Generally Speaking
How are undergrads involved in BME labs?
Undergraduate researchers are usually either “Lab Technicians” (paid) or “Research Assistants” (paid, volunteer, or for-credit). A lab tech is an employee with routine tasks. A research assistant is a team member working on an independent project that supports ongoing faculty research or design.

Does every BME student work in a lab? No. It’s not for everyone, and it’s only one way to get hands-on experience. Other options include industry internships, sponsored summer programs (via the NSF, NIH & other sources), Global Health projects, volunteer medical service programs, etc.

Is Research the same as an “Internship?” No. Internships are paid summer work situations at an industry site. BME has an internship program coordinated by our Internship Director, Bobbe Nixon, bobbe@virginia.edu.

Is there funding for undergrad research? Yes. Some students earn wages, mostly during the summer. Also, there are UVa research grants in the $2000-$5000 range, such as Harrison Awards and DoubleHoo grants.

Research (and Design) For Credit
Can independent research count toward the BME degree? Yes, you can count up to 6 (total) credits toward the BME degree. 3 credits count as a BME Elective, and the other 3 count as an Unrestricted Elective.

What course number do I use? BME 4995. Can I just do one semester? Yes.

What’s the time commitment? For each credit hour earned, you spend 3-4 hours/week in the lab. Most students end up spending more than that.

What else is involved? (1) You must propose your research project using the form on page 5. (2) You must meet your mentor’s expectations. These may include reading and reporting on background literature, attending weekly lab meetings, writing progress reports, and meeting one-on-one. (3) You must write a comprehensive final report.

That’s a lot. Is it worth it? Absolutely. The advice 4th years give younger students is to get involved in a lab and get involved early! In addition its inherent value as an intellectual pursuit, BME majors have published their work in peer-reviewed journals, funded their work via competitive funding opportunities, and won 1st place at Research Symposia, poster sessions, etc. Plus, they provide themselves a launching pad for internships, graduate school, medical school, and the jobs market.

Projects in non-BME Labs
Can I do BME 4995 in a non-BME lab? Yes, students regularly do research in labs in Engineering, Medicine, and Nursing. However, you must find a BME faculty member to act as co-advisor for your project. You will have to follow his/her guidelines, in addition to meeting the expectations of your research mentor. For more info: kitter@virginia.edu for info.

What is the BME faculty advisor’s role on projects outside the department? The BME advisor helps ensure that each student’s experience equates to what is normally described by a three credit BME elective course. The BME advisor meets regularly with the student to assess progress. The BME advisor assigns the final grade for the class, in conference with the research mentor.

Are there any exceptions to this rule? Under certain circumstances, we may permit a secondary BME faculty member to act as sole advisor for BME 4995. Kitter@virginia.edu for more info.

Can a post-doc or graduate student be my research advisor? No. Your research advisor must be a faculty member. That said, post docs and graduate students often serve as day-to-day mentors and supervisors.

Capstone and Research
Can my Senior Thesis (STS 4010-4020) & Capstone Project be intertwined? Yes.
Can I do paid or for-credit research at the same time as my Capstone project? Not unless the two projects are absolutely, entirely separate. (No double counting effort).

Getting Started
Where is the master list of ready-made research jobs in the labs? There isn’t one. Undergraduate research and design (whether paid, for-credit, or volunteer) is really something that you have to make happen for yourself. While there is an occasional “want-ad” for an undergrad researcher, the more likely scenario is that you will have to go the “Network, Inquire, and Follow Up” route described on the next page.

What is Lab Shadowing? Lab Shadowing, described in more detail on the next page, is an ice-breaker to get you started on exploring BME and affiliated labs. Basically it’s a way to connect you to graduate students in the labs.

How do I know which labs have BME grad students in them? See the BME Labs list, available on the BME Undergrad website or in the BME office.

What if I’m more interested in “biomedical design” projects vs. “basic life sciences research” projects? You will enjoy classes like BME 2000, BME 4550 BME Advanced Design, and BME Capstone. You can also do “design-for-credit” as a BME 4995. To explore project options, third years may attend the BME Capstone Project Fair in September with Dr. Allen’s permission (every year there are projects that are not matched to 4th year teams that you could pick up). Also, talk to BME faculty who have U.Va.-Coulter translational research funding. You can find out about these projects by exploring the U.Va.-Coulter website.
When it comes to undergraduate research, the best advice is—

Don’t Procrastinate: Get Started Now!

First and Second Years

Do YOUR research. Shadow in BME Labs. This involves following a graduate student in her work for 2-6 total hours, depending on the lab. Procedure:

- Pick out 2-3 labs that interest you. To choose labs, use the BME Labs List and the “Research” section of the BME website. Talk to your professors and TAs.
- Fill out the Shadowing Application in this guide, and return it to Kitter Bishop (UG Coordinator) MR5 2010. You’ll be connected with grad students via email.
- Or - arrange shadowing experiences on your own by visiting labs and talking with the graduate students.

Volunteer. Very often students volunteer for a semester before doing research for credit or pay. If you are willing to volunteer, think about how many hours a week you’re available. It helps to know specific days and times.

Have a long term goal. Even if, in the short term, you are looking to volunteer, you should already be talking about long-term goals, too... such as Research-for-Credit, 5-Year BS-to-MS, Industry Internships, Summer REUs, and your Capstone and Senior Thesis projects.

Get Networking. Set up a meeting with your BME advisor, course instructor, or another BME faculty member. Describe your thoughts and efforts thus far. Ask for help figuring out what research areas, techniques, and specific labs might be a good match for you. If that person’s own research group sounds like a good match, ask if you can volunteer in his/her lab.

Email a letter of inquiry to a lab director. See Sample Letter of Inquiry. Attach your resume. See Sample Resume.

Faculty are busy—if you don’t hear back after your initial email, try again. Also, call or visit the faculty member’s office to set up an appointment. Take another copy of your resume. Be positive and enthusiastic; show that you are willing to learn.

Plan Ahead

If your goal is Research-For-Credit (BME 4995 Advanced Projects), allow ample time for finalizing the details of your project with your research mentor and completing the required approval form in this guide.

If you’re contemplating the 5-year Advanced BS-to-MS Program, talk to your potential thesis advisor(s) well before the application deadline (Jan of your 6th semester). For more information: kitter@virginia.edu or bmemeg@virginia.edu.

Look into Summer Industry Internships. Bobbe Nixon, BME’s Director of Internships coordinates 10-week summer internships with local and national BME companies. These internships are first made available to BME Majors. Make sure you’re on the “bme-undergrad” mailing list to hear about these opportunities (and more). You can also identify your own internship opportunity. Talk to Bobbe Nixon: 434 243-6285, bobbe@virginia.edu.

Think ahead about Summer Research Experiences, as well as your Senior Thesis (STS 4010-4020) and Capstone (BME 4063-4064) Projects.
Sample Letter of Inquiry

Read this first. This is why the letter below is a good letter:

Length. It conveys info but doesn’t take long to read.

Content. It is not a form letter. It is geared to a specific lab.

Checklist. It contains the following information:

☐ Who you are (name, year, major, minor).
☐ Why you are interested in a particular lab / lab director.
☐ What you are looking for (volunteer or paid research opportunity, Advanced Project, STS Thesis, Capstone).
☐ When you are available, now and in the future.

Sample Letter;

Dear Dr. Guilford,

My name is Susie Wahoo, and I am a second year BME major in your Cell and Molecular Biology class. I am interested in the research that the Molecular Biomechanics Laboratory is performing. I am highly interested in optics, more specifically, how lasers and optical systems are used to study biological systems. The laser trap sounds interesting as well, and I would like to learn more about your current research.

At this point I am gathering information about a volunteer research position that might turn into a paid summer position. During the semester, I am available Wednesdays and Friday afternoons for four hours and then full time during the summer. My GPA is 3.6, and my resume is attached. I have done two “shadowing” experiences in the Ley and Lawrence labs. I am experienced in C++, HTML, MATHCAD, and Silverscreen CAD. I would appreciate any assistance you could give me. Thank you for your time.

Sincerely, Susie

Sample Resume for 1st/2nd Year Student

Susie Q. Wahoo
UVa Address
Phone, Email

Home Address
Phone, Email

Objective
To obtain a position as a volunteer or paid research assistant in a biomedical engineering laboratory

Education
Bachelor of Science in Biomedical Engineering, Expected May 2005, University of Virginia, Dean’s List with 3.6 GPA
Coursework: Cell and Molecular Biology, Chemistry, Physics, Computer Science, Calculus through Differential Equations.

Experience
Medical Extern, Spring 2002, UVA Hospital (Emergency Room).
BME Lab Shadowing, Fall 2003, Lawrence and Ley Labs.
Lab assistant, 1999-2001, High School, Anywhere USA
Assisted in the set-up and operation of A.P. Chemistry labs.

Skills
Laboratory: Cell culture, centrifugation, gel electrophoresis, microscopy.
Computer: MS Office, C++, HTML, MATHCAD, Silverscreen CAD, Photoshop, Illustrator
Language: Korean speaker

Awards
National Merit Scholar, AP Scholar with Honors

Volunteer
Engineering Student Council, Student Advisor; Madison House, Big Sibling Program
Required Approval Form for BME Advanced Projects (BME 4995, “Research-for-Credit”)

Consists of the design, execution, and analysis of lab work, computational modeling, or theoretical analysis in a biomedical engineering subject area. Requires a comprehensive final report describing methods and results.

You may work with any BME primary faculty member. It is possible to work with non-BME faculty, if a BME primary faculty member agrees to co-advising your project. In this case, the BME faculty member is listed as the course instructor and assigns the grade, in consultation with the research mentor. Under certain circumstances, this rule may be waived. See the Undergrad Coordinator for details.

Use BME 4995 “BME Advanced Projects.” All projects must approved by the Undergraduate Program Director using this form.

- You must submit this form for approval EACH SEMESTER you plan to do research-for-credit (even for a continuing project).
- For each credit hour earned, you must spend at least 3-4 hours per week in the lab, for a minimum of 10 hours/week for 3 credit-hour course.
- Relationship between Advanced Projects & Capstone Projects: Unless the two projects are entirely separate, you may NOT earn credit for BME 4995 at the same time you are earning credit for BME 4063, 4064.
- BME Majors may count up to six credits (total) toward the degree. Three (3) credits can be used as a BIOM or Bioengineering Elective, and the other three (3) credits can be used as an Unrestricted Elective.

Procedure

Your Name: ___________________________________________  Email: __________________________  Today’s Date: ___________________________

Lab Name: ____________________________________________  Research Advisor’s name (print): ______________________________

If your research advisor is not a primary BME faculty member, which primary BME faculty member is co-advising this project? __________________________________________

Will you be attending lab meetings? (circle one)  Yes  No  If no, why not? __________________________________________

1) Attach a PROJECT PROPOSAL (half-page). The proposal should include i) Project Title and Study Name (more specific than title), ii) Purpose/Objective of your proposed project, iii) your Hypothesis (if applicable), iv) the Experimental Design (i.e. experimental conditions and measurable output), v) your Methods, and vi) the Significance of your research (what is the impact of your results in the field?)

2) Attach a PROJECT EXPECTATIONS STATEMENT (one paragraph). Here you describe the project guidelines worked out between you, your research mentor, and (if applicable) the BME primary faculty member co-advising your project. You must cover i) Days and times you are scheduled to work in the lab, ii) How often you will be meeting with your research mentor, iii) When your final report is due and iv) Other expectations, including required background literature, monthly progress reports, etc. If you are working in a non-BME lab, you must also report how often you plan to meet with your BME primary advisor.

3) SIGNATURES. Both you and your Research Advisor must sign the Project Proposal / Expectations Statement. If you plan to work in a non-BME lab, your BME primary advisor must sign, too. Return this form and the signed Project Proposal / Expectations Statement to the Undergraduate Coordinator (MR5 2010). You will be informed of the success of your petition via email.

Approved: ______________________________________

BME Undergraduate Program Director
**Shadowing Application**

**Shadowing** = An undergraduate student volunteers to follow/shadow a graduate student at her work in a BME lab in order to gain a quick understanding of what a given lab or student does. Depending on the lab, a shadowing experience can involve anywhere from 2-6 hours over 1-3 days.

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Briefly, describe your engineering interest areas.

Look at the BME Labs List and Research section of the BME website. List 2-3 lab groups whose research intrigues you, in order of preference. We will try to match you to your top two choices.

Relevant Experience (this could be past experience in a lab, work experience, a special project, etc).

What times are you available? Be specific.

Return completed form to Kitter Bishop, BME Undergraduate Coordinator, kbishop@virginia.edu, MR-5 Room 2010. Attach a resume, if you have one. Kitter will connect you with graduate students via email.