STANFORD UNIVERSITY UNDERGRADUATE

RESEARCH PROGRAMS
Inquiry, investigation, and discovery are at the heart of Stanford's mission. Opportunities for discovery begin in the classroom and extend into the rich research life of campus laboratories, libraries, studios and beyond. The University urges undergraduates to join with our faculty in the search for new knowledge and new artistic creation.

The Undergraduate Research Programs (URP) office is your campus nexus for information about becoming personally involved in the exciting quest of a research project.

**Fellowship and Graduate School News**

**CAMPUSS DEADLINE:** Truman Scholarship on November 12 at 5:00 p.m. Interested in other competitions that are due this fall? CLICK HERE for news on upcoming workshops and information meetings. If you would like to join our email list to receive news regarding fellowships, please CLICK HERE.

**SURP Poster Awards**

CLICK HERE to see this year's award-winning SURP posters!

**Statement of Purpose**

Now is the season for preparation of applications that come due this fall. For help preparing your statement of purpose, check here for workshop announcements and contact Hilton Obenzinger.

**Workshops**

Workshops! CLICK HERE to visit our new centralized list of workshops that will support your research, writing, and the preparation of fellowship and graduate school applications. Please check back for weekly updates!

**How I Write**

"How I Write" is a series of conversations with faculty on the topic of writing. CLICK HERE for more information.
Welcome

Individual Consultations
Finding a Fellowship
Asking for Letters of Recommendation

Domestic Fellowships and Scholarships
Freshmen
Sophomores and Juniors
Seniors and Recent Graduates

Fellowships for International Study

Deadlines at a Glance

Graduate School Applications

Fellowship Services Brochure

Fellowships and Graduate School Applications Services

Our mission is to provide Stanford undergraduates and recent alumni with practical advice on how to apply for graduate school, how to find fellowships to fund your particular goals, and how to prepare compelling application materials for both graduate applications and fellowships.

There are awards available to sophomores, juniors, and seniors alike. Some awards are open to students in all fields, while others relate to specific disciplines (like American history or life sciences) or certain student populations (like minorities or recent American immigrants). Some are exclusively for the pursuit of a doctoral degree; others for study and purposeful travel at a variety of levels.

Individual Consultations TOP
The Fellowships Services advisors can provide you personalized advice on finding fellowship opportunities, choosing the right fellowship or graduate program for you, and planning ahead to make yourself a strong candidate in your senior year.

On more practical level, we provide one-on-one writing consultations to help you in preparing all written aspects of your applications: personal statements, short-answer essays, activities lists, and others.

Contact us to schedule an appointment to meet with us one-on-one, by telephone at (650) 724-7562, or e-mail urp@vpue.stanford.edu.

In addition to personal help, our office often hosts workshops and information sessions to assist students in locating and applying for scholarships and fellowships. A schedule of upcoming workshops can be found here, or by contacting the URP office ((650) 724-7562, or e-mail urp@vpue.stanford.edu).

Finding a Fellowship TOP
There is a large range of fellowships available for postcollege travel, study, and Ph.D. programs. Some are administered directly through offices at Stanford; some are administered in full by governmental and private foundations. The fellowships listed below and on pages 18-24 of the Fellowships Services brochure are a small sample of what is available. For more comprehensive listings of fellowships, you may browse printed guidebooks in the Fellowships and Graduate School Applications Services in the URP offices, on the fourth floor of...
Sweet Hall.

Additional online fellowship databases can be found by following these links:

**COS Funding Opportunities**

**Columbia University's Graduate Funding Website**

**The University of Pennsylvania's Directory of Fellowships, Scholarships, and Grants**

**Asking for Letters of Recommendation**

Scholarship selection committees depend heavily on recommendation letters to gain insight into applicants' personal strengths, weaknesses, and accomplishments. This kind of information cannot be readily gleaned from transcripts and test scores, so it is in your best interest to help your recommenders write the most accurate and detailed letters possible.

You should begin to cultivate close working relationships with faculty early in your undergraduate career. Once you've become acquainted with faculty members through coursework, research, or other ways, consider stopping by their offices once a quarter to discuss your interests and to keep in touch. When the time comes, you need not feel shy about requesting a recommendation. All faculty members and graduate students had the same service done for them in the past, and they regard this as a familiar process. Refer to the following guidelines for managing your letter requests.

1. Choose the people who know you best. Many students wonder whether they should ask a "big name" professor who knows only their face and final grade or a less-known professor who knows them better. Letters by famous people or well-known scholars only carry more weight if the famous person knows you well and can write a substantial, convincing letter. The more detailed and personalized a letter is, the more likely it is to make a strong impression on a selection committee, so you should ask your instructors with the most extensive, personal knowledge of you and your work.

2. Ask early. It is common courtesy to allow recommenders at least three weeks to prepare and submit their letters. We highly recommend involving them in the early stages of your application process, while you are deciding what to write about and how to present yourself in the application materials. Their insights will prove invaluable, and they will be well informed of your interests when they write their recommendations. You should thus begin your request with a substantial conversation about your interests and goals, and then ask them if they can write a strong letter of recommendation. Most likely they will say yes. In some cases, however, the faculty member may say no or that he or she can only write a recommendation citing certain qualifiers or weaknesses. In this case, you should accept his/her judgment graciously and consider asking for more feedback about your goals and plan for study.

3. Once faculty have agreed to write your letters, provide them with copies of your application materials. The following items will help
them to write accurate and purposeful letters:

- photocopies of key pages from the application brochure, describing the nature and purpose of the scholarship
- a copy (or a draft) of your application essays, or a summary of your career and educational goals
- a list of your activities (sports, organizations, leadership and volunteer positions, etc.)
- a description of pertinent work or research experiences
- a copy of your transcript
- If a number of quarters has passed since you worked with a recommender, you should also provide her/him with a copy of your paper or class project.

4. Write out all submission instructions and deadlines. There should be no question as to when and where to submit the finished letters. Provide properly addressed, typed, and stamped envelopes.

5. Keep in touch with your recommenders. After submitting your application, send recommenders a thank you note expressing your appreciation for their guidance and support. Update them on your progress throughout the stages of the competition and inform them whether you are selected for the award or not. Should you need a recommendation in the future, this kind of follow-up communication will continue to foster a close, positive relationship with your faculty sponsors.

**Workshops**

<table>
<thead>
<tr>
<th>Event</th>
<th>Time &amp; Date</th>
<th>RSVP</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of Purpose</td>
<td>October 6, 7:00 p.m.</td>
<td>none required</td>
<td>The Writing Center/Margaret Jacks Hall</td>
</tr>
<tr>
<td>Truman Information Meeting</td>
<td>October 11, 4:30-5:30 p.m.</td>
<td><a href="mailto:rcourey@stanford.edu">rcourey@stanford.edu</a></td>
<td>Sweet 413</td>
</tr>
<tr>
<td>Fellowships for the Natural Sciences,</td>
<td>October 7, 6:30-7:30 p.m. (dessert will be</td>
<td><a href="mailto:rcourey@stanford.edu">rcourey@stanford.edu</a></td>
<td>TBD</td>
</tr>
<tr>
<td>Engineering, and Science Policy</td>
<td>served)</td>
<td></td>
<td>TBD</td>
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<td></td>
<td>October 22, 12:00-1:00 p.m. (lunch will be</td>
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<td>BDS</td>
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<tr>
<td>Fellowships for the Humanities, Arts,</td>
<td>October 15, 12:-1:00 p.m. (lunch will be served</td>
<td><a href="mailto:rcourey@stanford.edu">rcourey@stanford.edu</a></td>
<td>TBD</td>
</tr>
<tr>
<td>and Social Sciences</td>
<td>October 19, 6:30-7:30 p.m. (dessert will be</td>
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<td>TBD</td>
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Click here for more information about SURP

First Prize Winners
Albert Chiou
Leila Ehsani
Jonathan Gabrio
Ashok Kumar
Srirsha Narayana
Scott Walter

Honorable Mentions
Antonio Iannarone
Amy Isaacs-Koplowicz
Christopher Li
Helen McLendon
Jennifer O'Neil
Laura Sherman
Molly Thomas
Dana Ung

The 2004 SURP Poster Award Winners were chosen based on the following criteria:

- visually exciting design
- intellectually compelling content
- overall excellent communication with a general audience

Congratulations to this year's winners!

chiou.jpg  ehsani.jpg  gabrio.jpg  kumar.jpg  li.jpg
mclendon.jpg  narayana.jpg  oneil.jpg  sherman.jpg  thomas.jpg
ung.jpg  walter.jpg
Welcome | Benefits of Student Participation | (The application period for SURP 2004 has now passed.)

Symposium of Undergraduate Research in Progress (SURP)

The Symposium of Undergraduate Research in Progress will take place on the afternoon of Thursday, October 21, 2004, from 3:00 to 6:00 p.m., in the McCaw Hall of the Frances C. Arrillaga Alumni Center, 326 Galvez Street on the Stanford University campus. CLICK HERE for schedule information.

Welcome to the Symposium of Undergraduate Research in Progress TOP

The Symposium of Undergraduate Research in Progress (SURP) is a forum for Stanford undergraduates to present their research and creative projects to the broader university community. Undergraduates from all disciplines will present their current and recent academic projects, showcasing the diversity of topics, approaches, and interests at Stanford. The Symposium will also serve as a resource for undergraduates not yet engaged in research or creative pursuits to learn how fellow students have developed their intellectual interests, current projects, and faculty connections. Finally, it will provide an occasion for students, faculty, and the greater Stanford alumni community to witness how student research builds upon, and enriches, faculty work and to explore interdisciplinary connections between cutting-edge research across the university.

All students, faculty, staff, and alumni are encouraged to attend this event. For more information, contact URP: urp@vpue.stanford.edu; (650) 724-7562.

Benefits of Student Participation TOP

Presenting your academic and creative work in a formal setting is a mark of true accomplishment in your undergraduate studies. It is also outstanding preparation for graduate school applications and other future presentations. All presenters may include their presentations on resumes and graduate school and fellowship applications.

You will also gain valuable experience in articulating ideas about your research and creative projects through poster or other...
your research and creative projects through poster or other visual display presentations involving both verbal and graphic forms of explanation. This experience will be greatly enhanced if you choose to participate in the pre-Symposium workshops on speaking and creating combined oral and visual representations of your work.

Because the Symposium will be held on the first official day of homecoming weekend, we anticipate that the audience will not only include Stanford faculty, students, and staff, but also Stanford alumni from many fields of study, industries, and career paths. This diverse audience should provide an excellent forum for networking and conversations about career paths and future educational opportunities.
Application Process

Students must apply to present their work at the Symposium by submitting the online application form through this website.

Application Contents
In addition to basic student contact and academic information, applications must include the following:

- Project Title: This will be printed in the SURP program of presentations to be distributed to all SURP audience members. Your title should state clearly the main idea of your research and should be understandable by more than specialists in your particular field of research/creative production.

- Faculty Research Advisor(s): All student presentations require endorsement by the faculty research advisor. The UR program office will contact your advisor directly via email to solicit her/his endorsement for your participation in SURP.

- Abstract, Project Summary, or Creative Statement: The center of your application materials, this approximately 250-word statement should present a succinct overview of your larger piece of research, analysis, or creative project. Abstracts are generally used in the natural sciences, engineering, and social sciences; summaries in the humanities; and creative statements in the creative arts. Consult the Guidelines for Writing Effective Abstracts, Summaries, and Creative Statements and Sample Abstracts, Summaries, and Creative Statements before submitting your application. Abstracts, summaries, and creative statements will appear in SURP print and/or online publications.

- Statement of Project Origins: Not longer than 350 words, this statement should describe the genesis of your project, including, but not limited to: the development of your initial interest in the topic, your early preparation for carrying out the project, affiliation with faculty advisor, the link between your project and your overall undergraduate program, and so on. This statement will appear in SURP print and/or online publications.

Selection Criteria
Applications will be judged for acceptance into the Symposium according to the following criteria:

- Evidence of a strong research question or focused area of inquiry, as expressed in the abstract/summary/creative...
Information for Academic Advisors

Student Application

Deans' Award for Academic Accomplishment

What is SRC?
How To Apply
Eligibility
Money Matters
SRC Contacts
Important SRC Policies
SRC Calendar
SRC FAQs

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Domestic Fellowships and Scholarships
Fellowships for International Study
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Graduate School Applications
Fellowships Services Brochure

Coming Soon!

Introduction
How to search in Odyssey
Sample Odyssey search
How to search in Illiad
Sample Illiad search
For Faculty: Adding or updating research opportunities in Odyssey
Search Odyssey
Search Illiad

Honors at Stanford
Honors Programs
Resources and Tools for Honors
Summer Honors College
Resources for Faculty

statement;
• Clarity of expression and general organization of the abstract/summary/creative statement and the statement of project origins;
• Evidence of sufficient background in the field of research or creative production;
• Progress on the project to date (note that this criterion does not exclude works-in-progress);
• Endorsement of participation submitted by the faculty research advisor.
A Guide to Summer Research Opportunities For Undergraduate Students In Science And Engineering

INTRODUCTION

This guide contains information on summer research opportunities that are available, or have been available in the past, to undergraduate students studying science, mathematics, and engineering. The opportunities are arranged alphabetically by science fields.

The production of this guide was commissioned by the Yale College Dean's Office and funded by The New England Consortium for Undergraduate Science Education (NECUSE). The Guide was prepared primarily for use by students at the NECUSE schools.

Please note: This Guide was last updated in 1999 and is not currently being actively maintained. A non-comprehensive listing of more recent undergraduate research opportunities may be found on the YSER (Yale Science and Engineering Research) site at www.yale.edu/ysr/links/extramural.html.

HOW TO USE THIS GUIDE

Research opportunities are listed in the science sections. To access the information, a student must consult the section whose topics fall within the student's area of scientific interest. Opportunities are listed alphabetically by sponsor. When available, each listing includes a description of the research position, application requirements, whether the opportunity includes a stipend, the phone number and address of a contact person, the competitiveness of the position, and the deadline for application. Opportunities available especially to minority students are marked with an asterisk (*).

Students may also wish to conduct a search for research opportunities not listed in this guide. The section titled "University Resources" provides a list of resources and services commonly found on college and university campuses.

SCIENCE SECTIONS

Each science section contains information on research opportunities that are available to students studying in the field listed as the title to the section. The following is a brief description of science topics included in each section.

Astronomical Sciences opportunities open to astronomy students.

Biological Sciences opportunities open to students studying biology, biochemistry, biotechnology, cell biology, ecology, ecosystem studies, molecular biology, natural resources, neurobiology, ocean studies, plant biology, socio-biology, zoology, and related disciplines.

Chemistry opportunities open to chemistry students.
Computer Science opportunities open to computer science students.

Earth Sciences opportunities open to students studying archeology, anthropology, earth science, geology, geophysics, hydrogeology, hydrology, polar programs, studies in the environment, and related disciplines.

Engineering opportunities open to engineering students.

General opportunities open to students studying in any science field.

Mathematical Sciences opportunities open to mathematics students.

Physical Sciences opportunities open to students studying atmospheric science, materials science, physical science, physics, and related disciplines.

University Resources

The production of this guide was funded by the New England Consortium for Undergraduate Science Education. For more information about this guide, contact John Meeske, Associate Dean of Yale College, P.O. Box 208241, New Haven, CT 06520-8241, e-mail john.meeske@yale.edu.

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Extramural Research Opportunities

While most Yale science and engineering undergraduates will perform research or engage in engineering and design projects in association with a Yale faculty member, others may wish to explore extramural opportunities as a complement to their Yale experiences. The Director of Undergraduate Studies or a faculty advisor will be able to recommend and facilitate contact with appropriate programs in research institutes, corporations, national laboratories or other universities.

The following non-comprehensive guide to extramural research opportunities provides links to information describing some of these opportunities. Many sites that have not yet been updated for summer 2004 may nonetheless provide useful contact and programmatic information.

Programs and Directories

American Astronomical Society Summer Programs Directory
National Science Foundation REU (Research Experiences for Undergraduates) Sites Listing
1999 NECUSE Guide to Summer Research Opportunities For Undergraduate Students In Science And Engineering
Organization for Tropical Studies (a consortium of universities and research institutions providing education and research opportunities in tropical biology)
POLYED National Information Center for Polymer Education
Yale Select Program in Engineering Corporate Partners Program

National Laboratories, Corporations, Research Institutes and Universities

Arizona State University Summer Undergraduate Research Program in Photosynthesis
Baylor College of Medicine Summer Medical and Research Training (SMART) Program
Carnegie Institution of Washington, Summer Intern Program in Geoscience
Cerro Tololo Inter-American Observatory Research Experiences for Undergraduates Program

Cornell University Travelers Summer Research Fellowship Program

DOE/Argonne National Laboratory Undergraduate Fellowship Programs

Emory University Summer Undergraduate Research Experience (SURE) Program

Fred Hutchinson Cancer Research Center Summer Intern Program

Harvard Forest, Harvard University Summer Research Program in Ecology

Harvard School of Public Health Biological Sciences Summer Internship Program

IBM Research Internship Program for Undergraduate Women

Mayo Clinic Summer Undergraduate Research Program

MIT Haystack Observatory Research Experiences for Undergraduates

NASA Undergraduate Student Research Program

National Institutes of Health Scholarship Program for Individuals from Disadvantaged Backgrounds (UGSP)

National Institutes of Health Summer Internship Program in Biomedical Research

New York University Howard Hughes Honors Summer Institute, Genomics, Bioinformatics and Computational Biology

New York University School of Medicine Summer Undergraduate Research Program

Northwestern University, Summer Research Opportunities in Drug Discovery

Schering-Plough Summer Intern Program

Scripps Research Institute Summer Internship Program in Immunology

Smithsonian Institution's National Museum of Natural History Research Training Program

Southern California Earthquake Center Summer Undergraduate Research Experiences

Stanford Summer Research Program in Biomedical Sciences

University of Arizona, Minority Health Disparities Summer Research Opportunities

University of California, Riverside Chemistry Summer Undergraduate Research Fellowships Program

University of California, White Mountain Research Station

University of Cincinnati Department of Chemistry Summer Research Program

University of Colorado Summer Multicultural Access to Research Training (SMART) Program

University of Montana Undergraduate Environmental Chemistry Research Program

University of Minnesota Chemistry Undergraduate Research Fellowships
University of North Carolina Summer Undergraduate Research Opportunities

University of Rochester Strong Children's Research Center Summer Training Program

University of Texas Medical Branch Summer Undergraduate Research Program

University of Wisconsin Milwaukee Great Lakes WATER Institute

Woods Hole Oceanographic Institution Summer Student Fellowship Program

modified 1/26/04
Faculty and Departmental Research Programs

With more than 800 science and engineering faculty in over 40 degree-granting programs, Yale University offers a remarkably diverse array of research opportunities. In addition to the many opportunities in Yale College, undergraduates enjoy access to the research laboratories of faculty in Yale’s graduate and professional degree-granting programs in the Yale School of Medicine and Yale School of Forestry and Environmental Studies.

Departmental Research Programs in the Faculty of Arts and Sciences

Many Yale science and engineering departments include research as an integral part of the course of study, and students will find departmental faculty research programs an invaluable resource. While students will often pursue research within the department of their major, either summer or academic year research may also be conducted in the laboratories of faculty in other Faculty of Arts and Sciences departments or in departments of Yale Professional Schools. The links below provide access to descriptions of research opportunities in departments and programs of the Faculty of Arts and Sciences and Professional Schools; either the linked undergraduate program description or the departmental home page will normally provide links to faculty research descriptions.

Faculty of Arts and Sciences Departments and Programs

Anthropology, Department Home Page

Applied Physics, Undergraduate Studies Page

Astronomy, Department Home Page

Biology (see Molecular, Cellular and Developmental Biology, Ecology and Evolutionary Biology)

Biomedical Engineering, Undergraduate Studies Page (see also Engineering)

Chemical Engineering, Undergraduate Studies Page (see also Engineering)

Chemistry, Undergraduate Studies Page

Computer Science, Undergraduate Handbook

Ecology & Evolutionary Biology, Departmental Home Page
Undergraduate Research in Yale University Professional Schools

While Yale University Professional Schools do not offer undergraduate majors, many undergraduates find appropriate research opportunities with any of the hundreds of professional school faculty performing basic scientific research.

Yale School of Forestry and Environmental Studies Home Page

Yale School of Medicine (including Epidemiology and Public Health) Undergraduate Research Page

Molecular, Cellular and Developmental Biology major Yan Qi '01 reviews Western blot data in the laboratory of her faculty mentor, Yale School of Medicine Neurobiology Chairman Pasko Rakic.

Faculty Research Grants and Support for Undergraduate Research
A substantial proportion of undergraduate research at Yale University is supported by faculty research grants. Each year, external faculty research grants contribute to the support of the research of more than three hundred Yale undergraduates. Depending on the nature of the research project and availability of funds, a faculty mentor may also be able to provide a stipend from grant funds. Undergraduates and faculty are reminded that many granting agencies provide supplements specifically for the support of undergraduate research projects. Instructions on obtaining supplements may be found on the web sites of the National Institutes of Health and National Science Foundation (NIH supplements for underrepresented minorities and students with disabilities; NSF REU Supplements).

modified 12/09/03
Undergraduate Research at Yale School of Medicine

The Yale University School of Medicine is renowned for its strengths in both clinical medicine and research, and the faculty includes more than 500 active investigators in the biological and biomedical sciences. While medical school departments do not conduct undergraduate degree programs*, many medical school faculty are active in teaching in Yale College and regularly supervise undergraduate research projects. Nine medical school departments offer Ph.D. programs and faculty of these and many other programs participate in graduate training through the Combined Graduate Program in Biological and Biomedical Sciences.

Molecular Biophysics and Biochemistry major Si-Wook Sung '01 and faculty mentor Stefan Somlo of Internal Medicine discuss the result of an HPLC run.

Research opportunities in the medical school range from basic research in biology and biochemistry to epidemiological research involving the transmission of tropical diseases. Students in Biomedical Engineering find fascinating opportunities in areas ranging from imaging to engineering of new clinically useful materials and devices.
Studies in the Environment and Molecular, Cellular and Developmental Biology major Megan MacLeod '01 tests the effects of nitric oxide on molecular markers of cellular stress in the laboratory of her faculty mentor, Michael Kashgarian of Pathology.

Each year, more than 100 undergraduates perform research with medical school faculty in departments including Cell Biology, Cellular and Molecular Physiology, Diagnostic Radiology, Epidemiology & Public Health, Genetics, Immunobiology, Internal Medicine, Neurobiology, Obstetrics & Gynecology, Pathology and Pharmacology.

Chemistry major Binu-John Sankoorikal confers with faculty advisor Priscilla Dannies of Pharmacology.

* Molecular Biophysics and Biochemistry is a department in both the Faculty of Arts and Sciences and the School of Medicine

modified 12/09/03
OFFICE OF DIVERSITY & EQUAL OPPORTUNITY (ODEO)

SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP (SURF) PROGRAM

Program Description Each summer the Yale SURF Program brings a group of qualified undergraduates to Yale for eight weeks. The experience is meant to familiarize students with the kind of work they can expect to do in graduate school, provide them with insight into the many steps involved in building a career based on Ph.D. level training, as well as foster a sense of confidence regarding their own abilities and potential. Students are immersed in an academic, professional setting involving a working relationship with a faculty mentor, a program of individual research, and participation in a series of program workshops and panel discussions. The focus of the program is primarily on research and on the methods of professional research. Students in the natural sciences learn advanced laboratory methods and conduct research under the guidance of a faculty mentor with postdoctoral associates and senior graduate students serving as sources of technical support. Students in the humanities and social sciences work closely with faculty mentors and have at their disposal the considerable archival resources found in the Yale University libraries. Because of the largely independent nature of their work, these students have more flexibility in structuring their own research schedules. Emphasis is also placed on the presentation of research findings to colleagues. All students give a final presentation to their peers, submit a written paper and attend the Leadership Alliance Conference to present their research at the meeting.

Eligibility Requirements The SURF Program is intended for students with a strong desire to pursue research careers at the Ph.D. level. If you choose to come to Yale, you will join a community of scholars in programs of study that are recognized nationally and internationally as among the best in the world, attracting a diversity of individuals from throughout the U.S. and abroad. The Graduate School prepares students for careers in research, scholarship and teaching in the arts and sciences. The work of the Graduate School is organized in three divisions:

- Humanities
- Social Sciences
- Biological & Physical Sciences

The divisions are comprised of 73 departments and programs, 57 of which offer courses of study leading to the Ph.D. degree. There are currently 23 programs that terminate with the Master of Arts, Master of Science and Master of Philosophy degrees. The Graduate School of Arts & Sciences is the only one of the 12 schools comprising Yale University that awards these degrees.

Covered Expenses Students are housed at no charge in the Yale Graduate School Dormitory, and meals are provided in the Yale Summer Program Dining Hall. Students also receive a stipend for participation in the SURF Program. Travel to and from the program will be covered and arranged through the SURF Program Office. Students will receive a stipend of $2,500 upon successful participation in the program.

Program Duration Eight Weeks in the Summer. 1st week of June – end of July each year.

How to Apply Applying to the SURF
level. The program is particularly interested in identifying and providing research experience to talented underrepresented minority students. Preference is given to students completing their sophomore or junior years. However, other students who express persuasive plans for research may be considered. Participation in the summer program is restricted to US citizens and permanent residents.

Yale Graduate School Environment Yale has long thrived on diversity. Not only was Yale the first university in North America to award Ph.D. degrees (in 1861), it was the first university here to award a Ph.D. to an African American, Edward Alexander Bouchet, in the field of Physics in 1876. It is equally noteworthy that with the formal establishment of the Yale Graduate School in 1892, women were also admitted as candidates for the doctorate.

There are two methods for applying to the summer program.

Application via an outside funding source. This is the preferred method. To provide a research experience for as many students as possible, applicants with full or partial funding from outside sources are given preference during the selection of the summer fellows. The Graduate School is a member of the Leadership Alliance and encourages qualified applicants to consider applying through this program. Information and applications for the Leadership Alliance can be found at: www.leadershipalliance.org.

Direct application to the SURF program. Each year a small number of students are fully funded by the SURF program.

Download application forms in PDF.

Yale SURF Program Application
Deadline February 1.

Admissions Notification Students will be notified regarding admissions decisions by April 1.

For more information, please contact
Dr. Liza Cariaga-Lo
Assistant Dean, Yale Graduate School
SURF Program Director
320 York Street (HGS 2678)
PO Box 208236
New Haven, CT 06520-8236
Ph. (203) 432-0763
Fax (203) 432-7765
E-mail: ygsadmissions@yale.edu
Website: www.yale.edu/graduateSchool/admissions

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COLUMBIA UNIVERSITY UNDERGRADUATE

RESEARCH PROGRAMS
Doesn't seem to have a central administrative office \textit{a la} Cornell.

However there are at least two strong programs based in schools and depts.

- Engineering and Applied Science
- Biological Sciences

Web pages attached.
Introduction

At The Fu Foundation School of Engineering and Applied Science at Columbia University, the faculty takes an active role in research, which is funded by both private and government sources. Faculty members view student involvement in research as a part of the educational process and actively encourage it.

Many students at Columbia SEAS are destined for the professional research environment, while others may work in professional capacities in tandem with the research function. It is the purpose of the program and this guide to enable undergraduate students to participate.

Participation in the program is voluntary, although students are advised that the faculty expects students to honor any commitment they may make. This booklet is designed to describe the specific opportunities themselves and to lay out the routes of access.

How to Find a Research Opportunity

Faculty members at The Fu Foundation School of Engineering and Applied Science have been asked to list particulars of research opportunities for undergraduate students. This booklet is a compilation of their responses.

A "research opportunity" is similar to—but not quite the same as—a job in research. Some opportunities involve academic credit and require that students register for "independent study" courses. Some positions involve pay, either as a part-time, casual employee of the University, or as a participant in the Federal Work-Study Program. Thus, special work-study eligibility via the Financial Aid Office may be required. Some opportunities extend for one or more academic terms; others continue over the summer. Some may begin only at the start of an academic year, in September. Opportunities may entail different time commitments or time periods of participation. Normally, students are expected to have an overall grade average of at least 3.0.

The duration and other critical factors of the opportunity reflect the needs of the faculty research coordinator and the skills, interests, and capacities of the student participants. As a student grasps new aspects of a project, such as by learning new skills, his/her role in the project may grow and evolve.

Each research opportunity involves areas of expertise and specialization. Thus, the opportunities have been listed both in terms of (1) the specific research area, and (2) the special skills required of the student. Each faculty member in charge of a research area (the "contact") was asked to specify whether his/her opportunity involved any or all of the following research activities:

- paper study, mathematical projects, library research
- engineering or scientific design
- mechanical or electrical assembly
- computational or computer analysis

They were also asked to specify:
• whether the opportunity entailed academic credit or hourly wages (either through the Federal Work-Study Program or other remuneration)

• the possible duration, whether term-time or summer participation only

• the weekly hour commitment

• any individual qualifications desirable in the applicant, such as minimum GPA, required courses, prior work experience, and computer language fluency

In some cases, respondents did not specify a certain item of information. This omission indicates that the item is not likely to be a requisite or constraint.

Application Procedure

If you are interested in participating in direct research, then your first step is to read through the opportunity descriptions on the following pages. Identify the two or three opportunities that interest you the most, and ask yourself whether or not you meet the basic qualifications. If so, then telephone (or e-mail) the contact listed after the research description to find out if the opportunity is still available. If you do not reach the contact on the first try, call again or write a letter. Remember, it is likely that you will not be the only applicant for a specific opportunity in the Undergraduate Research Involvement Program and that the contact has the final say as to who is selected for the opportunity.

Research Opportunities

• Dean’s Office

• Applied Math and Applied Physics

• Biomedical Engineering

• Chemical Engineering

• Civil Engineering and Engineering Mechanics

• Computer Science

• Earth and Environmental Engineering

  Henry Krumb School of Mines

• Electrical Engineering

• Industrial Engineering and Operations Research

• Materials Science and Engineering

• Mechanical Engineering
Getting Experience

There are several ways that undergraduates can get experience working in a research laboratory:

1. WORK-STUDY
   There are very few such opportunities available, but if you're eligible for work-study, contact Greg Hemison, who will add your name to the list and let you know when something is available.

2. VOLUNTEER
   Most students working in labs do so initially without pay. Positions like this are not "advertised" anywhere; it's up to you to go around and find a professor who could use some help.

   First, look through your class schedule and decide how many hours per week you can work. Can you put in one hour each morning? Or do you have one free day when you can spend 5 hours straight in the lab? The times that you have available will help determine which projects you can work on. Keep in mind that you'll need to spend some time on homework, sleeping, and having fun; if you're taking 22 credits this semester, this is not the best time to add a commitment to lab work. Lab experience can make a good academic record look even better, but it won't "rescue" a poor academic record, so don't let the lab work come at the expense of your coursework.

   Next, look through the descriptions of the research conducted by scientists at Columbia University in the Departments of Biological Sciences, Chemistry (which includes labs in biochemistry) and Psychology (which includes labs in the neurosciences). These are all on campus, and easy to get to between classes. Many students work on the Health Sciences Campus, on 168th Street, which you can get to in about 15 minutes on the free shuttle bus (or on the 1/9 uptown subway or M4 bus). The bus leaves about once an hour, so this option is best for those who have several long blocks of time available, rather than just an hour or two between classes. Most students work in the basic science departments: Anatomy & Cell Biology, Biochemistry & Molecular Biophysics, Genetics & Development, Neurobiology & Behavior, Microbiology, Pathology. Some professors in the Pharmacology, Physiology & Cellular Biophysics, clinical departments also have small labs. Read through some of these descriptions, and choose 5 or 6 scientists whose work sounds interesting. These descriptions are actually written for potential graduate students who are trying to decide which lab to work in, so don't be intimidated if you don't understand them. Still, you should be able to get some sense of the general area the scientist is working in, and the kinds of techniques that they use. Don't feel that you have to go to some "big name", established scientist. In most of these labs, which are very large, you won't be working directly with the lab head anyway, but will be assigned to work with a lab technician, graduate student, or postdoctoral fellow.

   Once you identify a few potential mentors, you can find their email/phone numbers either on the web pages or in the Columbia directory. (At the $ prompt, type in "lookup" followed by the name of the person, and you'll get their address, email, phone. For example:

   $ lookup marie curie
   No, she's not listed, I just checked.)

   Contact these scientists and say that you're an undergraduate student who would like to get some experience working in their lab. You'll either get:

   A. No response. If no one answers the phone, it's best to call back later, rather than leaving a voice mail or email, which are easy to ignore when one is busy, as scientists generally are.

   B. "No, sorry, I can't take any more students." There are many reasons why a scientist may not
want you to work there. Firstly, there may already be a lot of people in that lab, and if everyone is crowded around the same equipment, no one will be able to work very efficiently. Secondly, you will be entering the lab as a novice and someone will have to train you in the techniques that you will use. If the other people in the lab are particularly busy this semester, they may not be able to give you the attention needed to train you. In any event, don't take it personally if you get several rejections. Just go through the list of scientists and choose the next 5 who sound interesting.

C. "Maybe. Come in and we'll talk." Make an appointment to meet the scientist. If the lab is uptown, check the shuttle bus schedule to see when it would be most convenient to schedule a meeting. Here are some things you can do to prepare for an interview:

1. Read the description of their research interests if they've put this on the web. This will probably be too technical for you to understand completely. Find the key terms in this description, look them up in the index of your biology textbook (e.g., Purves or Becker), and read the relevant sections of the text. The professors will not expect you to know about their own research, but they will expect that you remember a little basic biology.

2. Put together a description of your background. This doesn't have to be as formal as a resume, but it will be helpful if you can bring a page that lists: your name, address, email, phone #, science courses (including math and computer sciences) you've taken or are currently taking (and the grades, if they're good; omit them, if they're not), any lab experience you've had, computer skills, career goals, other noteworthy experience. This can be useful both as a conversation starter, and as something for the professor to keep on file, in case it is not possible to make a place for you in the lab right away. Also, bring a timetable that shows your class schedule, so the professor can see the times that you'll be available.

3. The scientist will probably ask whether you've worked in a lab before, and if so, what you did. If you have some lab experience from high school, you should review beforehand in your own mind what you did, so that you'll be able to give a coherent, concise, 3-4 minute description of the purpose of the experiment, the techniques you used, your interpretation of the results.

4. Dress nicely, but casually. This is not a business interview, and you don't want to give the impression that you're so concerned about your three-piece suit or your three-shade nail polish that you won't be willing to get your hands dirty at the lab bench.

The interview is not a cross-examination, but simply an informal conversation to help the scientist decide whether you seem eager and able to learn, whether you'll get along with the others in the labs, whether your schedule makes it possible to work on a particular project. At the same time, you should be thinking about whether you'd like to work in this particular lab. Most students are very satisfied with whichever lab they work in, but if you feel uncomfortable at the interview (everyone in the lab looks unhappy, the scientist doesn't seem able to explain things in a way that you can understand), you may want to try a different lab.

The type of work you'll be offered will depend in part on how much time you have available. Many students start out by working 5-10 hours/week, doing routine maintenance: feeding animals, ordering supplies, making up solutions, preparing equipment for experiments, and helping other lab workers in their experiments. After getting some experience, students may be given independent projects to work on, but many such projects require a larger time commitment (10-15 hours/week).

3. WORKING FOR CREDIT
Students can get academic credit for working in a lab, by registering for BIOL C/3500, Independent Research. You're expected to spend about 3 hours in the lab for each credit, and most students register for 3 credits and work about 10 hours/week. You still have to find a lab to work in, as described under VOLUNTEER. The only difference is that you must make it clear to the scientist that you are looking for a lab to work in for academic credit, and that you will be expected to work on an independent research project for about 10 hours/week. You can either take this course pass/fail, or for a letter grade. The latter requires you to write a research paper at the end of the semester. (See C3500 requirements.)

While it's nice to be able to get credit for your lab experience, keep in mind that this means that you're making a commitment to work there for the entire semester. If you're not sure that you want to make this commitment, you may want to volunteer in a lab for one semester first, and then ask the head of the lab if you can continue to work there for credit.

4. GETTING PAID
Some scientists are able to pay for student hourly help from their research grants. This generally happens after the student has some experience in that particular lab.
5. SUMMER RESEARCH

There are many more opportunities to work in a lab during the summer, when you can devote full-time to research. The Department of Biological Sciences sponsors a SURF program, which provides a $2500 stipend for students to spend ten weeks on an independent research project during the summer. Over 100 students applied last year, and 64 of them were accepted.

Applications for this program will be available in the beginning of the spring semester. To get an idea what the program is like, plan to come to the next SURF Symposium (contact Dr. Judith Gibber for the date of the next Symposium) where last year’s SURF students will discuss the research that they did.

There are many other institutions that offer similar programs. The Columbia Biological Society has an internship list, which includes programs that have been offered in the past. Most of these are offered on a regular basis, so you can contact those programs that interest you for further information. As we get information on their programs for the summer, we’ll post these on the Other summer internships page.

For specific questions about C3500, contact Dr. Ron Prywes at mrp6@columbia.edu.

For general questions about undergraduate lab research, and comments or suggestions for this page, contact Dr. Debby Mowshowitz at dbm2@columbia.edu or Dr. Ron Prywes at mrp6@columbia.edu.

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Academic Credit

Undergraduates can get academic credit for research by enrolling in C3500. Please visit this site for more detailed information.

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The Research Paper

Scientific research articles provide a method for scientists to communicate with other scientists about the results of their research. A standard format is used for these articles, in which the author presents the research in an orderly, logical manner. This doesn’t necessarily reflect the order in which you did or thought about the work. For detailed instructions on how to write a scientific research paper please visit this site.

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SURF

The Department of Biological Sciences at Columbia University offers Summer Undergraduate Research Fellowships to a select group of motivated undergraduate students who will benefit from the opportunity for hands-on laboratory research. This is a chance to experience the joys of discovering something completely new, while learning to overcome the challenges inherent in scientific research. Most students work either in our department on the Morningside Heights campus or in the biomedical labs at Columbia’s Health Sciences Center (the free shuttle bus gets you there in ten minutes), and a few students work in other local research institutions.

For more detailed information on this program, please visit the SURF website.

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Other Summer Internships

Of course there are other summer internship programs across the country. For a list of various summer biology programs, please visit this site.
SURF application is up! Click on "Apply".

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The fellowship is competitive, with awards based on grades, recommendations, previous experience, and a personal meeting with the laboratory director. You may apply if you are currently a junior, sophomore, or first-year student in Columbia College, Barnard College, the School of Engineering and Applied Science, or the School of General Studies. No previous research experience is necessary and you do not need to be a biology major to apply. Students are expected to work full-time for the duration of the program, so participation in SURF is not compatible with attending summer school or working at another job.

The SURF program runs for 10 weeks, from June 1 through August 6, 2004. The orientation program scheduled during the first week includes a discussion of ethical issues in biomedical research, and instructions on laboratory safety. Subsequently, students work full-time (about 40 hours/week) on independent study projects, under the guidance of a research scientist. Once a week, SURF students get together to hear a scientist present a research seminar, or to describe their own research to the other SURF students. All fellows are required to write a short written report at the end of the summer, and to present a poster of their work at the SURF symposium during the spring semester. Participants receive a stipend of $3000.

For further information, contact Dr. Judith Gibber, jrg43@columbia.edu, 744 Mudd, 854-5952.