other campus mentors used to select students for UR?

How did your colleagues select their students?
What if things aren’t working out?

Have you ever had an undergraduate researcher that was so problematic that he or she had to be let go from your lab?

What projects are suitable for UR?

- Potential projects vary in several respects
  - Skills required
  - Time required
  - Funds required
  - Equipment and reagents required
  - Number of researchers required
  - Interest to mentor
  - Interest to specific undergraduate researcher(s)
  - Potential for publication
  - Potential to procure future funding

It’s often useful to weigh the skill level, schedule, and interests of available personnel when selecting a project.
How much time do your colleagues spend on UR per week?

Undergraduate Research Program Schedule

- Important Dates and Deadlines for the UWW Undergraduate research program can be found at [https://www.uww.edu/urp](https://www.uww.edu/urp).
- These dates include deadlines for undergraduate grant and fellowship applications.
- They also include deadlines associated with major meetings and other opportunities for the undergraduate researchers to present their work.

So what are the major events in an undergraduate researcher’s year?
A Typical Year in UR at UW-W

- **September** – Fall Grant Deadline for academic year funding.
- **October** – Grantee Orientation, Posters on the Hill deadline
- **November** – NCUR (National Conference on Undergraduate Research) Abstract Deadline
- **January** – NCUR registration, UWSA abstracts due
- **February** – UWW Undergraduate Research Day abstract due
- **March** – NCUR posters due, Summer Research Fellowship Grant Application Deadline
- **April** – NCUR Conference and Travel
- **April** – UWSA posters due and UWSA Symposium, UWW Undergraduate Research Day, Posters in the Rotunda, Posters on the Hill
- **May** – Spring Grant Deadline for academic year funding.

For complete and accurate details on UR events in a given year, please consult the URP website ([http://www.uww.edu/urp/september](http://www.uww.edu/urp/september))

What do UR mentors spend most of their time doing with their students?
Especially Important Dates

• Important dates for mentors to remember are the fall and spring *grant application deadlines* and the deadline for undergraduate *summer fellowship applications* as these are opportunities to obtain funding of your student’s research

• If a mentor’s undergraduate researcher is awarded a grant or fellowship, the dates for *undergraduate research day* and *NCUR* or *UWSA* become important as the researcher must attend undergraduate research day and either NCUR or UWSA

Obtaining Equipment and Reagents

• Most equipment that will reside in your lab will be purchased with “start-up” funds

• Your department also has some common use equipment (see your chair for details)

• An initial supply of reagents can also be purchased using start-up funds

• Replacement reagents and other needed supplies for projects are generally purchased from grant funds.
Obtaining Financial Support

• Financial support can come from many sources, including:
  ▪ Undergraduate research grants to student researchers (typically $500 per year or less)
  ▪ Students completing honors theses can apply for up to $1,000 from the URP
  ▪ Some student organizations or honorary societies have student awards (e.g., ΒΒΒ or Sigma Xi)
  ▪ Funds from external sources are often partially matched by the College of Letters and Sciences
  ▪ Long-term, stable funding for research projects may be procured from other federal funding agencies (e.g., DOE, NIH, NSF, or USDA)
  ▪ Funds may also be procured from private sources (e.g., Merck Pharmaceuticals, The National Geographic Society)

Keeping the Learning Experience Safe

• Students vary widely in their degree of familiarity with methods, reagents, and equipment used in research.
• Inexperienced students may unwittingly engage in unsafe behavior while conducting research.
• Mentors have to anticipate potentially hazardous behavior, where possible.
• Additionally, they need to devise lab protocols that teach safe methodology.
• Many campus mentors bring with them considerable knowledge of safe practices and procedures.
• The UW-W research community offers a set of resources to assist new research mentors, as needed, in developing safe practices for their undergraduate research.
Safety Services at UW-W

- Safety Training: Several links that can help you learn basic safety issues.
- Vehicle & Driving Information: Driver authorization and procedures.
- Waste Management: Chemical and biological waste management, batteries, etc.
- Worker's Compensation: The Worker's Compensation Act provides benefits when at the time of injury the employee is performing service growing out of and incidental to his or her employment. Forms can be found on this page. [http://www.uww.edu/adminaffairs/riskmanagement/work-comp](http://www.uww.edu/adminaffairs/riskmanagement/work-comp)
- Ergonomic Assessments: Contact x1856 or via email at riskmgmt@uww.edu to schedule an assessment.

Safety-Related Resources Available to Campus Mentors

- Safety Forms
- Automated External Defibrillators
- Campus Safety Committee
- Continuity of Operations Planning
- Employee Safety
- Environmental Health & Ergonomics
- MSDS Collection
- Pandemic Influenza Information
- Risk Management
- UW-W Health & Safety Policies
Important Forms

- **Safety and Health Hazard Reporting Form**
  The data collected through this form will be used to help locate, evaluate, and resolve reported workplace safety hazards. This form is intended to be an anonymous method for reporting hazards.

- **Indoor Air Quality Survey:**
  Do you have any other comments regarding the indoor air quality in your work area?

- For protocols about research concerning human, animal, and plant subjects; please go to this link:
  [http://www.uww.edu/orsp/compliance/human-research](http://www.uww.edu/orsp/compliance/human-research)

- For any other safety concerns, please contact contact:
  
  Lance Fredrick  
  Director of Risk Management & Safety  
  E-mail: fredricl@uww.edu  
  Phone: (262) 472-5723  
  Fax: (262) 472-5668

Mentoring Students Who are Completing Honors Theses

- **Honors Theses in Letters and Sciences at UWW**

  - Some departments on campus allow extraordinary students to complete honors theses.
  - In the College of Letters and Sciences there are currently three: Biology, Chemistry, and Geography/Geology.
  - The department of psychology also offers a thesis option, but this is not attached to an honors emphasis.
  - The thesis programs in the Departments of Biology and Psychology have been in place for many years.
  - Thesis options were added more recently to Chemistry (2007) and Geography/Geology (2011).
Mentoring Students Who are Completing Honors Theses

Elements of Honors Theses

Honors theses typically entail at least two semesters of in-depth research on a suitably complex problem and:

- A written thesis (typically ranging from 25 to 60 pages)
- An oral presentation (typically 30 to 50 minutes), and
- A defense with a thesis committee (typically 3 to 4 members).

To date, numerous honors theses have been completed by participating students.

Examples of previously completed honors theses are available in the main offices of participating departments.

Mentoring Students Who are Completing Honors Theses

- Students who have completed honors theses in each of the participating departments have acquired a range of unique life experiences.
- These experiences substantially deepen the quality of their undergraduate research experience (see also Relationship of Undergraduate Research to LEAP Objectives).
- Students who have completed honors theses in recent years at UWW have been very competitive for post-graduate and vocational opportunities, including:
  - M.D programs at The Medical College of Wisconsin, Ohio State University, The University of South Florida, UW-Madison, and Washington University;
  - Ph.D. programs at The Medical College of Wisconsin, The University of Chicago, The University of Central Florida, The University of Washington, and UW-Milwaukee;
  - M.S. programs at George Washington University, Carroll University, Mississippi State University, and The University of Iowa.
  - Research positions at Lake Ripley Management and The Medical College of Wisconsin and in Environmental Geology and in the Petroleum Industry.
  - STEM education in the public school system.
Mentoring Students Who are Completing Honors Theses

- Rewards for mentors who advise undergraduate researchers completing honors theses are more variable and sometimes less tangible.
- An informal survey of eight faculty who are actively mentoring students completing theses or who have done so previously, revealed a set of rewards and challenges.
- Rewards include seeing students grow and mature substantially and seeing students produce more substantive projects, posters, presentations and, in cases, publications.
- Other benefits for mentors include:
  1. providing a stimulus to delve into recent literature that might otherwise remain unread, owing to our busy teaching schedules;
  2. having an opportunity to explore a new research area that might be out of reach for students who have less time, energy, or initiative to apply to a research project; or
  3. having a role model for less experienced students in the lab.
- Challenges for mentors include making a greater time investment for an individual student researcher and occasionally having to keep high functioning students, with many competing commitments, engaged and focused on a project for the amount of time needed to bring it to fruition.
Is it rewarding for mentors?

What do you find most rewarding about working with undergraduates?

<table>
<thead>
<tr>
<th>Comment</th>
<th>Percent of Survey Takers That Agreed With the Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making a difference in students' lives</td>
<td>90%</td>
</tr>
<tr>
<td>Seeing students succeed after graduation</td>
<td>80%</td>
</tr>
<tr>
<td>Seeing a student present research</td>
<td>70%</td>
</tr>
<tr>
<td>Helps me retain working knowledge of field</td>
<td>60%</td>
</tr>
<tr>
<td>Helps me retain skills</td>
<td>50%</td>
</tr>
<tr>
<td>Seeing a student complete a thesis</td>
<td>40%</td>
</tr>
<tr>
<td>Increases chance of promotion</td>
<td>30%</td>
</tr>
</tbody>
</table>

What about the downside?

Greatest Frustrations of Campus Mentors

<table>
<thead>
<tr>
<th>Comment</th>
<th>Percent of Survey Takers That Agreed With the Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate time to discuss students with bg</td>
<td>80%</td>
</tr>
<tr>
<td>Inadequate time to discuss articles with students</td>
<td>70%</td>
</tr>
<tr>
<td>Lack of compensation for time/fundry</td>
<td>60%</td>
</tr>
<tr>
<td>Inadequate time to assist students with writing</td>
<td>50%</td>
</tr>
<tr>
<td>Lack of recognition for initiative</td>
<td>40%</td>
</tr>
<tr>
<td>Negative impact on classroom teaching</td>
<td>30%</td>
</tr>
<tr>
<td>Other</td>
<td>20%</td>
</tr>
</tbody>
</table>
Liberal Education and America’s Promise (LEAP)

• LEAP was developed by the Association of American Colleges and Universities and is endorsed by the University of Wisconsin-Whitewater

• In general, LEAP is meant to help show the value of a well rounded college education

• Mentoring undergraduate research is great way to incorporate the elements of LEAP into the curriculum and help students attain LEAP’s goals

Liberal Education and America’s Promise (LEAP)

• **Elements of LEAP**
  – Essential Learning Outcomes (ELOs)
  – Principles of Excellence
  – Inclusive Excellence
  – High Impact Practices (HIPs)
  – VALUE: Valid Assessment of Learning in Undergraduate Education

• **LEAP’s Goals**
  – Provide a foundation for vocational pursuits
  – Provide a foundation for life long learning
LEAP elements and undergraduate research

- Essential learning outcomes (ELOs)
  - Undergraduate research is often where students first see the real world, essential value of what is being learned in their coursework

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### The Essential Learning Outcomes

#### Knowledge of Human Cultures and the Physical and Natural World
- Through study in the sciences and mathematics, social sciences, humanities, histories, languages, and the arts
- Focused by engagement with big questions, both contemporary and enduring

#### Intellectual and Practical Skills, including
- Inquiry and analysis
- Critical and creative thinking
- Written and oral communication
- Quantitative literacy
- Information literacy
- Teamwork and problem solving
- Practiced extensively, across the curriculum, in the context of progressively more challenging problems, projects, and standards for performance

#### Personal and Social Responsibility, including
- Civic knowledge and engagement—local and global
- Intercultural knowledge and competence
- Ethical reasoning and action
- Foundations and skills for lifelong learning
- Anchored through active involvement with diverse communities and real-world challenges

#### Integrative Learning, including
- Synthesis and advanced accomplishment across general and specialized studies
- Demonstrated through the application of knowledge, skills, and responsibilities to new settings and complex problems

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### The Principles of Excellence

#### Principle One
**Aim High—and Make Excellence Inclusive**
Make the Essential Learning Outcomes a Framework for the Entire Educational Experience, Connecting School, College, Work, and Life

#### Principle Two
**Give Students a Compass**
Focus Each Student's Plan of Study on Achieving the Essential Learning Outcomes—and Assess Progress

#### Principle Three
**Teach the Arts of Inquiry and Innovation**
Immerse All Students in Analysis, Discovery, Problem Solving, and Communication, Beginning in School and Advancing in College

#### Principle Four
**Engage the Big Questions**
Teach through the Curriculum to Far-Reaching Issues—Contemporary and Enduring—in Science and Society, Cultures and Values, Global Interdependence, the Changing Economy, and Human Dignity and Freedom

#### Principle Five
**Connect Knowledge with Choices and Action**
Prepare Students for Citizenship and Work through Engaged and Guided Learning on "Real-World" Problems

#### Principle Six
**Foster Civic, Intercultural, and Ethical Learning**
Emphasize Personal and Social Responsibility, in Every Field of Study

#### Principle Seven
**Assess Students' Ability to Apply Learning to Complex Problems**
Use Assessment to Deepen Learning and to Establish a Culture of Shared Purpose and Continuous Improvement

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LEAP elements and undergraduate research

- Principles of excellence
  - Undergraduate research is not passive, it requires students to actively utilize what they have learned in numerous classes if they are to excel
Inclusive excellence

- Anyone can benefit from participating in undergraduate research. Faculty should strive for full representation of all demographic groups in university endeavors, including undergraduate research.

High impact practices (HIPs)

- Undergraduate research is the most effective HIP (at least in the Science, Technology, Engineering and Math or STEM fields)

- Additionally, undergraduate research entails a substantial amount of reading, writing, and oral presentation, and may serve as a capstone experience (see honors theses, above) also consistent with HIPs.
LEAP elements and undergraduate research

• VALUE: Valid Assessment of Learning in Undergraduate Education
  – Undergraduate research is a excellent means of assessing the overall student in a situation that most resembles a future vocation

LEAP goals and undergraduate research

• Provide a foundation for vocational pursuits
  – Undergraduate research is similar to a job in their field for the student researchers, for some it might actually be a part time job in their field
  – While most will not continue on in their mentor’s specific area of research, it is good general training for the future
  - Mentoring undergraduate researchers allows the mentor to better know the undergraduate, be a more effective advocate and provide a more thorough recommendation when the student is applying for jobs or graduate school
LEAP goals and undergraduate research

Provide a foundation for life long learning
- Most undergraduate researchers think research is fun, which for some may be the first time learning has been exciting
- Almost all undergraduate researchers see how much still remains to be learned and recognize that there is a lot they and even their mentors don’t know through their research experience

For Further Guidance

- The official URP Website at UW-W
  [http://www.uww.edu/urp](http://www.uww.edu/urp)

- Tips from URP at Buffalo State University
  [http://undergraduateresearch.buffalostate.edu/faculty](http://undergraduateresearch.buffalostate.edu/faculty)

- Tips from The University of Washington (Poster-pdf)
  [http://www.washington.edu/research/urp/downloads/Mentoring_Undergraduate_Researchers.pdf](http://www.washington.edu/research/urp/downloads/Mentoring_Undergraduate_Researchers.pdf)

- Tips from URP at Oregon State University
  [http://oregonstate.edu/students/research/mentoring-undergraduates](http://oregonstate.edu/students/research/mentoring-undergraduates)

- Tips from CRA-W