Biochemistry
UNIVERSITY OF TORONTO

Sept. 6th, 2024

Dear BCH Specialists and Majors:

It's a new academic year and we hope the first week has been a good one! On behalf of the Department of Biochemistry, I'd like to welcome all returning and new students to our undergraduate classes and introduce myself as the new Undergraduate Coordinator and Associate Chair - Undergraduate Education. I'll be working alongside Dr. Walid Houry, the Associate Chair - Undergraduate Research and Mentorship, to help you navigate the biochemistry program and all it has to offer.

This newsletter contains useful information and tips for your year of study, including information about course selection, program requirements, research opportunities, important contacts and general information about the Department of Biochemistry. Please pay careful attention to the information provided for your specific year and the upper years within your program, as this may help prevent problems before they arise. We are here to assist you in your undergraduate studies and encourage you to ask questions that are not addressed in this information package. Feel free to reach out to either myself or Ms. Jennifer Haughton, our Undergraduate Administrator, or swing by the 5th floor of the Medical Science Building to say hi.

All the best for a successful year!

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FALL 2024 NEWSLETTER
BCH SPECIALISTS AND MAJORS

BCH SPECIALIST STUDENTS

SECOND YEAR STUDENTS

First, a sincere welcome to all of you, as you begin your first year in the BCH Specialist program! You will find the BCH faculty and staff to be very informative and helpful, so do not hesitate to approach them with any questions or concerns that you may have. Outlined below, are important details about required courses in second year, the Research Shadowing Program, and Research Project courses.

BCH242Y

Your first BCH course is **BCH242Y**; an excellent, full-year course intended to give you a comprehensive background in biochemistry and preparation for the 3rd and 4th year lecture and laboratory courses in the program. For BCH242Y, you will have lectures Mondays, Wednesdays and Fridays at 10 am in MSB 4171 and 4279. Tutorials are scheduled on Wednesdays 11 am-12 noon and on certain Wednesdays the whole morning (9 am-12 noon) is devoted to laboratories. This includes one introductory lab and four laboratory periods, encompassing each of the lecture sections: Proteins and Enzymes, Molecular Biology, Biomembranes and Membrane Proteins, and Metabolism.
The tutorial sessions will be held approximately bimonthly throughout the year and will be led by Nicholas Silver, a graduate of the biochemistry specialist program. He will lead discussions on material presented within lectures and address any questions arising from the lectures and past exams. Your attendance and participation at the tutorials is highly encouraged and will provide additional understanding of the course material and is excellent preparation for exams.
Please visit the BCH242Y Quercus website for details about the course, including the lecture, tutorial and laboratory schedule. **NOTE**: there is no recommended textbook for BCH242Y but there are some on course reserve at Gerstein, or you may choose purchase Biochemistry, Voet and Voet, 4th ed. (Wiley) for use throughout your undergraduate degree.

Other 2nd Year Course Requirements

The BCH Specialist program also requires a **Genetics** course (BIO260H or HMB265H).
Note: The large scope of the program's elective courses listed in the Arts and Science academic calendar include courses in a wide range of Life Science Departments, as well as Chemistry, Statistics, Computer Science, and Math.

It is important to realize that second year courses are more challenging than those taken in 1st year. **Since the course syllabus will state the various assessments and their due dates, leaving the preparation of any assessment until the week of its due date is likely to result in low grades which may reduce your acceptance into research opportunities and post-graduate programs. Reviewing lecture content often and keeping on top of each of your courses will have a positive impact on your academic experience.**

***Shadowing Program*:** "The Office of Research and Health Science Education (RHSE) in the Temerty Faculty of Medicine is committed to organizing activities that will help undergraduate Life Science students discern their future career paths. RHSE's annual Research Shadowing Program aims to expose students to the innovative research conducted within Temerty Medicine as well as its partner Institutes. In addition, we hope to encourage students to consider graduate studies in Temerty Medicine following completion of their undergraduate programs. With these goals in mind, this program pairs undergraduate students with graduate student or post-doc mentors from across Temerty Medicine's 14 different graduate programs.

Program Overview

The Research Shadowing Program aims to give students a glimpse into the research environment and the opportunity to ask questions they may have about the graduate student experience. Program mentors will give an overview of the nature of their research and how it may tie with concepts undergraduate students have learned in their courses. Additionally, students will have an opportunity to shadow their mentor as they perform their experiments and daily tasks.
The program will take place during the February Reading week**.** The length of the shadowing experience can range from **1 to 3 days** and must be mutually agreed upon by the undergraduate student and their mentor. The specific schedule and shadowing activities (which may take place in-person and/or online via Zoom, MS Teams, Facetime, etc.) will be at the discretion of the mentor.

Eligibility

All UofT Life Science undergraduate students are welcome to apply, regardless of year or program of study. Note**:** The number of applicants typically far exceeds the availability of mentors, thus, we encourage students to apply early. Students will be paired with available mentors on a **first-come, first-served basis, with priority given to those students who have no prior research experience**.

Application Process and Deadline

Students interested in participating apply by completing the registration form. During registration, students will be prompted to list their preferred graduate program(s) which will subsequently guide the pairing process. You can learn more about what each graduate program offers by visiting the RHSE website.

Questions?

For any questions regarding this program, please email medicine.hse@utoronto.ca.

Research Project Courses

*****The Specialist Program is designed as a route towards graduate/professional school as it offers more thorough training in biochemistry and practical laboratory experience in the sciences.*****

To develop your research skills and improve your laboratory techniques, a number of BCH-research project courses may be available to you after the successful completion of the 2nd year required courses: BCH242Y1, BIO230H1, and CHM247H1.

NOTE: There is an enrolment procedure for all project courses. Please review the course website for more information. One FCE from a research course may be used for the BCH Specialist program (14 FCEs total).
The first research project course, BCH372Y, is offered in the summer session following 2nd year.

The Biochemistry Summer Student Research Program (SSRP) is also another opportunity to enhance your research and laboratory skills. These summer research positions provide a stipend for students but do not provide a course credit. You may contact Jennifer Haughton (biochemistry.undergrad@utoronto.ca) about the application process in December/January. [*always include your student ID# at the end of your email when contacting the department*].

More information about the Biochemistry Summer Student Research Program (SSRP) is available at the end of this Newsletter.

THIRD YEAR STUDENTS

Welcome back! You will find your courses this year (**BCH340H, MGY311Y and the lab course BCH377H**) to be stimulating and challenging, bringing you that much closer to actual research in Biochemistry (if you have not participated in a research project yet!).

For **BCH377H**, please review the course Quercus site for this year's timetable, location, and other important information.

Course Selection

Review the extended list of elective courses that are available in the BCH Specialist program (see the Biochemistry | Academic Calendar (utoronto.ca) and Timetable Builder (utoronto.ca)).
It is highly recommended that you complete all your 3rd year requirements this year as you will need **BCH340H, BCH377H, and MGY311Y** for the advanced laboratory course **BCH478H** next year. When planning the courses that you will take in 3rd year, please ensure that you have completed your needed course requirements up to the end of 3rd year.

If you are considering dropping any course required for program completion, you are strongly advised to discuss your concerns with Dr. Patterson prior to taking this action. Most of these courses are offered only once a year and by dropping a course/s, you may be delaying your progress through the program. For example, you will not be permitted to enrol into BCH478H1 without the successful completion of BCH340H, BCH377H, and MGY311Y. Also, opting in CR/NCR for any of these courses is not accepted for program completion.

Research Project Courses

It is advantageous to have lab experience when applying to graduate school! The BCH Specialist program offers courses that provide research experience. One FCE from a research project course, may be used for the BCH Specialist Program requirements. Specialists may also take as many of the BCH research courses as they wish and use them as part of their 20 credits for their degree. **If a Specialist takes more than 1 FCE BCH research project course, it is recommended that the extra research FCEs is completed in a different laboratory.**

It is your responsibility to ensure that you have completed the prerequisites prior to enrolling in a research project course.

The 3rd year research courses are BCH 372Y (summer following 2nd year), and BCH374Y (Fall and Spring terms of 3rd year). You may enroll in either BCH372Y and BCH374Y. Additional research project courses include the summer course following 3rd year (BCH472Y) and during 4th year (BCH473Y).

Summer Research

After completion of your 3rd year BCH courses, you may be eligible for BCH472Y (summer research project course). It may also be possible for you to complete a paid, summer research position in a lab supervised by a Biochemistry faculty member and then take the BCH research project course BCH473Y in the same (or a different) lab during your 4th year.

Information about the Biochemistry Summer Student Research Program (SSRP) may be found at the end of this Newsletter.

FOURTH YEAR STUDENTS

Well, this is it, your final year! Congratulations on your progress! By using Degree Explorer, you can review your completed courses and those required for 4th year to ensure that you meet all the requirements of the BCH Specialist Program, the Degree Requirements, and the Distribution Requirement noted in the Arts and Science academic calendar. Arts and Science expects students to closely monitor their own progress throughout the program so that there are no surprises.

Course Requirements

You need to select 4 of the 4th year BCH/BCB/MGY/CHM lecture half courses listed in the Arts and Science academic calendar - **2 of these must be BCH 'H' courses**. Most of these courses prioritize enrolment for students in the Biochemistry programs. Email Dr. Patterson or Jennifer Haughton (biochemistry.undergrad@utoronto.ca) if you have questions. [*always include your student ID# at the end of your email when contacting the department*].

Most of the 400-level BCH courses require the successful completion of BCH242Y and MGY311Y. It is your responsibility to ensure that you have completed the prerequisites prior to enrolling into your 4th year courses.

BCH479H Seminar course

The seminar course, BCH479H is available for 4th year BCH Specialists. This will be a small class (maximum of 8 students). "The course will foster close interactions between students and faculty through the in-depth discussion of key papers in in four different areas of research. Critical thinking skills will be developed as students analyze data, present results, and discuss experimental methods and the significance of the findings. Writing skills will be developed through a project proposal and other written assignments." BCH479H can fulfill one of your 4 required H courses in 4th year.

BCH478H Advanced Lab

The advanced lab course BCH478H is required in 4th year. This course is built on experiences and skills acquired during previous lab courses. Oral communication, collaboration and discussion will be emphasized as these skills are vital to success in research and in the workplace. Please review the course Quercus site for this year's timetable, location, and other important information.

4th Year Research Project Course

If you are interested in the Research Project Course, BCH473Y, in June/July, email Dr. Craig Smibert, the Course Coordinator in June/July to discuss your goals. **NOTE: Consideration will be given to students who have successfully completed BCH340H, BCH377H and MGY311Y. BCH478H is also a co-requisite for BCH473Y** (the only exception to this rule is if you take BCH 473Y in a 5th year and already have a credit for BCH478H). Check the **BCH473Y website** for more information about eligibility and the enrolment procedure.

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BCH MAJOR STUDENTS

SECOND YEAR STUDENTS

First, a warm welcome to all of you, as you begin your first year in the BCH Major program! You will find the BCH Faculty and Staff very informative and available for assistance during business hours. Outlined below, are important details about courses in second year and what you should be aware of regarding program requirements. Since many of you will be combining your BCH Major with a second Major, you are strongly advised to pay careful attention to the requirements of both of your programs.

BCH210H

Your first Biochemistry course is the fall half-course **BCH210H (Biochemistry I)**; an excellent preparatory course in Biochemistry for students with broader scientific interests. Please review the **BCH210H** course Quercus site for important information**.** Lectures are held on Tuesdays, Thursdays at 9 am and Tutorials are held on Fridays.

Help Session tutorials in **BCH210H** are held on Fridays from 9-11am or 11 am - 1 pm. In tutorials, questions and topics from the lectures are taken up, including sample exam questions. There is no recommended text for BCH210H but there are textbooks on course reserve at Gerstein Library.

Please remember you will do best when you attend and pay attention to each lecture and tutorial. You will also do better if you take notes during these sessions, as this will help you recall the concepts more easily afterwards. **If you miss a lecture, you will miss course information and the lecturer's guidance, and this will likely result in a lower final grade in BCH210H**. Attending regular tutorials will enable you to work out any problems with the lecture material and familiarize yourself with the sample exam questions and earn participation grades.

*****NOTE: When you have successfully completed BCH210H in December 2024, you are eligible to enroll into BCH311H (Biochemistry II) and BCH370H (Laboratory Course) starting in January 2025. The only prerequisite for these courses is BCH210H.*****

Important Information for the Combination of Majors

Majors also need to combine their BCH Major with a Major from another program. The required courses that you need/select for the two majors must have at least 12 FCE's that are distinct.

In other words: take the BCH Major and list the 8 FCE credits you need here. Then look at your second major. You should be able to identify at least 4 FCEs that are different in the requirements for the second major. (FCE = Full Course Equivalent)

BCH Major (8 FCE)		**Human Biology Major (8 FCE)**	
BIO120H, BIO130H	**BCH 370H**	BIO120H, BIO130H	**PSL300H**
CHM136H	BCH 311H	CHM135H, CHM136H1	**PSL301H**
CHM135H	**BCH 340H/CHM217H/CHM220H**		
		CSB329H1, CSB331H1	
MAT135H, MAT136H		MAT135H, MAT136H	
BCH210H	BCH422H	BCH210H, **BIO220H**, BIO230H1	
BIO230H	BCH426H	BIO260H/HMB265H	
CHM247H			

In the example above, you can see that the courses in the BCH Major that differ from the HMB Major are noted in bold. This schedule has 4 FCEs in the BCH Major that are different from the required courses in the HMB Major.

If you are in doubt about fulfilling this double major, please email Dr. Patterson or your college registrar's office. BCH Majors who also have a PSL or PCL Major should be particularly careful as the 12 FCE rule may be challenging to fulfill.

THIRD YEAR STUDENTS

Congratulations on having successfully completed second year!

Program Requirements

It is important, as noted in the comments to 2nd year students, that you check your required courses in your two Majors to ensure that you will have at least 12 distinct FCEs by the end of 4th year. Students in the BCH/PSL and BCH/PCL Major programs may contact Dr. Patterson for further clarification of this requirement. All students are strongly advised to attend to this issue *before* classes begin or before the end of the fall session.

Aim to complete all of your 3rd year requirements this year. You do have priority for 3rd year course selections in Biochemistry as a 3rd year student. If you leave 3rd year courses until your 4th year, you may not have space in your timetable for 3rd year courses as conflicts may arise with the 4th year courses. Many of the 4th year BCH courses also require the successful completion of the 3rd year molecular biology course **BCH 311H (Biochemistry II, Nucleic Acids and Biologic Information Flow**).

Popular and approved 300-level courses to complete the 8 FCEs are: CHM310H, CHM347H, CSB331H, CJH332H, IMM340H, IMM350H, LMP301H, MGY377H, MGY378H1, PSL300H, and PSL301H.

NOTE: you may enroll into BCH 311H and/or BCH 370H in your 2nd year after successfully completing BCH 210H in the Fall session.
**** BCH311H is the required 3rd year molecular biology course. PSL350H cannot be used for BCH Major Students.****

****Most students choose to complete BCH370H in their 3rd year**

Withdrawing from any of the required courses in your 3rd year may result in a delay of your progress through the program. You are encouraged to discuss your concerns with Dr. Patterson prior to taking this action. Also, opting in CR/NCR for any of these courses is not accepted for program completion.

You may also be thinking about **employment** at this time or possibly entrance into professional programs. Majors can combine BCH with a Major on the Arts and Humanities side. English and BCH could very well lead to careers in scientific journalism. Visual Studies and BCH could lead to scientific illustrations, programming of molecular structure and science in communication. Economics and Biochemistry could lead to careers in the financial investment industry. You can certainly e-mail Dr. Patterson with questions about medical school or concerns about courses.

FOURTH YEAR STUDENTS

Welcome back! You are now in your final year!

Program Requirements

BCH Majors in 4th year are expected to review their course credits and the courses they intend to take this year and ensure:

1. You meet the requirements of each of your two Major programs (if that is your program combination) and you have at least 12 distinct FCEs among the designated required courses for your two Majors

2. You meet the Degree Requirements and Distribution Requirements noted in the Arts and Science academic calendar

3. You have utilized Degree Explorer to obtain a snapshot of your schedule

If you have difficulty enrolling in a 4th year BCH lecture course/s, please email Jennifer Haughton (biochemistry.undergrad@utoronto.ca) for assistance [*always include your student ID# at the end of your email when contacting the department*].

If you have not already done so and you are in the BCH/PSL Major or a BCH/PCL Major programs, please email Dr. Patterson if you are having difficulty with the 12 distinct FCE rule for required courses in BCH + PSL or BCH + PCL.

SOME HINTS FOR FIRST YEAR STUDENTS

If you have friends or relatives entering Life Science at the First-Year level, I invite you to share the following information to aid them in making their decision about their Program of Study.

Course Requirements

1. **Both our Specialist and Major programs require that you complete at least four FCEs (full course credits) from the prerequisite courses in 1st year prior to applying to these limited Collaborative Life Science programs. Students usually complete five FCEs in their first (and each subsequent) year.** If you leave a course or two until the summer, your applications to the BCH programs may need to be considered at the end of August (after most students have entered programs of study and selected their upcoming courses).

2. **Prerequisites for all our courses are required without exception**. So, if you do not have the necessary prerequisites (e.g. CHM135H and 136H for BCH242Y and BCH210H), you will not be permitted to enrol in these courses. You may initially register for the courses, but within the first few weeks, prerequisite checks will be performed randomly and students who do not have the required prerequisites will be removed.

3. If you are transferring from UTM or UTSC to St George to begin your 2nd year, your first year CHM course at UTM or UTSC will NOT give you an equivalent credit for CHM136H (organic). Thus, it is wise to take this course over the summer at the St George campus if you are planning to take courses downtown for 2nd year.

4. The BCH Specialist and several of the other Medical Life Science Specialist programs require a first year PHY credit. It is recommended that you complete this course in 1st of 2nd year, since taking the PHY requirement in later years may create conflicts with upper-year courses. If you intend to pursue graduate studies and a career in research, your best choice is a Specialist program that offers in-depth practical laboratory training.

5. Consistently showing up for your classes and attending scheduled office hours enhances your learning process and can increase your academic performance.

6. As soon as you begin to experience difficulties with the lecture material, your first point of contact is the Course Coordinator.

Double Major or Specialist Program?

Major programs have been quite popular for many years and certainly provide students with a diverse selection of courses. You can also combine strategically two Majors to follow a particular career path.

Students are often interested in applying to professional schools (medicine, dentistry, veterinary and chiropractic schools) and naturally have an active, ongoing interest in maintaining high grades for entry. As a result, students choose Major programs and often find themselves in larger classes of more general courses offered at the university. As well, if there is a choice, Major students may opt out of laboratory or research courses since there is the perception that these courses are time intensive.

It is important to consider the following when deciding to select the Major or Specialist program:
If you are interested in a research career either at the university, in a hospital research institute, in government or industrial laboratories, an appropriate Specialist program will give you more theoretical and practical lab and research training. This is the best route to graduate school and research careers (including clinical research).

1. If you are considering a Major program as a route to a professional school, one of the admission criteria will be the achievement of a minimum mark in the courses for entry and/or a minimum cGPA. Often, only a small percentage of applications are successful. If your applications are unsuccessful, you may find that your alternate career choices are limited especially if you lack the advanced laboratory or research experience, which is a principal feature of Specialist programs. Specialist programs are the preferred route into Graduate School and will expose you to advanced practical and research experience. As a graduate of the Specialist program, you will be a member of a small class of highly trained students who will have greater access to one-on-one guidance as you personally get to know Biochemistry faculty members. As a Major student, your graduating class will be larger and you may not have the practical skills needed to further your education.

2. A **very** important feature of professional school applications are **letters of reference**. These letters require knowledge of your academic performance beyond your term test and exam results. The best letters will inevitably come from small classes where the instructor knows you well or research courses where you have a supervisor who interacts closely with you. These are hallmarks of Specialist programs. These important interactions will not arise if you take larger classes and avoid laboratory or research courses. You can imagine that a reference letter that says: “Student X was a member of our class, received a grade of 85% (class average 73%) and thus I can recommend X to you.” is **insufficient** when professional schools are asking detailed assessments about initiative, leadership, maturity, cooperation, integrity, problem solving, fluency in spoken and written English,

ability to communicate, relate to others and self-directed learning and critical thinking. A referee who is familiar with your academic performance will be highly beneficial.

3. At the University of Toronto, the Temerty Faculty of Medicine places tremendous value in research. The phrase "From Bench to Bedside" stresses the very substantial link between research and successful clinical treatment. The research experience acquired in the Specialist programs is very much an asset for professional applications. Research experience will also increase your chances of entry into graduate school and as a successful graduate student with a graduate degree you can also apply to professional schools.

4. **The grade averages in specialist courses are often just as good or better than average grades in general courses.** The Specialist courses may be more intensive than general courses but, as it is your future that is in the balance, it is worth it to spend the extra time.

5. **Relying on friends and colleagues for advice about programs or courses is not helpful in the long term.** You are your own person, and you owe it to yourself to find out all the details about different programs before making a program decision. Consult with students who are performing well and are in the programs that interest you. Consult with the Course Coordinators. Consult with Dr. Patterson. Make an informed choice. Think about where you will be in four years and what career, or career path is your best choice and choose a program that can get you there!

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BUSS

Throughout the academic year, the Biochemistry Undergraduate Students' Society (BUSS) organizes a variety of extracurricular events for BCH students. These may include the **Biojeopardy** evening which pits students and faculty from BCH, IMM and MGY against each other, as well as lunch and learn information sessions, an industry networking event, course selection seminar, study sessions etc.
If you have any further questions about the nature of required courses and wish to have a student perspective (level of difficulty, method of preparation for examinations, etc.,) you may email the BUSS Executive team: uoftbuss@gmail.com

BIOCHEMISTRY SUMMER STUDENT RESEARCH PROGRAM

At the end of 2nd or 3rd year in the Specialist Program, and especially after intensive, formal lab training in biochemistry (**BCH242Y**, **BCH377H),** you may be able to find a summer paid research opportunity within a Biochemistry research laboratory! Students in the Major Program are also encouraged to seek out summer paid research opportunities offered in a Biochemistry research laboratory. In the past, eligible 3rd year students and, exceptional 2nd year students have been accepted into the Biochemistry Summer Student Research Program (SSRP). In December/January, you may email Jennifer Haughton (biochemistry.undergrad@utoronto.ca) about the application process. [*always include your student ID# at the end of your email when contacting the department*].

Students who choose to have a summer research experience for course credit, can still participate in the Biochemistry SSRP by enrolling in one of the summer project course: BCH372Y/BCH472Y. During the Fall session, you may email Jennifer Haughton (biochemistry.undergrad@utoronto.ca) and Dr. Houry (walid.houry@utoronto.ca) for more information about the Biochemistry summer research courses for credit. [*always include your student ID# at the end of your email when contacting the department*].

Just before the New Year, you may also consider approaching the research institutes at the hospitals for paid summer opportunities located in their labs. Pay careful attention to their application process and deadlines.

RESEARCH and HEALTH SCIENCE EDUCATION (RHSE)

Interested in other research and graduate opportunities? You can explore these opportunities by checking out this website: Research Opportunities for Undergraduate Students | Research and Health Science Education (utoronto.ca)

RHSE also offers an annual information fair (Temerty Faculty of Medicine Graduate Recruitment Fair | Research and Health Science Education (utoronto.ca), and we encourage you to attend this event and as many events as you can to learn more about the interesting and exciting graduate and undergraduate programs within the Temerty Faculty of Medicine!

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CONTACT INFORMATION

The Biochemistry Faculty and Undergraduate Office are available to assist you.

Dr. Patterson, Associate Chair – Undergraduate Education
biochemistry.undergrad@utoronto.ca

Dr. Houry, Associate Chair – Undergraduate Research and Mentorship
walid.houry@utoronto.ca

Jennifer Haughton, Undergraduate Administrator
biochemistry.undergrad@utoronto.ca

Contact information for faculty members involved in specific undergraduate courses can be found on the website: Biochemistry, University of Toronto – Undergraduate Courses (utoronto.ca)