Research at UW–Madison

With over $1.2 billion spent on research every year, the University of Wisconsin–Madison is a research powerhouse. Ranking eighth in the nation for research volume and fourth for public universities, UW–Madison is home to hundreds of investigative groups—one can only imagine the diversity of research opportunities on campus. Undergraduate students play a critical role in the research process and are increasingly encouraged to actively engage in research. We at WISCIENCE aim to connect enthusiastic undergrads with life-changing research opportunities. We hope this guide to undergraduate research strengthens your resolve to pursue academic research and offers the tools you need to succeed at UW–Madison.

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Fun Fact: As of 2015, nineteen University of Wisconsin–Madison faculty have received Nobel Prizes for their outstanding research discoveries.
Section One: Getting into Research

So you want to engage in research on campus. That’s great, UW–Madison is excited to have you! The research finding process can be daunting, but with a little introspection and some internet searching, you’ll be well on your way.

Step One: Narrow your interests

Before searching for potential mentors, determine what you are most interested in researching. Interested in Biology? Physics? Psychology? Math? That’s great! Keep in mind that UW–Madison is a research facility packed with an extraordinary amount of opportunities. Through your explorations, you will have a better idea of what topics interest you the most within these broader areas of study.

If you are interested in doing research, there is likely something motivating you to get involved. Consider the influence of the factors below on your research pursuit.

- Academic Major
- Academic Goals
- Career Aspirations
- Extracurricular Interests
- Hobbies

When looking at a particular research area, try asking yourself “how does this field fit with my major/career?”, “what about this field aligns with my interests?”, or “why is this field better for me than another?”. Even if your motivations for pursuing research are purely extrinsic, identifying intrinsic motivations is a great way to narrow the research spectrum.

This stage in the research finding process is also a great time to discuss your interests with family, friends, or advisors. Sometimes, those who know you well can illuminate interests that you have difficulty identifying. Moreover, you can also try the UW Experts guides to read interview or articles on researchers to identify keywords of areas of your interest. If all else fails, look for inspiration in pop culture. Watch a documentary or a sci-fi movie (or ten) and see what jumps out at you. Think about what parts draw your interest and what areas seem particularly mysterious. There may well be a group on campus that researches that area.

After settling down a few research areas that you find interesting, you can start to brainstorm and think about specific keywords within these broader areas that fit more into your research interests. For example, in the broad area of “biology”, you can put down “genetics” as a more specific research area, or “cancer” as a disease type you would like to learn more about. Narrowing down your research interests by generating these lists of keywords will help you find researchers whose work better fits your interests in the next step.
Step Two: Finding Research on Campus

Now you have found a few research areas of interest. Nice job! You may wonder where to find researchers in these fields/facilities in or outside of the UW–Madison campus. How can you gather specific information about researchers and projects?

Here is a list of helpful sites to search for researchers on campus:

- Discovery Portal discoveryportal.org/default.aspx
- UW Experts Guide experts.news.wisc.edu/
- UW Departments wisc.edu/academics/
- UW Research Centers research.wisc.edu/centers-cores/
- Graduate School Programs gradsch.wisc.edu/mas/
- Student Job Center jobcenter.wisc.edu/

The Discovery Portal compiles useful information about UW researchers, including areas of expertise, contact information, publications, and lab/UW Department websites. With your research interests in hand, simply search by key word/phrase to find all relevant research groups across departments.

Another useful website is the UW Experts Guide, which organizes principal investigators by research topics, making it easy to find research groups within your general interests. After selecting a research topic, you can find a brief introduction of each researcher’s work or projects.

The UW Research Centers website is a great resource for finding opportunities on and off campus. When you click on a particular research center, you will be directed to a page with more details about ongoing research projects. If you have declared a major or know what majors your research interests correspond to, you can check out major department websites. In department faculty list, you can find information about all faculty members in each department. You may find a researcher you are interested in happens to be your course professor or lecturer, which is always a great way to build an initial connection.

Sometimes researchers listed in the undergraduate department websites may not include those who focus on teaching graduate-level courses, so checking out Graduate school programs websites is also a great way to expand your search range. Another benefit to explore graduate school program websites is that the researchers are grouped by broader fields that span across majors. So, to look for potential mentors that are not limited to undergraduate departments, just select a program in your area of interest, enter the program website, and check on the different fields that interest you.

The Student Job Center is the best place to look for paid research positions. It is likely that the positions listed require more lab maintenance duties, including cleaning, collecting samples, or making reagents, so be sure to check the requirements carefully before you decide to apply. However, this is still a good way to get your feet wet and try it out to see if you like lab work. If your lab can help you achieve further goals beside doing basic lab work, you can always negotiate with your PI and progress to conducting independent research.

After searching around these websites, you may have identified a few research groups you are interested in. Ultimately, you will want at least 5-20 researchers to set the expectation; in other words, you may need to email quite a few before hearing back positively. To keep track of their information, it is important to keep a well-organized list of potential mentors. Here we have provided a Mentor Search Spreadsheet, which can help you keep track of the information you have gathered and draft emails more efficiently later on.
Step Three: Sifting and Winnowing

Hopefully, you were able to find an abundance of interesting research groups on campus. If you feel overwhelmed by the wealth of information you’ve assembled, don’t worry; this is the perfect time to take a step back and review your priorities. Just like what the figure illustrates, it is important to think and rethink about things, such as time commitment and research fields, that you like and don’t way, you will find the ones you are which you will get your desired are some strategies to help you research mentors.

Among all the potential mentors (generally professors or heads of their labs who you are interested in) it is typically best to start with a short list of candidates, usually around ten investigators from distinct research group. Narrowing your list will set you up to contact five or more researchers at a time for your first two rounds of introductions.

Start sifting and winnowing by re-ordering your list with regard to your level of interest.

- Assign each research group an “interest score” between one and ten, with a score of one being the group/groups in which you have the least interest and ten being the group/groups in which you have the most (it’s okay to have more than one group with the same interest score).
- Use your assigned interest scores to rank your list. Put the groups in descending order, with the highest interest scores at the top of the list and the lowest scores at the bottom.
- The first ten groups are likely the best candidates for your initial rounds of introductions. Be sure to save the rest of your list too. If at any point you need to reach out to more potential mentors, it may be necessary to have more than the first ten contacts on your list.
- If you are having trouble assigning interest scores, revisit Narrowing Interests for tips on introspection.

Consider learning more about the research groups before evaluating potential mentor candidates. Peer reviewed articles can be challenging to digest, so search for more accessible media, like popular press articles or interviews. The UW Experts Guide may have useful and comprehensible info, but not all labs are listed. Twitter and other social media platforms also have active research communities worth exploring.
Step Four: Email Introductions

After you have selected the researchers you are most interested in, it is the time to craft the professional email. As your email is the first impression that you are making with your potential mentors, it is important to keep things professional and concise with, ideally, no more than three paragraphs.

Therefore, we suggest you to:

1. Start your email with professional greetings. Address the research mentor as Dr. or Prof. and their last name, and use “Dear” or “Hello” as a greeting.
2. End your email with a polite closing line such as "I look forward to hearing from you", "Thank you for your time", and "Sincerely".
3. Include an email signature with your information including your full name, major/minor, academic year in college or your expected graduation date, GPA (optional), and university email address.

What is the purpose of your email?

Here you should be brief but clear about why you are emailing. If you have seen the lab you are interested in posting an open position for undergraduate researchers on either their lab website or Student Job Center website, please do reference that here. If you haven’t seen any specific information about recruitment, which is pretty normal and totally fine, just be clear about why you are writing and that you are interested in potential research opportunities.

Why are you interested in the research topic and/or what you hope to learn from the experience?

This is probably the most important part of the email and should be tailored for each research group. Try to avoid anything general like “I am interested in your lab research, so I would like to be part of it.” Be specific about what you learned from their website that made you interested in their work, and then articulate why you are interested. You could mention the specific research questions that intrigue you, some previous work or research results from this research group that you find impressive and interesting, or the techniques they use in lab that you would like to learn more about. If possible, you could also read some of their publications to have a better idea of the project you are interested in. It is normal that you may encounter techniques or concepts that you don’t understand, but this gives you the chance to ask questions and thus keep the conversation going with the potential mentor. Generating questions from reading publications is also helpful for your interviews, which we will talk about later. Basically, this “why interested” part can show the researchers whether you have made enough effort in learning about their lab research and how you are motivated and eager to participate in their research, which is crucial to make you stand out to your potential mentors.
Do you have any previous experience or skills relevant to this opportunity?

The answer is NO. It is absolutely no problem if you do not have previous experience or skills. Focus on your enthusiasm and interests in their research topics and what you hope to get out of the experience. After all, you can always be trained in skills and techniques. What matters the most to many researchers is your passion and interest in their research, your eagerness to learn, and your devotion to research rather than previous research experiences. Additionally, faculty like working with underclassmen because they will be able to stay in the research space longer. This sense of persistence is another capacity that researchers look for in an undergraduate researcher.

What is your anticipated time commitment (hrs/week, number of semesters)? Would you like to earn credit for your research experience? Would you like to volunteer as a researcher?

This is where you should indicate how you would like to participate in research and how much you could commit. Normally, you will have further discussion about your options you’re your potential mentors when they accept you in lab, but it is still necessary to include this information in your email to give them an idea about whether or how you would be involved in their research.

We have also provided you with question prompts of things you should be aware of and include in your email.

If you are getting a bit overwhelmed, check out the example email we attached here to help you formalize your own.

Sometimes you will find on lab websites the requirement for documents you should include in your email, including resume, cover letter, and transcripts. In this case, make sure to follow the instructions. If you haven’t found any specific instruction, it doesn’t hurt to attach a resume for their reference and to let them know more about you. You can find a resume template here. If you need extra help in writing your resume, the Writing Center and Career Services have great workshops and one-on-one appointments to help you with formalizing and revising your resume. Additionally, you could also reach out to our Research Peer Leaders to help you with email and/or resume drafting by either scheduling one-on-one meetings or visiting our drop-in hours.

If you haven’t heard back from any researcher for over a week or so, don’t get too disappointed! Professors and researchers receive hundreds of emails every day, so it is much more likely that they haven’t noticed your email yet than ignoring because of personal reasons. If you are still interested in the labs, just shoot them a follow-up email! Tell them that you are really interested in their research and would like to work with them. If you have done something during this waiting time that you think may impress them further, such as reading more of their publications, learning more about their research topics in your class, or even drafting a literature review with friends, then list them up in your follow-up emails for sure!
Step Five: Interviews

Interview is what researchers normally will provide after they give you a positive reply to know you better and see if you will be the good fit for their research group. While many researchers would love to meet you in person, during special situations they would also be fine with a phone call or video chat. The format of the interview can be a casual conversation or a more structured, job-interview type meeting, so it is important for you to be professional and well-prepared either way.

To prepare for the interview, you can start with reading some papers from the researchers’ recent publications to get a better idea of the current progress in the projects of your interest. Researchers will not expect you to understand every single detail of their projects, so you do not have to stress yourself out trying to learn all concepts and techniques at this time. You could simply skim through the papers or focus more on the abstracts to grasp the main ideas and the significance of their work.

You can also generate a few questions about the projects or their publications to ask during the interview. This will show the researchers not only your efforts made in learning about their research, but also your eagerness to learn, your passion, and your critical thinking ability, which will definitely help you stand out. Additionally, this process can be a good way to help you reflect on what you could get out of this research experience and, more importantly, be better prepared for the questions your potential mentors would ask, including which part of the projects you want to be involved in, what techniques or skills you would like to learn, and how you could utilize the new knowledge and new skills in your future.

During the interview, you should be able to illustrate your interests in the specific work and projects of the labs just like you have done in your emails, but in more detail. This means you should explain what makes this lab unique from other labs with similar research focus and perfect for your research interests and pursuits. And, of course, ask out questions you have prepared. You should also listen attentively to the researchers and ask some follow-up questions at appropriate times to show your curiosity.

Additionally, you should remember that this interview process is just as much of them interviewing you as it is YOU interviewing THEM. Therefore, you should be clear about what you prefer and not prefer from this research experience. You can ask what your specific roles and tasks are in lab and how much hours of a week you are required to work. You can also discuss your options to get compensation from your work (e.g. course credit(s), hourly wage) and some long-term goals including how many semesters/years you plan to stay in this lab, and your future opportunities to have an independent project which is often required by capstone courses and senior projects for many majors and can increase your chance to win fellowships and scholarships.

Overall, researchers are always looking for mentees who are really passionate and dedicated about their research and see a lot of potential growth through being involved in their research experience. Remember this and now, go nail down that interview!
**Step Six: Follow-Up**

Now you've nailed the hardest parts of finding a research mentor. Hooray! But the research finding process isn't quite done yet; remember, even though you have received positive responses from your potential mentors and aced the interviews, you still need to keep following up.

Normally, the researchers will confirm whether you are offered a position in the research group through emails or directly in the interview, and it is possible that you will receive offers to multiple research groups. While you may have the concern of whether you should pick the first research group that accepts to keep this valuable opportunity, we suggest you take some time and figure out what you prefer and not prefer in a research group. Receiving recognition and invitation to work in a research group gives you the sense of reward and even more when you receive multiple invitations, but it's also really important to think carefully about your needs and preferences in your research experience when you are picking the research group to work with. It is a commitment to both yourself and the research group.

When you have confirmed the lab that you would like to work with, it is important to keep following up with your mentor. Besides sending a thank you email after the interview, you should keep contacting your mentor about when you can start working in the lab, what project you will participate in, and, if possible, which of the research group members will guide you in your research. If you and your mentor have figured out the options to get compensated for your work, either in credits or payment, you should also ask how you could enrol in credits or how you could receive the payment.

As for the labs that you decide to "turn down," it is important to be professional and thank the researchers and let them know about your decision. And for the labs that have given you negative replies? Certainly, you should still send thank you emails and wish them all the best with their research.
Section Two: Succeeding in Research

Take a deep breath; you’ve overcome your first set of hurdles and now you’re part of an exciting research group! From here on out, we will discuss how to make the most of your research opportunity and adapt to unique lab experiences.

Part One: Mentor-Mentee Relationships

This may be the first mentoring experience you’ve had, and as such, it is important to acknowledge the differences between a mentor, teacher, and advisor. You’ve likely had a great deal of experience with teachers in a range of formats, but unlike your relationship with teachers, your relationship with your mentor will be close, communicative, and fluid; there will be give and take. While your mentor may offer advice, this is not their sole role, separating them from the academic/professional advisors you’ve likely encountered. In sum, a mentor is a teacher, advisor, and friend rolled into one.

Mentoring will look different lab-to-lab, but it’s likely you will be paired with an experienced lab member to guide you through the research process. Your mentor may be a graduate student, postdoc, staff scientist, principal investigator, or another undergrad. Whoever your mentor may be, establishing a co-supportive relationship is key to succeeding a research experience.

To kick off your mentoring relationship, it is a great idea to set expectations, boundaries, and goals. One way this is achieved is through a research mentor-mentee compact (see the example on the next page). A mentor-mentee compact is formal document signed by you and your mentor after you have discussed and recorded laboratory expectations and commitments. By signing the compact, you and your mentor agree to adhere to the expectations set. You can find a sample mentor-mentee compact here.

Below are a few areas to consider when forming your mentor-mentee compact.

- Your research experience should further your knowledge of the research area
- Your research experience should bolster your academic/professional profile
- Your work should actively advance the lab agenda
- Your time commitment should be routine and appropriate for the credit/pay provided (if applicable)

While you have agreed to a set of guidelines in your mentor-mentee compact, it is important to understand this compact is a living document and adjustments can be made when necessary. In fact, it is good practice to revisit your mentor-mentee compact periodically. The frequency of review will be dependent on the volatility of your commitments.

Like any supervisor, it is important to discuss conflicts with your mentor should they arise. These could be issues with schedules, workload, or competencies. Your mentor should be receptive to feedback just like you, but if there are consistent issues, it is okay to speak with another lab member, or if necessary, the Dean of Students Office.
Part Two: Research Group Culture

Throughout your undergraduate career, you’ve likely found environments best suited to your working habits. Perhaps you like to hunker down alone at a desk and complete your tasks in one lump sum; maybe you like to take frequent breaks and consult with others. There is no one ‘right’ way to work in your laboratory, but your work environment might be contingent on available space and lab norms. Learning how to work effectively in your research space and navigating your lab culture is important to succeeding and feeling comfortable in your new research experience.

Not all labs operate the same. The beauty of research is every research group can set their own standards within the greater umbrella of the field. Some labs adhere to a strict nine to five, some choose to follow a 'work when there's work to do' routine. Often times the types of experiments a lab performs dictates the schedules of lab members; this is an important point to consider when deciding which projects to join. Since you will likely work under the direction of a lab mentor, be sure to consult them about your schedule. If you are flexible about your research schedule, it's a good idea to sure to let your mentor know, but more importantly, let them know when you are inflexible.

As a regular lab member, you’ll likely pick up on lab norms within a matter of time, but there are a few general rules to follow below.

- Clean up after you’re done using a space.
- Let someone (usually your mentor) know when you run out of a necessary lab material.
- Keep detailed records of your work (typically in a lab notebook, which does not leave the lab)
- Organize your files; physical or digital.
- Attend all required meetings, and don’t be late.
- Follow safety protocols to the tee.
- Don’t mess with another lab member’s experiments.

These are all basic rules of thumb. Your research group will likely have amendments and additions to this list, but these are a good place to start.

In addition to regular lab work, many research groups will choose to host learning opportunities or social events. As a junior researcher, it is understandable if you find these events intimidating, but as a valuable lab member, keep in mind these events are for your benefit too. Unless otherwise specified, it is often a good idea to engage with your team in as many ways as possible. If your lab offers a journal club, consider joining and exploring the field with the rest of your team; you may pick up valuable critical analysis and science literacy skills.
Part Three: Learning Approach

You may choose to stay in your lab for just one semester or over four years, but no matter how long you’re around, you’ll want to learn as much as possible. The key to learning lots in any span of time is collaboration, whether that be within your lab, with other labs on campus, or in other areas of your life. Below are five ways to collaborate in your learning process during your research experience.

Ask lots of questions. As you’ve heard since kindergarten, there are no dumb questions. The more you ask, the more you’ll learn about a particular topic or technique. More than likely, your mentor will appreciate your questions, as they show you are critically about new information. Students often express that they feel annoying when they ask lots of questions, especially if they believe the questions are repetitive, but it is important to recognize that the members of your lab always prefer repetitive question over procedural mistakes.

Debrief with your mentor. After going through a new technique, you will have absorbed a lot of information in a relatively short period of time. It is a great idea to review that information before it fades. Not only will this help you solidify the process, but you will gain a deeper understanding of the rationale for each step.

Use the internet. Follow that Wikipedia sub-link! While your mentor is a great go-to for information when you’re in the lab, you will often have to find different sources when you’re outside lab. Wikipedia and YouTube are surprisingly good sources for accessible science material. While you’re learning the lingo of your field, it can be super helpful to follow links for terms you are unfamiliar with. After performing a deeper dive, you’ll understand the material better and you may come away with novel questions.

Apply your course knowledge. You’re in school for a reason: to learn material you can later apply to your life and career. Why not start applying that knowledge here? Many of the techniques used in modern laboratories are built on fundamental STEM concepts. Reevaluate lab protocols critically by revisiting your lecture notes.

Look outside of your field. Interdisciplinary research has produced some of the most exciting discoveries in history. Standard practices may be drastically different in another field, but often aspects of lab techniques are directly translatable. Exploring research methods in labs outside of your field may change how you view your lab’s techniques and possibly offer ways to optimize your experiments.
Step Four: Goal Setting

You’re in a lab. You have a mentor. You know your topic. Now what? As an undergraduate researcher, you have virtually limitless opportunity to learn and succeed in your field. You might not obtain an NIH grant or receive a Nobel Prize, but you can set your sights high. Many undergrads do achieve funding for their projects and publish studies. There’s certainly no reason to feel under accomplished if you don’t, but goal setting is an important driving force in your training process.

Start small. Set a short-term goal—what’s something you hope to accomplish in the next month?

Examples of short-term goals

- Learn a research technique (e.g., DNA isolation, soil sample collection, PCR).
- Strengthen interpersonal connections (e.g., Learn the names of everyone in your research group).
- Understand research fundamentals (e.g., read a research paper, attend a seminar, complete an online course).

Ultimately, short term goals are aimed at achieving larger long-term goals. Short-term goals will serve as action items to keep your progress in check. When setting short term goals, it is important to consider how they fit with your training plan—ask yourself, “how might achieving this goal help me grow as a researcher?”

Long-term goals may be things you hope to accomplish in a year or within your research experience. These will often be multi-step processes and significant achievements.

Examples of long-term goals

- Publish research (you may publish your work in an undergrad journal or broader peer-reviewed collection).
- Acquire funding (maybe you move into a paid position or earn a research fellowship).
- Present a study (this could be in one of your classes, in your lab, or at a research conference).

These are no small tasks; they’ll take time and work to achieve, but with dedication and support from your research group, you’re sure to succeed. Keep in mind, you are not alone in your research experience. Members of your research group are available to help you achieve your goals. Be sure to converse with your mentor about your aspiration in your research experience and beyond. They will likely have valuable guidance and can direct you to other resources if not.
Step Five: Time Management

As you stay longer in lab, you will be able to accumulate more research skills and gain more chances to participate in your project. At the same time, you will also be borne with more responsibilities and asked to be more committed to your lab work. Then how can you stay efficient and manage your time at lab wisely? Here are some tips that you can try.

1. Organize your lab time:

It is important to plan out the time you would like to work in lab each week, which is Macro-scheduling, AND the time for each task or experiment that you need to do every day, which is Micro-scheduling.

For Macro-scheduling, you can use calendars (e.g. Google Calendar, Outlook Calendar) to record what time you plan to come in lab each day of a week in advance. This can help you make each week organized with schoolwork, your lab time, and extracurricular activities set into appropriate time blocks. Additionally, if you are taking credits for your lab work or have to log your time sheet to get payment, this also helps you to track down your hours in lab.

For Micro-scheduling, you can try To-Do List or any planner to map out the time for each experiment you need to do in a day. This strategy becomes really handy when you have multiple tasks a day. With the time information sorted out, you can not only make your work more efficient by multitasking, but also save some time of the day for schoolwork or extra rest. For example, if an experiment takes 2 or 3 hours of wait, instead of wasting your time just waiting, you can look for other tasks that can fit in this empty time blocks. Alternatively, if you have lots of homework or would like to have some extra time to study for exams, this time block will absolutely help! However, you should be aware that multitasking sometimes can sacrifice the quality of your work. Therefore, think clearly about your time availability and your capability before you decide to multitask.

2. Use time-saving hacks:

It is the little things that can save your time and make your work productive. With your experience accumulated, gradually you will find your own ways of saving time for your experiments, such as restocking supplies and reagents, creating your own labeling system, and restock supplies and reagents during waiting periods.

While these hacks may seem easy, it is important to remember that full preparation and planning of time will make your work running more smoothly and avoid big mistakes that make you redo the experiments and waste time. Therefore, try to plan out the experiments and make clear notes about the procedures before you start working. If you have extra time at the end of your day, you can also try preparing for the next day’s experiments including labeling tubes and organizing notes.
Need More Help?

Check out these other WISCIENCE resources:

- Attend an upcoming: Find a Mentor Workshop
- Check out: Steps to Finding a Research Mentor
- Watch the: Finding a Research Mentor Workshop Video Series
- Read over these: Frequently Asked Questions

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