UROP Supervision Guide

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Goals of UROP

1. **Education**
   - Mens et manus/Mind and Hand - UROP helps students develop research skills within specific disciplines, form connections with faculty and other researchers, enhance presentation skills, and have "real-world" experiences that help inform choice of major/minor, graduate study, or career.

2. **Mentorship**
   - An approved UROP project presumes active and regular communication and oversight between participating undergraduates and their MIT faculty supervisors.
   - UROP helps build meaningful connections with faculty, researchers, graduate students, and other undergraduates who share similar research and career interests.

3. **Independence and academic maturity**
   - UROP helps students develop independence and academic maturity throughout their research experiences.
   - Some UROP students go on to author papers on research projects in which they are involved in, or are able to develop independent projects

Goals of UROP mentorship

The UROP Mentor-Mentee Relationship

For mentee:
- See how research works
- Prepare for graduate school
- Contribute to and built research and skills
- Develop communication and collaboration skills in a research setting
- Explore a field of inquiry
- Expand professional network and gain letter(s) of recommendation
- Receive pay or credit

For mentor:
- Project planning and development skills
- Documentation experience
- Management experience
- Opportunity to educate, mentor, and shape the future of the field
- Reflection time within research
- Bring in new skills and tools to research
- Improve productivity and output in research via delegation

Logistics of UROP

7 Steps to a great UROP experience for you and your student!

1. **Deadlines**
   a. Keep track of the posted deadlines on the UROP website!
2. **Compensation**
   a. Decide with the student if they will be compensated through pay or credit.
      i. Sponsored vs Direct Funding (UROP funding is not guaranteed)
      ii. Pay rates
      iii. Credit - Letter graded vs Pass/Fail (some departments only offer Pass/Fail); Number of units that will be awarded. How will the UROP be graded? On what will their grade be based?
      iv. Wellesley College restrictions on funding and deadlines
3. **Expectations**
   a. Discuss your expectations for the term with them, so they have a clear understanding of:
      i. Communication norms and expectations
      ii. Project deliverables
      iii. Expectations for work and laboratory rules
      iv. The metrics of success for them as a UROP student and for the project
4. **Application**
   a. Every UROP must submit an application by the given term deadline (even if it's a continuing UROP from a previous term)! It must include a student-authored 1-3 page research proposal, clearly stating the project purpose and describing in detail their planned research duties.
   b. Your faculty advisor (or you if you are faculty) must review and approve your students' **UROP applications online**.
   c. See **Online System Help** for instructions.
5. **Training and Safety**
   a. By approving your students' UROP applications, you are confirming not only your support for the academic content of the proposal, but also acknowledging that no UROP student is allowed to begin work in the lab until all departmental and Institute chemical hygiene and **EHS** training requirements have been fulfilled.
   b. Please communicate the hazards typically encountered in your laboratory as well as project-specific hazards to your UROP students before they begin and be sure they complete all requisite training.
   c. Follow EHS policy and protocol through **ATLAS** for all safety
6. **Communication**
   a. Throughout the term the student should be in consistent communication with their direct supervisor. They must also receive communication from and meet with the faculty supervisor.

7. **Evaluation**

a. Your student(s) must be evaluated at the end of each term. Feedback can be submitted via your **Online UROP system homepage** (only available to faculty supervisors) or by email to **urop@mit.edu.**

Writing and Posting a UROP Listing

Postings are an important outreach tool for faculty/labs to connect with prospective undergraduate researchers. While it is not a requirement that you post a UROP listing, we strongly encourage it as part of your recruitment of UROP students.

Writing a Post:
Overall: Make it concise and try to be specific about what type of student you are looking for (duties, skills, passions, etc) and project details.

> **3 main post types**
> 1. Project-specific listings -- include links, etc., to the project if possible
> 2. Student profile -- seeking a student who fits an umbrella set of skills that can be useful in a laboratory. These skills could be from previous experiences or from certain classes. Furthermore, for advertising first year friendly opportunities for that type of mentoring experience.
> 3. Exploratory -- exploration of a new process, tool, and/or literature that you do not have the bandwidth to explore but that you need to be explored for the greater research agenda.

We have provided templates later in this document.

How to post:
1. Visit elx-admin.mit.edu and select **Add Opportunity.**
2. Select your department, lab or center.
3. Select whether interested students should apply through the new internal application form or select external application to specify that students should contact you directly if interested, or provide a link to an external application or google form that you have already developed.
4. Provide a project title and add an additional tagline or subtitle as desired.
5. Select **Undergraduate Research (UROPs)** from the **Theme / Track / Program** dropdown or your listing cannot be properly approved and listed for students.
6. Select from pre-populated keywords or add your own.
7. Specify **location** – either remote/virtual or provide on-campus location.
8. Select the **term** the position is offered.
9. Provide **estimated hours per week**.
   a. Note: in fall and spring students should not work more than 20 hours per week, but for IAP & Summer students can work up to 40 hours per week.
10. Provide **a date range** that you wish your listing to be viewable to students (students will only see your UROP advertised during the specified date range).
11. **List an application deadline** if you want interested students to contact you by a specified date.

12. Provide a project overview/**description** and add a link to your project or lab website, if applicable.
13. Under **requirements**, you may list any safety considerations or leave this section blank.
14. Under **"Student Compensation and Expenses,"** please select all options that apply.
    a. For hourly rate and units of credit – you may enter "to be arranged" if these will vary. In the **Academics** section, student eligibility details and prerequisites.
    b. You can also elect to target specific class years or majors only, and must specify any prerequisites for the position in this section.
15. Under contact, please be sure to specify the faculty supervisor (by name or Kerberos email). Note that the contact email in this section must be a valid email address (either that of an individual or an email list), no name or other detail can be added to this field.

A video tutorial on posting to the ELX website can be found here.

Responding to UROP Inquiry Emails

This section covers how to handle inquiries from students about UROPing with you! We have provided email templates here in this document.

Things to know before you respond
- Deadlines for the term - available at urop.mit.edu/dates-deadlines
- Availability of positions for UROP students in your laboratory
- Your schedule and if you have the time and ability to mentor and manage a student
- Only MIT and Wellesley College undergraduates are eligible for UROP. Students from other institutions are not eligible to conduct research via UROP, unless they are part of a formal exchange program with MIT.

If you ARE interested in having this student UROP for the term:
- Set-up expectations for the UROP position before speaking with students
- Interview the student and talk about these expectations
- Make sure the student is a match in the context of their skills and availability/schedule, and your time and research needs

If you ARE NOT interested, it's not a good fit, you don't have lab space, etc.:
- Do you have a colleague that you can introduce them to?
- Can they do something else for credit for you, like a "mini UROP?"
- Can you give them some relevant advice and information for other laboratories, courses, or resources you think they should look into?

Email management, especially in these times, is a skill and isn't always easy. Be kind to yourself!"

Interviewing UROP students

Most UROP interviews are more informal than job or graduate school interviews. And remember, for some folks this is the first time they are being interviewed and it may be your first time as an interviewer! Here are some tips to help prepare for and conduct a UROP interview:

Before the interview
- Make sure that you have sent a calendar invite to the student (with meeting location, Zoom link, or other meeting details).
- Read over their resume and highlight any concerns or gaps you may have for this position
- Be prepared to know about logistics of the position, such as working hours and if your laboratory is offering it for pay or credit

During the interview
- You should gain knowledge of:
  - The student's time availability
  - Their current knowledge and abilities
  - Their passion for the project
  - What they have to learn during the project

Dos and Don'ts of a UROP Interview

| Do	Don't
Do ask about their comfort level with different relevant frameworks and tools in your field	Don't ask too many technical "interview" questions -- undergrads don't typically have time to do a lot of technical prep
Do ask about relevant coursework they have taken and class projects and field knowledge	Don't have an interview for more than an hour
Do ask about previous experience on their resume	Don't have the student do major prep work for the interview unless it's just reading over a website

UROP Expectations

It is extremely important to set expectations for your UROP students early during interviews and when the student is starting their position. An agreement document, of which there is a [sample at the end of this document](#), is one great way to accomplish this.

Some important things to cover include:

- **Project deliverables**
  - What does an 'A' or 'Pass' look like?
  - Deliverables for the end of term?
  - Milestones for each week?
- **Work style and rules**
  - What are necessary safety practices?
  - What are working norms (e.g: attendance, lab documentation, communication hours, etc) and expectations for your laboratory?
  - What are working norms that you want between you and your UROP?
  - Will you have the student keep documentation in a lab notebook, Google Drive, or another method?
- **Communication**
  - How will you communicate with one another? (e.g: email, Zoom, Slack)
  - How often will you meet?
  - How should the student ask you questions and how will they report progress of their tasks?
  - Will your student go to lab meetings?
  - How will your student interact with the faculty supervisor? How often?
- **Continuing work**
  - Could this UROP go on for multiple terms?
  - Does the student want to continue on for multiple semesters?
  - How should the student define their contributions on their CV, future applications, etc.?
- **Authorship and credit (if relevant)**
  - Will your student present at the end of their UROP to the lab or department?
  - Will there be a poster or paper opportunity for this work?
  - Where and how will the student be credited for their contribution?

Project planning

What makes a successful UROP project?
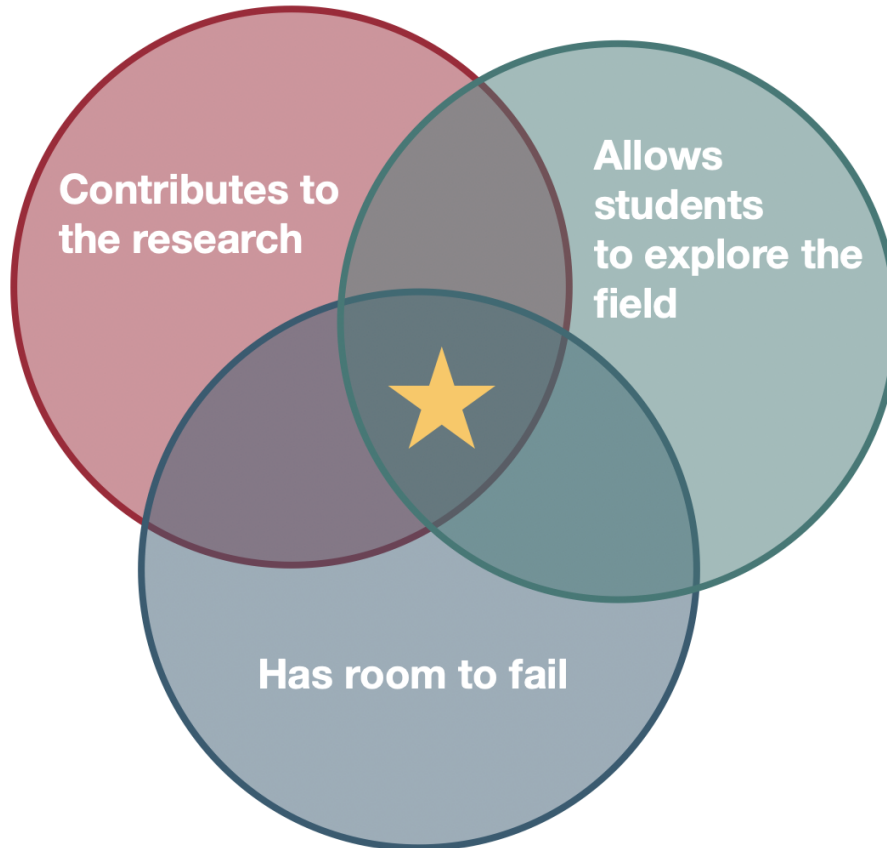
A good UROP project should try to embody the diagram above to best help the student, laboratory, and you.

There are a few other recommended guidelines:
- For newer/inexperienced students, if there isn't time or space for failure, then the UROP project shouldn't be an integral part of critical research or the supervisor's thesis work.
- The project should build off the student's field of inquiry and teach useful field/disciplinary skills.
  - There always will be some busy/monotonous work in research, but...
  - ...UROP students should also be doing some novel work and/or learning skills and techniques relevant to the field that will help move the project forward in some manner.

For fall/spring term UROPs, since students often get busy in classes, we recommend that every UROP project has an MVP (minimal viable product). This MVP should be a contribution or set of duties that can be accomplished with less hours of effort a week throughout the term. This is

because there are weeks that students will need days off for exams, etc and many tasks might take your UROP student longer than you!

"Reach" goals are often accomplished with more hours per week on top of the MVP.

Within the project it is always a good idea to:
- Contextualize the student work within the bigger project, lab vision, or the field
- Relate this work to future potential internships, jobs or graduate school
- Add useful literature or network ties to the work -- i.e is this work something that makes them encounter people or things in the field that are key for their development?

For project planning, we strongly recommend our **Facilitating Effective Research (FER)** workshop, to always plan backwards from the goal of the project to the tasks needed each week. If you want to explore this more in depth, we encourage you to sign up for our workshop on our website.

Planning Backwards to Achieve Goals

What will students have done by the end of the project?	→	What needs to be done in order to achieve the goal(s)?	→	What needs to be done to meet milestones?
Project Goals Long term	→	**Establish Milestones** [Bi or tri weekly]	→	**Set Tasks** [Daily or Weekly]

Type 1 Goal Examples

- Assess the visibility of 3 different processing routes
- Build a device to measure something
- Determine the relationship between components of a system
- Complete a user study or design an ethnography

Type 2 Goal Examples

- Complete first draft of a paper to be submitted for publication
- Present research findings to a society
- Create and present a poster for a local symposium

Type 1 Goal Examples

- Read and summarize a research paper
- Machine holder for a lens
- Take focused SEM images
- Write a function to…

Type 2 Goal Examples

- Write up experimental procedure
- Draft introduction
- Create schematic

Examples

- Meet to discuss literature
- Create a table of experimental variables
- Take a tour of the machine shop
- Get trained to operate a machine
- Write a function in C++
- Make documentation about a method in the lab

There may be **experiential goals** as well like:
Appreciating the non-linearity of scientific research
Being able to function in a multidisciplinary research team

[You may decide to let students define the tasks needed to meet the milestones]

Credit: Janet Rankin, PhD; Director, MIT's Teaching + Learning Lab

While UROPing during the fall or spring semester is perhaps the most common, IAP and Summer term UROPs are also very common and a great time to devote to research.

How do you plan an IAP UROP?
A lot of people have UROPs during IAP, which is a great time to UROP! There are 3 main categories:
- Continuing student from fall (Fall → IAP)
  - Building off what they learned in Fall by treating them as a full time lab member for a month
  - Giving them a focused month to iterate on or document what was done in Fall
- Onboarding a student in IAP to continue in the Spring (IAP → Spring)
  - Training and building foundation for spring
  - Literature review
  - Integrating them into lab processes and culture
- IAP only
  - Basically you want either a predictable building block or a small contained module
    - A small sprint to do a mockup or to explore something that needs to be learned (i.e a new software or method)
    - A literature review
    - Help communicating or analyzing existing data

How do you plan a Summer UROP?
Summer is an awesome time to UROP because classes aren't in session, which means students can be full time (~35 hours weekly) for approximately three months!

- Generally, summer projects and duties should be structured to treat the student like a full time member of the laboratory.
- Gain an understanding of the student's goals for this summer and if they are interested in continuing research beyond the summer.
- Plan and calendar these goals with them, including any summer vacations they (and you) may be taking.
- Clearly state the expected output and set-up structured milestones since they will be working more hours each week.
- Check-in with summer UROPs frequently; make sure they aren't stuck on a project component and need guidance
- Have a venue for your student to present at the end of the summer, preferably in a group meeting, but at least to your faculty member if you are not the PI. (Note: some departments host poster sessions. Ask your department if they have such opportunities for UROPs).

Types of UROP duties

If you didn't have undergraduate researchers at your previous institution it might be confusing to outline duties and responsibility for undergraduate researchers.These of course will vary largely based on the project that you are planning.

Overall, duties should be directly related to the deliverables of the project. But if you are running out of things for your UROP student to do, or if you are trying to add more to your project planning, we recommend considering the following categories of duties.

1. **Literature review**
   a. Any researcher needs to read the research in the field and keep up to date with it. Furthermore, reading academic literature is an important skill that takes time to develop. Having your UROP student read key papers and going over them together can be a great way to develop this skill.
2. **Trainings**
   a. Are there training sessions that might be helpful for your UROP student for their current UROP or within your field? Such as new equipment or software? Or EHS training through ATLAS?
3. **Documentation**
   a. Documentation is an important part of any research! Instilling the value of good and proper documentation practices in your UROP students is extremely important.
4. **Analysis**
   a. Analysis of experimental data, techniques, and past results is another important part of research in which UROPs can take part. Can you have your UROP define new metrics for data you have? Write scripts and visualize the data?
5. **Experimental Support**
   a. How can your student support the experiments you are doing? Helping with setup and takedown? Helping document while it's happening?
6. **New Tools**
   a. Is there software or a new tool you want to evaluate for your research but you don't have time to? This could be great for a UROP student!

Supervision Skills

The day-to-day supervision of UROP students is a necessary component of the UROP experience. Mentoring and supervising are important skills that any researcher needs to learn. It is a skill that is honed over time and everyone has their own unique style that they develop.

We encourage students to remember and understand that a mentoring relationship is two-sided and you do not have control over all aspects of the mentor-mentee relationship, or other external factors. For example, students may unexpectedly become overwhelmed with their courses, extracurriculars, or personal lives. And that is okay. Being a good mentor often means acknowledging these limitations and adapting.

The UROP Office offers an in-depth mentoring workshop,**Facilitating Effective Research**, (FER) which you can sign up for on the [UROP website](). This workshop delves more deeply into supervision skills, mentorship, and project planning.

The main aspects of supervision skills we encourage mentors to consider and develop are outlined below:

Communication
- Maintain active communication throughout the UROP
- Set up norms around communication methods and frequency with your UROP students
- Provide feedback and consider how to convey constructive criticism

Project and duty scoping
- Plan the project with the structure of the UROP in mind (summer, part time, remote, hybrid, etc.)
- Make sure there are sufficient and appropriate duties for students
- Acknowledging and working with shifts in timelines, duties, and project scope

Flexibility, adaptability, and empathy
- It is always important to be flexible and adaptable while supervising students
- If you have concerns about a student, you can contact UROP staff, but we also recommend contacting Student Support Services (S3) at [studentlife.mit.edu/s3]()

Documentation and organization
- A large part of being a good supervisor is being organized and keeping documentation on your UROP's work
- Having your student keep a lab notebook or a running notes document and frequently reviewing it is a great way to do this
- Taking notes or delegating the responsibility of doing so during meetings

Community

- Try to make your student feel comfortable and part of the lab group, by including them in meetings and introducing them to colleagues
- Also introduce your student to other UROPs in your lab or department

Career development
- A good supervisor helps a mentor prepare for their next step after that appointment -- keep this in mind with your UROP students
- Help them frame their UROP on their resume
- Express what skills they have acquired in their UROP and why they are valuable in the field that they are interested in
- Give them advice from your own experience and career
- Nominate them for awards if appropriate and encourage them to apply for relevant opportunities (e.g. internships, conferences, graduate schools, etc.)

Safety and proper lab procedures
- Model good laboratory behavior with your students
- Supervise them carefully when they are still learning new skills and new machines

Scheduling
- Schedule meetings and follow-ups during those meetings
- Have a clear agenda for meetings
- Manage your time and your UROPs time effectively, such that things are not unnecessarily repeated
- Schedule work for when you and your student are both in the lab at the same time

Teaching new skills
- Don't assume prior knowledge for new skills
- Give your students the confidence and opportunity to learn new skills
- Assign your students relevant literature and conduct constructive conversations around this literature

Holistic mentorship
- Mentor them as a whole, not just in day-to-day supervision tasks. For example, having honest and real conversations around career options and also the implications of the field and the ethics around this type of work. Also being ready to help with tips around working styles and helping them learn skills such as reading academic literature and understanding the importance of documentation.

Remember that the best mentors aren't the ones that know everything, but are the ones that are invested in their mentees and helping them grow.

Career Development

Helping your UROP with Career Development
- Do you have colleagues that you can introduce them to in order to help them develop a professional network?
- Can you make sure to teach them some marketable skills within this field?
- Can you get them facetime with your PI if they do not already have it?
- Introduce and nominate them for awards/opportunities such as:
    - Going to a conference with you even if they aren't an author
    - Conducting fieldwork
    - Meeting with collaborators/sponsors
    - Telling them about things you did like REUs or internships
    - Seeing what UROP or department awards for which they may qualify

Writing Letters of Recommendation (LOR)
- Make sure that the UROP student gives you information about the position, deadlines, and any key things that they want you to highlight in the letter
- Highlight what the student did in the UROP, skills/techniques they utilized, and any initiative they took and how it relates to the position for which you are recommending them
- Keep it short and simple -- a good LOR is one that can be read quickly
- Use active words and communicate how they acted as a lab member and researcher without usingUROP-specific context -- remember, not all schools have UROP programs, and some internships want descriptions to be more applicable and general
    - Use "undergraduate research assistant," "research assistant," or "undergraduate researcher"
- Some resources that might be helpful:
    - https://www.indeed.com/career-advice/career-development/how-to-write-a-letter-of-recommendation-with-examples
    - https://www.themuse.com/advice/3-steps-for-writing-a-glowing-letter-of-recommendation
    - https://www.themuse.com/advice/3-steps-for-writing-a-glowing-letter-of-recommendation
    - https://mitadmissions.org/apply/parents-educators/writingrecs/
    - https://www.indeed.com/career-advice/career-development/write-an-academic-recommendation-letter
    - https://www.thebalancecareers.com/academic-recommendation-letters-2062959
    - https://www.mrc-cbu.cam.ac.uk/documents/equality/HHMI_WriteReference.pdf
    - https://www.wordtemplatesonline.net/academic-recommendation-letter/
    - https://blog.prepscholar.com/4-amazing-recommendation-letter-samples

Adding to your career with UROP

- ○ Mentorship
  - ■ Many programs don't always have a strong emphasis on TA roles or other mentorship opportunities so mentoring UROPs is a great opportunity to develop mentorship, supervision, and teaching skills
  - ■ Fellowship -- [Graduate Community Fellows](#) (GCF) is an awesome opportunity if you aren't aware of it and a lot of offices like people who have mentorship experience
  - ■ Department awards -- a lot of departments have awards for mentorship. If your department doesn't already have one, ask to see if they will create one!
- ○ Leadership
  - ■ Take on roles within your laboratory to help coordinate and mentor UROPs
  - ■ Coordinate UROPs across the lab or department for poster sessions, awards, journal clubs, etc.
- ○ Letters of Recommendation (LOR), applications, etc.
  - ■ Ask your PI to highlight your mentoring UROP student(s)
  - ■ Add statements from UROP students along with any teaching evaluations, especially since MIT teaching evaluations don't always include comments
  - ■ Look at roles and responsibilities within university postings for folks with experience supervising and coordinating undergrad research
  - ■ Seek awards for research mentorship within UROP office, your school/department, MIT at large, and/or academic societies
  - ■ Many universities are interested in expanding their undergraduate research programs, and this can be a great point to help structure your applications for any Diversity, Equity, and Inclusion (DEI) or mentorship positions at universities

Supporting First Year Students

Understanding the first year experience
- Familiarize yourself with:
  - The grading system for first year students
  - Academic calendar and deadlines if you haven't already done so -- first years may be less likely to know these
  - [Relevant introductory or exploratory courses that are geared towards first years in your field](#)
- Some MIT first year students are very advanced and some may have even done research before in high school, but some are not and that is okay. Keep your expectations open.

Goals of the UROP for First Years
- Learning/exploratory
  - If they have no experience, this will be more of an educational experience
  - Good to identify potential tasks or avenues of exploration
    - Documentation, self study, literature review, learning a tool or software
- Contributing directly to a part of the research pipeline
  - Where in the pipeline can someone with some experience or some tangible skills contribute while still developing as a researcher?
    - Scripting, perfecting a process, prototyping, evaluating a new protocol or tool, conducting literature review, helping conduct studies
- Preparation for success
  - A student's first term in the UROP may need to be focused on preparing them to make more significant contributions in future terms.
  - The first term, depending on the field and amount of time, may consist more of safety training, literature/documentation review, and learning new tools, techniques, or software.

Goals of mentorship
- Exposing the first year to the field and to research
- Developing skills and knowledge they may not be getting in their current classes. Or, putting into practice the knowledge they are learning in classes.
- Being open to and planning towards the possibility that this is not the major/field/interest for them
  - At the end of the day, they may be trying research for the first time, and/or exploring your field for the first time. They might find that they do not like the field or research. And that is okay!
  - So, have a Plan B and think about how to frame a UROP experience for a student who realizes that this field isn't for them -- think about times that you tried a field or a new line of research/inquiry that didn't work out. In the end, be prepared for the UROP student to decide they may not wish to continue.

Setting expectations and communications
- First year students aren't as familiar working in labs or with mentors, so set norms including:
  - Check-ins
  - Documentation
  - Milestone dates
  - Contact and communication expectations
  - Group meetings
  - Working hours and timelines
- Setting the expectations for things going wrong in research and how to handle it
- Also setting the expectation for them to get busy and how you want them to communicate that to you
  - i.e taking their busy weeks at the beginning of the term and thinking about exams, big projects, etc.

Next steps/future plans
- Summer plans
  - Talking to them about their summer plans
  - Stressing that it is ok to take a summer off, especially after their first year
  - Discussing things like readings and projects they can do in the summer
    - Thinking about programs or resources that you took advantage of in UG
    - Thinking about valuable skills to learn in your field of study that MIT might have access to (e.g. software), coding languages, or if there are particular topics or authors in your field that are valuable for them to explore
  - See if they want to continue UROPing with you this summer or explore another UROP
    - Perhaps there is a colleague that you can introduce them to
- Major decisions
  - Talking with your student about their major declaration decision can be super helpful -- think about your UG experience and how that shaped your grad school and research experiences
  - Overall, if they are interested in your department or a related department -- you are a great resource for them
- Next UROP
  - Overall the goal is that, even if their next UROP isn't with you, they have explored research to make an informed decision about their next UROP and feel confident going into it
  - If they are continuing with you, think about how you can structure their next UROP term to continue their growth

Remote UROP Supervision

Remote or hybrid remote/in-person remains a viable option for UROP work. Depending on the type of research or student circumstances, this can allow students to take part in UROP in new and exciting ways. However, supervisors planning to mentor remote UROPs should consider the following:

Keys to remote/hybrid UROP supervision
- Communication
  - Maintain active communication throughout the UROP
- Project and duty scoping
  - Plan the project with the remote or hybrid structure in mind
  - Make sure there are sufficient and appropriate duties for remote or hybrid students
- Flexibility, adaptability, and empathy
  - Depending on the circumstances that warrant remote UROP work, it is very important to be extra flexible, mindful, and empathetic to our supervisees. Remote or not, it is important that our UROP students feel engaged and supported.
- Community and mentorship
  - Try to make your student feel comfortable and part of the lab group, as well as mentor them as a whole person regarding their goals and passions in the field, not just in day-to-day supervision tasks

These areas are elaborated in more detail below. And while they are especially important for remote and hybrid supervision, many of these can be applied to in-person supervisor.

Communication
- Set up norms and expectations
  - How and when you communicate (ex: Slack, email, calls, etc)
  - Setting the expectations for things going wrong in research and how to handle it productively
  - Understanding and establishing how they should communicate their busy weeks to you
- Checking in regularly
  - Understanding people are Zoomed out -- making short check-ins or email when possible at times
  - Weekly meetings and daily written check ins -- hybrid between written and video check ins
  - Try to make check-ins human! Ask them about their day, tell them to send you a meme if they weren't able to get things done. Overall, remote work for students can make them feel detached so anything you can do to make remote communication more "human" is great!
- Setting up milestone and MVP meetings, as well as communication with your PI if you are not the faculty supervisor.

Project and duty scoping
- Have an MVP that can be accomplished with less hours of effort a week than they are estimating to work -- and then a tier above that with more hours per week (for semester) -- this is extremely important to have, especially when remote since students may have less access to help and have more distracting work environments and since things go wrong in research and can take students more time
- Adding variety to the duties of the UROP when possible to make the remote work less of a slog and to help you not be too overwhelmed with planning:
  - Literature review
  - Sending them to relevant talks
  - Trying new tools that you don't have the time to test and evaluate yourself
  - Adding this variety adds more dimensions to mentorship

Flexibility, adaptability, and empathy
- Setting the norm that things will go wrong and deciding how to communicate and handle these situations
  - Can you reframe things as a learning experience?
  - Can you scope down work if they are too overwhelmed?
  - Is a colleague working with undergrads too and do they have any insight as to what is and isn't working?
- Be kind to yourself and students
  - Supervising is hard, supervising during a pandemic is harder, so always be kind to yourself.
  - It is going to take everyone a while to adjust to life after the pandemic

Community and mentorship
- Group meetings
  - Inviting them to group meetings if possible and ok with your PI
- Coffee chats/other group members
  - Are there colleagues that you can introduce them to for a coffee chat since they will be having less interaction with them in these remote times?
- Are there ways for you to allow your student to present at your laboratory or department?

Project evaluation

Evaluating a student's research duties and project output is an important part of research and mentorship. While UROP students should not be held to the same standards as a graduate student or postdoc, the goal of UROP is for them to learn how to do research properly, and evaluation can be useful in accomplishing this goal.

Overall, it is important to make the expectations and metrics of success clear from the start. This can be done by having a UROP agreement that you go over with the student at the start of their UROP, some samples of which are later in this document. The expectations for both research outputs and routines (safety, documentation, etc) should be included when considering the evaluation of a student.

This is especially important for credit-bearing, graded UROPs. A great way to do this is through a rubric that goes from A, B, C, D, F. This rubric should be based on both the goals of the project, but also the day to day routines and documentation.

Example starter rubric for a biology project

	A	B	C	D	F
Lab notebook	Clean, up-to-date lab notebook without missing entries that documents each experiment	Some experiments missing	Many experiments missing	Almost blank lab notebook	No lab notebook
Experiment setup	Great setup of experiment, following all safety protocols	Good setup of experiment, maybe missed one or two accuracies or a messier set up	Acceptable set up, but needed frequent correction	Unacceptable or unsafe setup	No setup attempted
Literature Review	Great job reading,finding papers and summarizing them	Good job reading and finding papers, some missing summaries or didn't read all papers	Did not read many of the papers assigned	Read almost no papers	Read no papers
Experiment conduct	Great conduct of experiment, following all safety protocols	Good conduct of experiment, following all safety protocols, but some adjustments needed	Acceptable conduct, but adjustments needed for safety	Unacceptable or unsafe conduct	Not completed
Cleanup	Great cleanup of experiment and surrounding space	Good cleanup of experiment space	Some adjustments needed	Unacceptable or unsafe cleanup	No cleanup

Email Templates to Respond to Students

No UROP spots for this project

Hello,

Thank you for your interest in this project! Unfortunately I can't take on a UROP student for this term but please keep in touch for future terms!

I will forward your email to my relevant colleagues to see if they have anything!

Be well,

Interested in student
Hello,

Thank you for your interest in this project! I would love to set up an interview with you to talk more about the project, your interests, and time commitments.

Some times I have this week: x, y, z and next week are: a, b, c. Let me know if any of those times work for you.

Be well,

Going with another student email
Hello,

Thank you for your interest in this project! Unfortunately we have gone with another student for this role, but please keep in touch for future terms!

I will forward your email to my relevant colleagues to see if they have anything!

Be well,

UROP Listing Template

This is a template to help you fill in information with your listing. Make your listings brief and include lots of white space.

Every listing should include:
Title:
Estimated hours per week: 5-10 (Semester) 30-40 (Summer)
Lab:
Department:

Required Skills/Classes:
Preferred Skills/Classes:

Description:

For the description, remember there are 3 types of listings

1. **Project specific listings**
   We are seeking a student to work on [Project]. [1-2 sentences about the project]

   The student will be responsible for [at least 3 duties relating to the project]. The outcome of this UROP will be [the component they are contributing to]. Possible outcomes may include [list reach outcomes like publication, etc if that is a possibility for a student].

   We are hoping the student will stay on for [x amount of terms].

   More information about the project can be found here: [LINK]

2. **Seeking a student of a certain profile**: an umbrella set of skills that can be useful in a laboratory or if you are interested in working with a first year student if applicable.

3. **Exploratory of a new process, tool, and/or literature that you do not have the bandwidth to explore but that you need to be explored for the greater research agenda**

Common Foundation Courses for Students

This is a list of relevant courses for some common majors across some common technical requirements we see for UROPs.

Undergraduate courses are available [here](). It is important to note that every undergraduate program is different, so if you studied Mechanical Engineering at another university it is very possible that you took slightly different classes, math requirements, or order of concepts than your UROP student.

Course 6 - EECS
- Math/NLP/AI/Signals/Sound: 6.034, 18.600, 6.036, 6.003, 18.200, 6.041, 6.042
- Development (Python/Server/IOT): 6.08, 6.00, 6.009
- Development (Web/Frontend/Fullstack): 6.148, 6.170, 6.031

Course 2 - Mechanical Engineering
- Mechanics: 2.001, 2.002
- Controls and Robotics: 2.003, 2.004, 2.007, 2.017, 2.12, 2.152
- Manufacturing and Product Design: 2.008, 2.009,
- Thermodynamics: 2.005, 2.006
- Machine Shop and Measurement: 2.670, 2.671

Life Sciences Skills
- Lab classes: 7.002, 7.003, 7.102, 20.109, 20.129, 20.345, 5.301, 5.310, 5.351, 5.352, 5.353, 5.363
- Computation and Statistics: 7.093, 7.094, 7.32, 7.33,

Common Math Classes:
- 18.03: Differential Equations
- 18.06: Linear Algebra
- 18.05: Probability and Random Variables
- 6.042: Mathematics for Computer Science
- 6.006: Algorithms
- 2.086: Numerical Simulation for Engineering
- 2.087: Linear Algebra for Engineering

Sample UROP Agreement and Roles Documents

A UROP agreement can be a great tool to set up the expectations for our and your UROP student at the beginning of their UROP. This should happen in an early conversation during their onboarding process. We have resources on the [UROP website](#) and have included a full one below.

Some key things to include in an agreement that is developed:

1. Goals that you both hope to achieve
2. How the project will be evaluated
3. How the student will be evaluated
4. How accountability will be kept and measured
5. How the student will be credited in and outside of the laboratory
6. The intended duration of this UROP
7. Frequency of mentoring meetings/communications (e.g., day, time, place/medium, etc.)
8. Project deliverables
9. Expectations for work norms and laboratory norms and safety

On the next page is a sample UROP agreement you can customize, print/share, and go through with a student. Former UROP Supervisor (and 2015 Outstanding UROP Mentor recipient), David Warsinger, MIT PhD '15, developed and shared an [Undergraduate Researcher Guide](#) that is another example of how to outline roles and expectations for you and your UROP students. It's like a course syllabus, but for UROPs!

While you don't have to set up a UROP agreement, it is highly recommended that you talk about these subjects while onboarding your UROP and document them in some way. Furthermore, having an agreement document for your laboratory is an excellent resource for new lab members and can help carve out the role of UROP students and UROP mentors in your laboratory.

Sample UROP Agreement Sheet

1. The goals I hope to achieve as a mentee are:

2. The goals I hope to achieve as a mentor are:

3. Accountability in this mentoring relationship will be determined by:

4. Progress towards deliverables and goals will be determined by:

5. We will communicate by these means and this frequency:

6. The intended duration of this UROP is:

7. Any other elements to note

Mentee: _____

Mentor: _____

MENTORSHIP ARTICLES & ONLINE RESOURCES

Bangera, G., & Brownell, S. E. (2014). Course-Based Undergraduate Research Experiences Can Make Scientific Research More Inclusive. *CBE-Life Sciences Education, 13*(Winter), 602-6. https://www.lifescied.org/doi/pdf/10.1187/cbe.14-06-0099

Emery, N., Hund, A., Burks, R., Duffy, M., Scoffoni, C., & Swei, A. (2019). Students as ecologists: Strategies for successful mentorship of undergraduate researchers. *Ecology and Evolution, 9*, 4316-26. https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/ece3.5090

The Gallup and Purdue University, (2014). *Great Jobs Great Lives: The 2014 Gallup-Purdue Index Report* is available online at https://www.gallup.com/services/176768/2014-gallup-purdue-index-report.aspx.

Hensel, Nancy, (Ed.). (2012). *Characteristics of Excellence in Undergraduate Research*. Council on Undergraduate Research is available online at https://www.cur.org/assets/1/23/COEUR_final.pdf or may be purchased through the CUR Bookstore.

Revelo, R. A., & Loui, M. (2015). A Developmental Model of Research Mentoring. *School of Engineering Education Faculty Publications* is available at Http://dx.doi.org/10.1080/87567555.2015.1125839.

Sand, A. (February 4, 2019). *Mentoring Beginning Students in Humanities Research*. CURAH, The Arts and Humanities Division of the Council on Undergraduate Research blog. http://curartsandhumanities.org/2019/02/04/mentoring-beginning-students/

Springer, M. S. (October 18, 2019). *Moving to a Multi-Mentor Model*. CURAH, The Arts and Humanities Division of the Council on Undergraduate Research blog. http://curartsandhumanities.org/2019/10/18/moving-to-a-multi-mentor-model/

National Mentoring Resource Center. Resources for Mentoring Programs. *National Mentoring Resource Center, A Program of OJJDP*. https://nationalmentoringresourcecenter.org/index.php/what-works-in-mentoring/resources-for-mentoring-programs.html

The National Academies of Sciences, Engineering, and Medicine. The Science of Effective Mentorship in STEMM, Online Guide. Https://www.nap.edu/resource/25568/interactive/index.html

ONLINE RESOURCES
- COUNCIL ON UNDERGRADUATE RESEARCH
- Center for the Improvement of Mentored Experiences in Research (CIMER)
- https://ctsi.umn.edu/training/mentors/mentor-training