



**DEPARTMENT OF
BIOCHEMISTRY AND BIOMEDICAL SCIENCES**

UNDERGRADUATE PROGRAM HANDBOOK

www.fhs.mcmaster.ca/biochem

**McMaster University
Hamilton, Ontario**

Departmental of Biochemistry and Biomedical Sciences

Theory, Practice, Real Life

ACTIVE LEARNING

- One of the unique aspects of the department is our teaching philosophy: **Active Learning**
- Students learn more and remember better when they learn actively and are allowed to use the knowledge they have learned and apply it to real or simulated cases

THEORY, PRACTICE, REAL LIFE

- Research-based teaching keeps our undergraduate education at the cusp of new technologies and discoveries
- By incorporating real problems and applications into lectures and courses, students take a more active role in their learning process
- Active learning develops **critical thinking** and creative **problem-solving skills**

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What is Biochemistry?

Biochemistry is the study of chemical or molecular basis of life and builds on a strong foundation of the other natural sciences. The science of Biochemistry ranges from the study of structures and properties of individual chemicals and molecules (such as proteins and DNA) to their function and integration into the whole organism. It deals with the chemical and physical properties of living organisms and understanding vital biological processes.

Academic Record & Calendar

Please take the time to check your academic record on MUGSI. For each term there is a deadline date for registration and changes (drop and add) in courses (refer to the current “Undergraduate Calendar”). Students registering in, or adding a course after the deadline will not receive academic credit for that course. There is also a deadline for canceling a course without failure by default. Students dropping a course after the deadline will receive a failing grade in that course. As you have access to your record on MUGSI, it is in your best interest to check your record to ensure that any changes during the year are accurately reflected on the system. If you notice any discrepancies, please notify the Department.

Drop & Add Courses

You may drop or add a course on-line using SOLAR. SOLAR can be found on your MUGSI account and is also used to register for regular course loads. SOLAR is open 24 hours daily with the exception of 3:00 am – 3:30 am. Be sure to check deadline dates for dropping and adding courses without financial penalties.

Email

The Department uses electronic mail to communicate directly with students at various times throughout the school year. The University Technology Services (UTS) provides each student with an email address. The MUGSI system can be accessed by (<https://adweb.cis.mcmaster.ca/cis/ahtml/login.htm>). Please check your account frequently to find out about locations, dates and times for upcoming career nights and co-op information nights.

Website

Please take the time to visit the Department’s website, www.fhs.mcmaster.ca/biochem. Updated information on seminars, faculty, graduate school, career links, contact information, course and program information, and general department information can be found here.

Learnlink

You will find that the majority of the Biochemistry courses use Learnlink. Learnlink is an interactive electronic environment that many courses use as a communication tool. Discussion boards, course material, course news updates, test dates and locations amongst other information can be found on this platform. You can either download the Learnlink software or access it online <http://www.learnlink.mcmaster.ca/>. All students are automatically assigned a LearnLink account. New account holders can log on to Learnlink using their student number as their UserID and their Date of Birth for their Password. The format for your password is 1980-06-30. Once you log-on you are able to change your password.

Petitions for Relief for Missed Term Work and for Deferred Examinations

The University wishes to assist students with legitimate difficulties. It also has the responsibility to ensure that degree, program and course requirements are met in a manner that is equitable to all students. Students may petition the office of the Associate Dean of Science (<http://www.science.mcmaster.ca/~associatedean/index.html>) for special consideration when there are compelling medical, personal or family reasons to justify an exception to University regulations. Supporting documentation will be required but will not ensure approval of the petition. The authority to grant petitions lies with the Faculty office and is discretionary. It is imperative that students make every effort to meet the originally-scheduled course requirements and it is a student's responsibility to write examinations as scheduled. For specific procedures for missed term work, deferred or missed examinations and appeals for special considerations, please visit the following website: <http://registrar.mcmaster.ca/calendar/current/pg24.html>

The Department

The Department is located in the Health Sciences Centre, room 4N59 and is comprised of 32 faculty members, 13 associate members, 7 Canada Research Chairs and boasts one of the most spacious well-equipped undergraduate teaching laboratories in Ontario.

Professor and Chair

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Individual Faculty contact information can be found on the departmental website:
www.fhs.mcmaster.ca/biochem

Bachelor of Science Requirements

In order to remain in the Biochemistry Honours Bachelor of Science programs, a minimum average of 6.0 must be maintained.

Programs Offered by the Department of Biochemistry and Biomedical Sciences

The Department offers four program options and three alternative courses of study in which to receive your Honours degree.

Honours Biochemistry: A more broadly based academic program that would be chosen if you intend to apply to a professional school or if graduate school is not one of your main aims. It allows more room for electives to pursue other interests (e.g. a minor in another faculty). Students registered in Honours Biochemistry also have the opportunity to apply for the Origins Research Specialization.

Honours Biochemistry (Molecular Biology Specialization): For students whose ultimate goal would be working in genomics, proteomics and other areas at the cutting edge of new scientific developments. Preparation for professional and graduate school.

Honours Biochemistry (Biotechnology and Genetic Engineering Specialization): Preparation for professional and graduate schools and biotechnology and pharmaceutical industries. A unique program offering applied science courses delivered in collaboration with the Department of Chemical Engineering.

Honours Biochemistry (Origins Research Specialization): Students graduating from this specialization will possess comprehensive, multifaceted knowledge about the natural world.

Honours Biochemistry Co-op: This 5-year work-study program gives excellent preparation for developing skills in research relevant to the private sector. Entry in year III following completion of Level II.

Degree Requirements

Refer to the “Undergraduate Calendar” for degree requirements.

Co-op Information

The Honours Biochemistry Co-op is a limited enrollment program with a maximum of 25 students per year. After completion of Level II you may apply to the Co-op program from any of our programs. This 5-year program is a work-study program, which is excellent preparation for directly entering a job after University or as preparation for further training. The Biochemistry Co-op Program features two eight-month work terms.

Students have conducted work terms in the following areas:

- Research and development in the fields of biochemistry, molecular biology, toxicology, immunology and pharmacology
- Organic and analytical chemistry in the food, agricultural and pharmaceutical industries
- Product development, compound screening and drug efficacy studies
- Clinical trials and regulatory affairs
- Technical service and support

What have recent Co-op students actually been doing in their placements?

- Learning current laboratory techniques and answering scientific questions in a research environment while unraveling mechanisms of signal transduction in neurons at the Montreal Neurological Institute
- Designing working protocols, carrying out and analyzing the results of experiments in cancer research in gene silencing at the Ottawa Regional Cancer Centre
- Developing new forms of affinity chromatography at the University of California
- Developing small scale purification schemes for recombinant human proteins at the biopharmaceutical company, Cangene in Mississauga, ON
- Research and development work in manufacturing antibodies at Affinity Biologicals in the Henderson Hospital
- Gathering information on health concerns for the Centre for Health Economics & Policy Analysis in Hamilton, ON
- Medical Research Associate for the Rheumatology Sales/Marketing Team for the biotechnology company, AMGEN Canada Inc. in Mississauga, ON

Other recent co-op Work Term Locations include:

- AEA Technology, Oxford, UK
- Agriculture Canada, Ottawa & Harrow, ON
- Banting and Best Diabetes Research Centre, Toronto, ON
- BioChem Pharma Inc., Laval, QC
- Janssen-Ortho Inc., North York, ON
- Millenium Pharmaceuticals Inc., Cambridge, MA

- Mitsubishi Chemical Corporation, Yokohama, Japan
- Veterinary Infectious Disease Organization, Saskatoon, SK

How much will I get paid?

Wages are determined by the employer and vary from institute to institute. As a guideline, co-op students employed in a university or hospital setting generally receive remuneration in the range of \$1100-1800 CDN/month. Co-op students who are employed in corporate or industrial setting generally earn a salary in the range of \$1800-3200 CDN/month.

For more information on the Co-op program, to view potential placements and for applications please visit the Science Career & Cooperative Education Office located in BSB 127. Applications are due by midnight February 28.

<http://www.science.mcmaster.ca/scce/students/coop/prospective.html>

Transfer Between Programs

All Honours Biochemistry programs are limited enrolment and **transfer depends on your C.A. and space availability**. If you wish to transfer from one specialization to another please talk to Robyn Tebbutt, Student Advisor, in the Associate Dean of Science Studies Office. She can be reached at ext. 27590 or in the Burke Science Building, room 129.

Course Descriptions

Refer to the “Undergraduate Calendar” and the Department website for course descriptions.

Course Offerings

Term 1	Term 2	Term 3
2B03	2BB3	2L06
3A03	3A03	4B06
3P03	3C03	4F09
3X03	3D03	
4E03	3H03	
4H03	3N03	
4J03	3Y03	
4P03	4C03	
4Q03	4EE3	
	4LL3	
	4N03	
	4P03	
	4Y03	

Fourth Year Research Project and Thesis Information

Biochemistry 4P03, 4B06 and 4F09

Course Coordinator:

Dr. Felicia Vulcu (vulcuf@mcmaster.ca), ext. 22341, HSC 1H6 (Biochem 4B06 & 4P03)

Dr. Tony Collins (tcollins@macbiophotonics.ca), ext. 28812, HSC 4H21A (Biochem 4F09)

Course Administrator:

Mary Margaret Strong (bioched@mcmaster.ca), ext. 22059, HSC 4H45

Communication of course information will be via email or ELM

(<http://ccl.mcmaster.ca/elm.html>). Please ensure that you check your e-mail regularly.

Undergraduate Student Research Guidelines

Undergraduate research is considered a vital component of learning by the department of Biochemistry and Biomedical Sciences, and is therefore a **degree requirement for students enrolled in both the Molecular Biology and Biotechnology & Genetic Engineering Specializations**. In their senior year, students will have the opportunity to conduct original scientific research in a faculty member's laboratory. On some occasions, students have been able to accomplish work that has contributed to a scientific publication.

Students enrolled in Honours Biochemistry who wish to do a research project have the opportunity to take the Biochemistry 3A03 research project (guidelines and requirements can be found on the dept. website).

The following information will help in the selection of an appropriate research course, a potential supervisor and research project.

Course Basics

Students can select 3, 6 or 9 units of research, depending on their program and cumulative average (CA) achieved at the end of their third year. All three courses involve original research and the completion of a thesis, but differ in the time commitment and course requirements. These research courses will require at least as much time as a regular course for which you receive 3, 6 or 9 units of credit, respectively, and differs from a regular course in terms of the more independent nature of the work, and the degree of student responsibility and initiative.

Biochem 4P03: A 3-unit research project in Biochemistry during the first or second term. Assessment is based on laboratory work (approximately 12 hours per week in one term), two interim reports and a final thesis report. *Minimum CA of 7.0 is required.*

Biochem 4B06: An extended 6-unit senior research project in Biochemistry. Assessment is based on laboratory work (approximately 12 hours per week over two terms), a poster presentation and a final thesis report. *Minimum CA of 8.0 is required.**

Biochem 4F09: A 9-unit senior thesis based on a major research project in Biochemistry. Assessment is based on laboratory work (an average of approximately 18 hours per week over two terms; depending on the distribution of the course load), two oral presentations and a final thesis report. *Minimum CA of 9.5 is required.**

Each course provides excellent experience and preparation for any career in Biochemistry. In particular, Biochem 4B06 and 4F09 are highly recommended to students considering a future in research or graduate school.

Making Arrangements for a Research Supervisor and Topic

In the fall of their third year, students should begin to think about potential supervisors and research projects for their senior year. The selection of a research topic should derive from a student's course experience and interests. It is recommended that students review the research interests of the faculty and associate faculty members in the department and schedule an interview with *at least 3* members to discuss possibilities for a research project. Supervisors may be full-time members of Biochemistry or associate members of Biochemistry. A list of potential supervisors and a description of their research can be found at www.fhs.mcmaster.ca/biochem under 'Department' and 'Research'. Research posters displayed in the hallways of the Biochemistry Department may also be useful resources in the investigation of your interests.

From September until January, both the students and faculty will have a chance to meet with a number of potential supervisors and potential thesis students, respectively. A special 'permission form' (which can be downloaded from the web site or obtained from Mary Margaret Strong) must be filled out by the student, signed by the supervisor and submitted to Mary Margaret Strong in the Biochemistry Department (HSC 4H45). **This information must be submitted no later than March 1st in level III. The final approval will be dependent on the final level III results.**

**Students who are unable to meet the required minimum CA for Biochem 4B06 and 4F09 at the end of their third year will automatically be considered for enrolment in Biochem 4P03 and 4B06, respectively.*

If it is possible for students and supervisors to delineate the project before the student leaves in April, it may be feasible for the student to do some preliminary research and reading during the summer months.

Please retain this information for future reference.

For more information on the thesis requirements visit:

"

To download a permission form (to be submitted to Mary Margaret Strong in the Department of Biochemistry (HSC 4H45) no later than March 1 in level III) visit:

4B06 permission form

4F09 permission form

4P03 permission form

For a specific outline and timetable (including due dates) for the 3-unit research project, 4P03, visit:

<http://www.fhs.mcmaster.ca/biochem/undergraduate/courses/4P03.pdf>

For a specific outline and timetable (including due dates) for the 6-unit senior research project, 4B06, visit:

<http://www.fhs.mcmaster.ca/biochem/undergraduate/courses/4B06.pdf>

For a specific outline and timetable (including due dates) for the 9-unit senior thesis based on a major research project, 4F09, visit:

<http://www.fhs.mcmaster.ca/biochem/undergraduate/courses/4F09.pdf>

Career Opportunities

Once you graduate with a degree in Biochemistry, there is a plethora of career options available to you in this ever-emerging field. The following is a list of where a Biochemistry degree can lead you.

Preparation for Professional School

- Medicine
- Dentistry
- Pharmacy
- Law
- Business
- Chiropractic
- Veterinary

Careers in Research

- Biochemistry
- Biology
- Biomedical
- Clinical
- Chemistry
- Ecology
- Environment
- Oncology
- Forensics/Criminology
- Toxicology
- Virology
- Immunology
- Pharmacology
- Medical Sciences
- Biotechnology

Careers in Teaching

- High School
- Community College
- University
- Corporate

Careers in Business and Industry

- Biotechnology
- Agriculture
- Pharmaceuticals
- Health Sciences
- Diagnostics
- Genetics
- Nutrition
- Therapeutics
- Pollution Control
- Centres for Disease Control
- Scientific Journalism
- Sales Representative for Medical Equipment and Pharmaceuticals

Preparation for Emerging Career Sectors

- Genomics
- Proteomics
- Gene therapy
- Bio-engineering
- Environment
- Biosensors

Graduate School

- Masters
- MBA
- PhD

To research more career options visit the following websites:

<http://www.science.mcmaster.ca/scs/biochemistry.html>

<http://www.accessexcellence.org/AB/CC/>

<http://www.biochem.ubc.ca/Career.html#biochemists>

For assistance in all aspects of career planning, educational planning and the employment search process, visit Career Services in Gilmour Hall, room 110 or visit their website:

<http://careers.mcmaster.ca/>. Career Services offers:

- Help in identifying and choosing career and educational goals
- Workshops on applying to graduate and professional schools
- Individual, confidential counseling
- Web-based on-line job postings (e-recruit)
- Workshops and assistance with resume writing, job search and interview skills
- Information about government employment programs
- A resource centre with career, educational and job search information
- Interest and personality type testing to help students make educational/career plans
- Help in applying to full-time, summer and part-time jobs

Recent Graduates of Biochemistry

Ever wonder what recent graduates of Biochemistry do once they leave school? Here is a list of current occupations graduates have undertaken.

- Film director
- Academic
- Physician
- Specialists (Anesthesiologist, Obstetrician, etc.)
- Dentist
- Teacher (elementary, secondary)
- Physiotherapist
- Technician
- Bookkeeper

A degree in Biochemistry can lead to a wide variety of career placements.

Decision to Enter Graduate School

How Do I Make The Decision to Attend Graduate School?

When coping with a decision about pursuing graduate work in the biochemical sciences, a student must first be comfortable with the WHY AM I GOING? question. Graduate work is not something you do merely to pass the time. Neither is it something you do for someone else. You must decide that you love the science and that you need an advanced degree to reach your own personal and professional goals.

This is an exciting time for the biochemical sciences. Students have the opportunity to join the ranks of genuine innovators and to contribute new knowledge that can be applied in deeply meaningful aspects of human life.

- Advances in understanding and altering molecular structure for defined functions are opening new vistas in drug design, genetic directives, and new materials that can be used for implantable sensors, appliances, and prostheses.
- Enhanced computer capabilities now allow us to model complex biological processes and to extract from extensive data sets better information than has ever been possible in the past.
- In the areas of energy and the environment, there are new materials and devices for better efficiency, more elaborate and reliable monitoring, and more effective remediation.
- Some students enjoy greater emphasis on the less conventional extensions of modern science and technology. There's a desperate need for individuals trained in the chemical sciences who can participate in the public-policy process or in interpreting modern science and technology for the general citizenry.
- Future challenges are enormous. The responsibility of scientists at all levels is a weighty but satisfying human endeavor. Any student who wishes to participate in this intellectual adventure of the twenty-first century would do well to consider an advanced degree.

What About Specializing?

Most universities offer several types of interdisciplinary graduate programs that build on a variety of different aspects of biochemistry. McMaster University offers research in projects dealing with the basic mechanisms of cancer, neurobiology, development, evolution and antibiotic resistance, as well as unique opportunities to pursue research in drug discovery, genomics, and proteomics. You must know at least the major area of emphasis in which you want to pursue graduate study so you can explore and apply to the appropriate program.

Once you're in a program, however, you may then delay a decision about a particular research emphasis until you have completed some course work and are ready to begin a research project required for the eventual dissertation. Where do you find the information about this plethora of options? Your undergraduate advisor is a good starting point. That person, as well as the departmental office or library, should have an assortment of materials on careers and graduate schools--and perhaps some personal advice as well. There is also a set of informational materials available from the *American Chemical Society*. Nothing, however, takes the place of talking

directly with the graduate program coordinators for *several* programs in which you are interested. Those chats, plus on-site interviews, should cover the gamut of considerations and consternations about graduate work.

Where Do I Want To Study?

Unless you have restricted your choices about WHERE DO I WANT TO STUDY? for personal reasons, the world is your stage.

Your choices also may be limited by your own record of performance at the undergraduate level. If you have not excelled in your undergraduate studies, you may not have the option of attending some of the most competitive (sometimes referred to as "prestigious") graduate schools. This latter consideration should *not* be a major factor for a motivated individual. There are many excellent graduate programs that have not yet enjoyed the privilege of universal prestige, frequently measured by flawed or overemphasized ranking schemes. You must decide where you are going to feel most comfortable geographically, financially, intellectually, and socially.

Geography is strictly a matter of personal preference. Do you like cities or more rural areas? Do you like warm or cold climates? Would you like to be near beaches or mountains for those all-important respites from intensive work? Being happy where you are will make the whole graduate experience more enjoyable. Do not underestimate the importance of that decision.

The questions of **financial feasibility** will be related to location by virtue of expected living expenses. The most amazing thing to many undergraduates, however, is learning that they are actually paid to go to graduate school in the chemical sciences! Currently, the combination of stipends and tuition allowances leaves a single person in a moderately reasonable state of financial security during graduate school. If you have a family to consider, there may have to be a second income.

What about **size**? Size certainly isn't the only factor for quality. Large programs may have greater potential for variety in talent and idea flow. But you might thrive instead in a smaller, more personalized program that may interact with a greater variety of departments. Again, it's a personal call.

Other questions related to **social and intellectual comfort levels** are much more subtle. Try to determine whether the faculty seems to be genuinely interested in you as a potential graduate student and colleague.

- Does the graduate student composite seem to be one with which you would be comfortable?
- Are the buildings where you will work safe, internally and externally?
- Is the faculty sufficiently diverse both academically and demographically?
- Will you be happy studying and working in this environment--including other students--for at least four years, possibly more?
- Will you be proud to have an advanced degree from this institution?

Exploring these components of your decision is often best accomplished during a visit for pre-enrollment interviews. Take advantage of these--and if you're staying overnight, ask whether a student in the department might put you up. You'll learn a lot informally, too.

What is Expected Of Me In Graduate School?

Assuming that you have decided to go to graduate school, that you've selected a particular field of study, and that you've chosen where to go, you will probably have numerous questions related to the mystery of WHAT WILL IT BE LIKE ONCE I GET THERE? There is, in fact, a general pattern to most graduate programs.

During the first year or two, you normally complete required courses. Each university has its own curricular sequence to achieve the desired breadth and depth. Be aware that required curricula is more often too broad than too specialized.

The actual sequence of courses for you as an individual may be determined in part by the scope of your undergraduate curriculum and performance. In other cases, the graduate curriculum is fairly standard for all graduate students. If you have special strengths or gaps, it will be your own responsibility to blend the past with the present. Your undergraduate advisor should be able to guide you through a well-rounded curriculum that will prepare you for graduate work. Inclusion in some undergraduate research experience is a real plus, in terms of both preparation and the decision-making process for graduate school.

At almost any university you will be required to complete at least one year as a teaching assistant (TA). In fact, your income for the first year or two will depend on this service, which doubles as part of your education. Even if you do not plan to teach ultimately, you learn by teaching others. The attributes of organization, clarity in explanation, and supervisory skills are infinitely important in any endeavor requiring an advanced degree.

There are several proverbial hoops you must jump through as a graduate student. While completing course work and TA responsibilities, you will probably be required to begin a process of initial examinations, usually dubbed prelims, comps, or cums (that's short for cumulatives). These exams may be administered as a series at regular intervals, or they may occur at some set point within the program of graduate study. In either case, one purpose is to help you as well as your departmental faculty to assess comprehension and performance in an interim fashion. They'll also indicate potential for research leading to an acceptable dissertation and final examination.

In most graduate programs you will also be required to participate periodically as a speaker in the seminar program. At a more advanced time in your program of study you may also be required to prepare a proposal for an original research project, and then defend that proposal before a professorial review committee. That possibility may sound awesome now, but by the time you get to this point your background and confidence should have reached proportions unimaginable to you early on.

And it's time to discuss one of your most crucial decisions: choice of a graduate research advisor. Be sure that the person you choose is competent and respected not only in a particular research area but also as a mentor. It is important that the advisor's research is adequately

supported financially and that the research group is congenial and complementary in personalities and abilities to contribute. It is perhaps even more important that you thoroughly enjoy the collegial and intellectual interactions with your research advisor.

Finally.

You'll last be required to complete, to the satisfaction of your graduate advisor and a review committee, a research project that is detailed in a dissertation. You will then present results and field questions in what has come to be known as the "final oral." Interpreted for the uninitiated, this means THE END. If you are like most graduate students, you will find that the final oral really is "a piece of cake." You will find yourself in a position of describing your very own project. You will know more about it than anyone else in the room because you performed the experiments, interpreted the data, and drew the conclusions. Besides that, you will have already been through all the preparatory hoops and have the intellectual maturity and confidence to be a PhD at this point! The prize is won. ENJOY!

How Do I Prepare for Graduate School?

First Year

Begin exploring goals for graduate study - Perhaps volunteer work with research group at school.

Second Year

Start attending seminars, perhaps Undergraduate Research conference in your area - Participate in research project- Investigate summer research opportunities.

By the end of your second year, you should have at least some experience in calculus, basic inorganic, elementary analytical, introductory organic, and simpler instrumental methods, including some work in UV/VIS and infrared spectrosopes, chromatography, and maybe some NMR and basic data analysis.

Third Year

Participate in undergraduate research or internship during term and summer - Begin reviewing brochures, posters of graduate school info- Start studying for the GRE (if required).

Fourth Year

Upper-division courses should leave you familiar with physical chemistry, instrumental methods of analysis, and probably biochemistry and other science courses like genetics or laboratory technique.

Narrow down interesting programs early in fall term; send for info-Take general GRE (if required)- Apply to schools of choice - Go for on-site visits- Choose! (Usually in April).

The above article was excerpted in part from "Tracking Down Your Primo Grad School" by Alice Cunningham from the February 1993 issue of Reaction Times, which is a copyrighted American Chemical Society publication.

For information on McMaster's Biochemistry Graduate program, contact the Graduate Assistant, Lisa Kush at ext. 22064 or email her at <mailto:bbsgrad@mcmaster.ca> You can also visit the Biochemistry Graduate School website at: <http://www.fhs.mcmaster.ca/biochem/educ/grad/prog.htm>

Sites of Interest related to Biochemistry

Biochemical tools: A list of handy conversion charts, tables and methods to make measurements of DNA and RNA.

<http://www.bio.com/protocolstools/sciref.jhtml>

Protocols for Molecular Biology, Biochemistry and Microbiology: Methods and protocols on how to prepare buffers, perform southern blotting, mutagenesis and other techniques on a variety of substances.

<http://www.bio.com/protocolstools/browsdesc.jhtml>

Protein Purification and Crystallization Techniques: Discusses chromatography and crystallography techniques as well as the phase problem.

<http://wserv1.dl.ac.uk/SRS/PX/openday/pure/xtal.html>

Virtual laboratory: A look at the different lab equipment.

<http://www.bio-link.org/vlab/Equipment.html>

Technical Orientation (WHMIS)

Under the Occupational Health and Safety Act, and the policies of the University, everyone must attend an education program relating to safety in the workplace. All students are required to attend the full "Technical Orientation" which includes WHMIS (Workplace Hazardous Material Information System) and Fire Safety Orientation before commencing their lab courses. WHMIS must be completed in order to graduate with a Bachelor of Science.

Annual WHMIS updates are required under University policy. Update sessions are mandatory. (see <http://fhs.mcmaster.ca/safetyoffice/training-sessions.html>) Pre-registration is not required, however the "Training Documentation" form must be signed by the session leader and returned to the Biochemistry Office.

Scholarship Information

Each year the Department is asked to nominate students for awards in the spring and fall. Many of these awards require us to submit nominations based on academics as well as extracurricular activities. If you are presently on the Dean's Honour List with an average of at least 10.5 and would like to be considered for any of these awards, please fill out the following form and return it to Mary Margaret Strong in HSC 4H45 before March 31st.

STUDENT PROFILE FORM FOR ACADEMIC AWARDS

Many scholarships and prizes awarded by the University require students to have shown leadership and involvement in extracurricular activities. This information is used by the department when we are asked to nominate students for some specific awards. If you have a minimum CA of 10.5 then please take a few moments to complete the following sheet for our records.

By filling out and submitting this profile the student acknowledges that the information is being used for potential awards. The student also agrees (if awarded a scholarship/prize) to this information being used in departmental Newsletters and Annual Reports.

Thank you.

RETURN TO: **Mary Margaret Strong**
Dept. of Biochemistry
Health Sciences Centre 4H45

NAME: _____
Surname First Name Middle Name

STUDENT NUMBER:

PROGRAMME: _____ LEVEL COMPLETED: _____

Please list the university and/or community organizations, including dates, of which you have been a member during your undergraduate years.

What office, if any, did you hold?

What other contributions have you made to the extracurricular activities at the university or in the community? (include approximate time involved each year).

If you were employed part-time, please indicate what your job was and the number of hours you worked per week.

Have you contributed creative work (such as a research project that was not part of required course work) which might qualify you for a University Prize for Special Achievement?

How to Get a Summer Research Position

Many professors hire undergraduate students to help them in their labs during the summer. This is a great way to obtain lab experience, prepare you for your thesis research, get contacts, and find areas of research that would interest you. To obtain these positions find a professor whose research truly interests you. Contact them with your intent (start early as there are limited positions). Show your interest in applying for a summer scholarship (professors are more inclined to hire students who receive these scholarships, as part of your salary is already paid for).

The Natural Sciences and Engineering Research Council of Canada (NSERC) provides undergraduate research scholarships with their Undergraduate Student Research Awards (USRA) in University or Industry settings. These awards are meant to stimulate your interest in research in the natural sciences and engineering. They are also meant to encourage you to undertake graduate studies and pursue a research career in these fields. If you would like to gain research experience in an academic or industrial setting, these awards can provide you with financial support through your host university. For more information and application guidelines and deadlines, please visit the NSERC website at http://www.nserc.ca/sf_e.asp?nav=sfnave&lbi=1_toc.

The Heart and Stroke Foundation offers a scholarship of \$4,000 for students interested in a three-month summer research project on cardiovascular and/or cerebrovascular research. Please visit the following website for application guidelines and deadlines: <http://www.hsf.ca/research/programs/index.html>.

Scholarships for Graduate School

If you are thinking about applying to Graduate School, there are many organizations that give out scholarships and grants to graduate students. The following are links to such organizations. Guidelines and application procedures can be found at these websites.

OGS- Ontario Graduate Scholarship (approx. deadline October 1)
http://osap.gov.on.ca/eng/not_secure/OGS.htm

CIHR- Canadian Institute for Health Research (approx. deadline Oct. 15)
<http://www.cihr-irsc.gc.ca/e/services/800.shtml#>

Heart and Stroke Foundation (approx. deadline Feb 1)
<http://www.hsf.ca/research/programs/index.html>

NSERC-Natural Sciences and Engineering Research Council (approx. deadline Oct. 1)
http://www.nserc.ca/sf_e.asp?nav=sfnave&lbi=2_toc

All of these applications will now be on-line, hard copies will not be available. They must be submitted to the Department in order to meet the deadline set by the School of Graduate Studies.

Study Abroad Options

McMaster University has formal student exchange programs with various institutions both abroad and within Canada. An exchange may be for one full academic year or one term. A student exchange will provide students with the opportunity to gain a varied perspective on your course of study and enhance your professional and personal goals. International study will enhance their marketability and give a competitive edge. Some returning students have been able to complete their degree programs and pursue graduate studies with their previous host university. Exchanges are often best taken in the third year of an undergraduate degree. However, due to the limited number of spaces available annually, students are encouraged to begin investigating potential placements as early as first year.

There are two ways to undertake international studies during Level III of an Honours program; via a Formal Exchange Program or a Third Year Study Elsewhere program. McMaster University has formal student exchanges with universities in 26 countries abroad. Third Year Study Elsewhere is available at universities with which McMaster University does not have a Formal Exchange Agreement.

Students registered in any Honours program in the Faculty of Science are encouraged to apply to study the whole Level III elsewhere. To be eligible to take part in this program, students are expected to complete Level II with a Cumulative Average of at least 7.0. Students must pay all associated travel, study and living expenses. For students in need of financial assistance, OSAP (Ontario Student Assistance Program) grants, loans and bursaries may be available.

Students interested in these opportunities should begin discussions with the Associate Dean of Science approximately one year before they plan to enroll elsewhere. Students must propose and submit an academic program to their Department for approval. Academic approval must be completed by the end of February for registration in the following Fall/Winter session.

Students must maintain links through correspondence with their departments at McMaster University while they are engaged in study elsewhere. All credit for work completed may only be confirmed after departments have reviewed the students' academic achievement following their return and registration in their final year of study. The maximum credit available in this way is normally 30 units for the full year of study, equivalent to Level III. In certain cases, students may be recommended for the Dean's Honour List on the basis of work undertaken in the program.

Undergraduate Biochemistry and Biomedical Sciences Society

The Undergraduate Biochemistry and Biomedical Sciences (BBS) Society acts as a means of communication between the students and faculty members within the department of Biochemistry. They work to provide a vast number of academic and social events in order to further diversify the learning environment provided at McMaster University. Contact the society at macbiochem@gmail.com.

Academic Ethics

The Senate “Statement on Academic Ethics” describes the expectations the University has of its scholars. Breaching academic ethics is ultimately destructive of the values of the University; it is, furthermore, unfair and discouraging to those students who pursue their studies with integrity.

Breaches of academic ethics fall into two general categories:

- a) a disregard for the norms of scholarly integrity, without necessarily intending to deceive
- b) academic dishonesty which is an intentional disregard for the norms of scholarly integrity.

Academic dishonesty is not qualitatively different from other types of dishonesty. It consists of misrepresentation by deception or by other fraudulent means. In an academic setting this may take any number of forms such as: copying or the use of unauthorized aids in tests, examinations and laboratory reports; plagiarism; the submission of work that is not one’s own or for which previous credit has been obtained, unless the previously submitted work has been presented as such to the instructor of that course; aiding and abetting another student’s dishonesty; giving false information for the purpose of gaining admission or credits; and forging or falsifying McMaster University documents.

Students should be aware that the most common form of academic dishonesty is plagiarism. While some instances of alleged plagiarism turn out to be poor research methodology, such a finding is also damaging to a student, who is expected to be competent in the treatment of secondary materials. Ignorance of what plagiarism is or what its consequences are likely to be is not an adequate defense

The Senate Resolutions on Academic Dishonesty specify the procedures to be followed in the event that a student is charged with academic dishonesty. Copies of the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty may be obtained for the Senate website at: http://www.mcmaster.ca/policy/ac_ethics.htm.