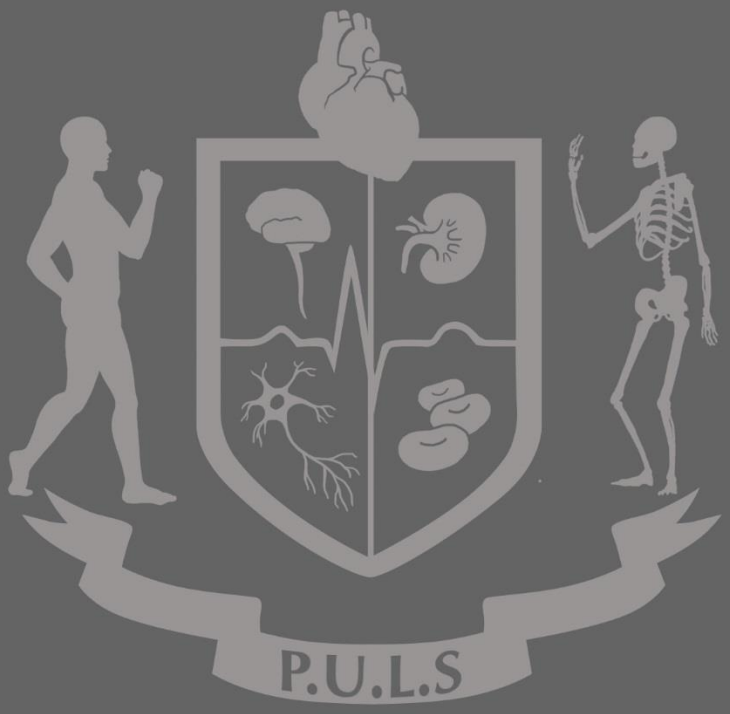

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PHYSIOLOGY HANDBOOK

Everything you need to know about Physiology at McGill

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A Message from the Editor-in-Chief

Dearest Physiology/Honours Physiology/Joint Major students,

On behalf of PULS, as well as the Department of Physiology, I would like to extend a warm welcome to those of you getting exposed to Physiology for the first time. I would also like to extend a warm welcome to current Physiology students who are perusing this Handbook either because they stopped watching Netflix after Walter White died (belated spoiler alert huehuehue), or because they're looking for advice on what courses to take next year and how they can get involved with PULS.

Regardless of where you're coming from, the PULS PHGY Handbook should serve as an excellent guide for you to get acquainted with what Physiology has to offer. After a nearly 6-year hiatus, the new and improved Handbook not only allows me to fulfill my constitutional mandate, but it also describes, in 3 simple steps, the keys to success in the Physiology program:

1: Choosing the right major. 2: Choosing the right courses. 3: Getting involved.

The Handbook serves as a comprehensive guide to achieving all of these three steps. It gives a description of the courses, the topics covered, how to do well in those courses, and a description of the professors of those courses. The 'Getting Involved' section describes all of PULS council, as well as the numerous events and services provided by PULS on a yearly basis. Just a disclaimer on using the Handbook: because this Handbook was published in the 2014-15 school year, we cannot guarantee that every single course mentioned here will be the same in the years to come. For that reason, we have included the semester corresponding to each course besides the course number. Additionally, the events and services provided may also be subject to change year after year, depending on the kind of council concerned.

Nonetheless, I hope you find the Handbook entertaining enough to be worthy of your time, and that it helps you in your journey to wherever you want to be in life. This is PULS' gift to the students, and I sincerely hope that you enjoy it.

Best Wishes,

Omar Khan, PULS VP Academic

Step 1: Choose the right program!

Majors Physiology: The Majors Physiology program is a 65 credit biomedical science major program in which students start out by learning the basics of molecular biology, genetics, anatomy, and physiology in first year (U1). The second year expands on specific things learnt in U1, and involves 4 challenging intermediate level physiology classes which expect students to critically assess current literature and apply higher level analytical skills. The third year is mainly spent fulfilling the flexible upper-level science and upper-level physiology requirements, and gives you the option of taking everything from Artificial Cells, to Molecular Physiology, to Advanced Cardiovascular and Advanced Respiratory Physiology. The program also involves 6 total credits of lab work, which are split between two introductory physiology labs in U1 as well as the BIOL 301 lab, which may be taken in either U2 or U3.

Honours Physiology: The Honours Physiology program consists of 75 credits and has a greater focus on research compared to the Majors program. In U2, you will take PHGY 351 which introduces you to various laboratory techniques used in physiology. This is followed by PHGY 461 in your U3 year, where you'll work through a research project under the supervision of a physiology professor. You'll also have a great opportunity to be mentored in PHGY 359 where you're paired with a professor to discuss papers, career options, or life philosophies. To become familiarized with academic literature, PHGY 459 takes you through rounds of different professors in physiology who present several studies. If you're curious about research, this is a great program to learn about the skills necessary to develop and answer scientific questions. One thing to note is that you will have to take ANAT 261 instead of ANAT 214 in order to qualify for the Honours program. An application is required for entry into this program and is based primarily on cGPA, a letter of intent, and possibly an interview. In addition, if interested in the BSc/Masters fast track program, you must be in the Honours or one of the joint programs to apply.

Physiology and Physics: This is an 80-credit Joint Majors program that's known for its rigor and intensity. You need to be especially proficient in the Math and Physics part of the program to succeed, but with some hard work beforehand, it's possible to get yourself up to speed. The degree of Physiology and Biology in this program is not that high, and you essentially only need the core 200-level and 300-level PHGY courses for this program, because many of the other courses in the Majors and Honors Physiology streams are replaced by Physics and Math courses, like Thermodynamics, Classical Mechanics, Differential Equations, etc.

Perhaps the most rewarding part of this program, however, is taking courses that integrate the Biological Sciences with Math and Physics, like MATH 437, PHYS 413, and BMDE 519. These classes really help you see Mathematics and Biology from a different perspective, and if you're open-minded enough, can even change the way you think! You also have the option to do interesting research that incorporate both the Math/Physics side of Science and the Biological side of Science in your 461 project! Although there isn't much room for electives, especially for those considering fulfilling the prerequisites of medical school, it's still possible to take courses in the summer and electives during the year that help you fulfill those requirements.

Physiology and Math: The Physiology and Math program is very similar to the Physiology and Physics program, with regard to the core MATH courses, the integrative courses, and the core Physiology courses. The main difference is that instead of the core Physics classes, you'll have to take BIOL 200, 201, and BIOL 309 (another integrative course between Math and Biology), as well as some additional MATH classes, like Probability, Statistics, PDEs and Analysis. You should be comfortable with theorems and proofs for these courses (especially for Analysis), because that skillset is required if you need a degree with 'Math' in it. Other than that, the programs and the general feeling is fairly similar between the two Joint programs.

Step 2: Pick the right courses and do well in them!

Typical U1 Courses

CHEM 212: Organic Chemistry I (Fall 2014)

Topics covered: Organic structures, alkanes and cycloalkanes, stereochemistry, alkyl halides, alkenes and alkynes, aromaticity, reactions of aromatic compounds, conjugated unsaturated systems.

The Professors:

Dr. Pavelka: Covers the first half of the course (organic structures to alkyl halide reactions). An incredibly clear and straightforward lecturer (and entertaining too!), her lectures slides are also very organized and easy to follow. She emphasizes the most important ideas in both her lectures and on her slides. Really wants her students to do well. However, it should be noted that her material is easier in nature than that of Dr. Tsantrizos.
Dr. Tsantrizos: Covers the second half of the course (alkyl halides to conjugated unsaturated systems). Her material is more difficult, and unfortunately her lectures are not as clear as Dr Pavelka's. She walks you through many examples of reactions, which are important to know for exams, but does not explain the theory behind them. Her lecture slides also have less important information on them, so you will need to be diligent in taking notes. If you are confused it is highly recommended to read through pertinent sections in the textbook.

How to do well: You cannot do well in this course without doing practice questions. The material from organic structures to stereochemistry is not too difficult, but everything past that involves reactions and 90% of the questions on the exams will involve reactions. In order to predict the products of a reaction given to you, you will need to practice. There are any practice questions in the textbook and posted on MyCourses, so take advantage of them! Overall, listen to all lectures carefully (rewatch the recordings if you need to!) and watch the organic bites as well (these are "pre-lecture" lectures posted on MyCourses) as there will be material from them on the exams.

Textbook: Solomons Organic Chemistry, 11th Edition

CHEM 203: Survey of Physical Chemistry (Fall 2014)

Topics covered: The First Law of Thermodynamics, The Second Law of Thermodynamics, and Chemical Kinetics

The Professors:

Dr Sanctuary: Unlike most science professors, Dr Sanctuary hand writes and projects his notes during each class. Thus, there are no "lecture slides". His lectures are sometimes unorganized, but he always stresses the information that is important to know. A very good resource is his lecture summaries, where he summarizes the key points and examples of each lecture. He is also very helpful during office hours and genuinely wants students to do well.

How to do well: His lectures stress the important information you need to know; however, they can be confusing. Your most helpful resources will be his lecture summaries and the textbook, which is a must. During lectures he will take you through the theory, but you will need to practice questions on your own. If you do the recommended practice questions and understand the theory behind them, you will undoubtedly do well. The exams are very fair and straightforward, with a balance of problems and theory questions.

Textbook: Physical Chemistry by Laidler, Meriser, and Sanctuary (note: only e-book versions of this textbook are available; they are online for purchase).

PHGY 209: Mammalian Physiology 1 (Fall 2014)

Topics covered: Body fluids; Transport mechanisms; Blood; Immunology; Nerves/synapses; Central nervous system: sensory/motor pathways, cognitive functions;

Professors (Dr. Wechsler, Dr. Shrier, Dr. Gold, Dr. Ragsdale, Dr. Cook): *All* of these professors are excellent. They are knowledgeable, approachable, and clear in lecture. Feel free to email any of them or ask questions after class, should you have any doubts regarding their lecture material. Their PowerPoint slides are helpful in consolidating and clarifying key concepts/terms learned in class, but you should *not* rely solely on the slides to understand course material. Undergraduate Student Course Assistants (USCAs) are also available to answer any questions.

How to do well: The two exams (30% midterm, 70% final) are *very* straightforward and quite fair. You will succeed on the midterm by reviewing lecture recordings, PowerPoint slides, your personal lecture notes, and/or NTCs if you choose to purchase them; then, assess your understanding of each lecture/topic by

completing all the multiple-choice USCA questions (uploaded on MyCourses) for that lecture/topic. USCA questions mimic the format and difficulty of exam questions, so they prepare you well. For condensed studying: allow ~2-3 days of condensed review before the midterm, and ~3-4 full days of condensed review before the final. Pro-tip: if watching lecture recordings on a time-crunch, download the lecture from MyCourses and watch it at 1.5x or 2x speed; you will still be able to understand it clearly, glean all necessary information, and save time! For studying throughout the semester: devote a couple of hours at the end of each week to review that week's lecture material, and complete that week's USCA questions.

Textbook: *Vander's Human Physiology: The Mechanisms of Body Function, 12e or 13e*

CHEM 204: Physical Chemistry for the Biological Sciences (Fall 2014)

Topics covered: Molecules and their Energies, a Brief Overview; Attractive Forces between Molecules; The 1st Law of Thermodynamics – Conservation of Energy; The 2nd Law of Thermodynamics – Ever-Increasing Entropy; Equilibrium in Aqueous Solution; Macromolecules, Chemical Aspects of Biology and Biomedical Engineering.

Professor (Dr. Christopher Barrett): *Very* approachable and welcoming. A truly compassionate professor! If ever you have doubts/questions about lecture material, email him or the TA, approach him after class, or visit his office during his office hours. You can also attend weekly tutorials with the TA. Dr. Barrett genuinely wants all his students to succeed, and certainly provides them the resources to do so. Note: this course is markedly different when taken with another professor, so the following notes are only relevant/valid if you take CHEM 204 with Chris Barrett.

How to do well: Exam questions (two 25% midterms, one 50% final) are taken *directly* from lecture material (i.e. what the prof says in lecture and what is presented on PowerPoint slides). The textbook is only meant as a guide to help explain and elaborate upon lecture material. It is not difficult to do well on Dr. Barrett's exams. Before each midterm, re-watch lecture recordings and review personal lecture notes, in conjunction with PPT slides. At the end of a week's lectures, complete the corresponding Problem Set (questions and solutions posted weekly on MyCourses) to assess your understanding/absorption of lecture material. The Problem Sets allow you to practice the calculations and mathematical formulas studied in class. Use practice midterms (posted on MyCourses in the days prior to the real midterm) to "get a feel" for the questions

that will appear on the exam; if there is a concept you do not understand on the practice midterm, review it in your notes.

Textbook: *Physical Chemistry for the Biological Sciences*, by R. Chang, 2000

PHGY 212: Introductory Physiology Lab 1 (Fall 2014)

Topics covered: Lab 1: Biological signal acquisition – types of signals, waveform acquisition, using and interpreting the EEG. **Lab 2:** Blood – erythrocyte fragility, erythrocyte sedimentation rate, hemostasis, blood-cell indices, blood-typing. **Lab 3:** Immunology – Enzyme-Linked Immunosorbent Assay, hemagluttination, complement-mediated cytotoxicity. **Lab 4:** Resting membrane potential – theory of RMP, Nernst equation/theory. **Lab 5:** Compound action potential – nerve anatomy, biphasic extracellular recording, characteristics of the CAP, strength-duration curve, conduction velocity, refractory periods (relative vs. absolute)

Professors and Technical Staff: (J. Martinez Trujillo, R. Jones, N. Bernard, M. Glavinovic, K. Krnjevic, D. Marghescu, R. Siegrist-Johnstone)
There are five, 50-minute PHGY 212 lectures in the semester. Each lecture corresponds to one of the 5 labs. During these lectures, the professors introduce the concepts/methods studied in the lab. They also attend the lab sessions and will help you with any doubts/questions you encounter during the lab. The Technical Staff are *very* helpful during the experiments, so listen to their pre-lab instructions and ask them if you are unsure of any procedures/methods.

How to do well: LABS (30%): Before attending each lab, *fully read the corresponding lab manual* on MyCourses and consult the Virtual Lab (http://www.medicine.mcgill.ca/physio/vlab/default.htm) if you are confused about any concepts/methods discussed in the lab manual. The Virtual Lab explains all PHGY 212 lab content in a clear and organized manner, complete with diagrams/graphs/equations; it also helps you understand the underlying physiological phenomena studied in each experiment. During the lab, you are given a copy of the lab manual and a lab report containing questions to be submitted in the end of the lab. Some of these questions are very specific, and require a thorough understanding of the lab material (ergo, study the lab manual and Virtual Lab before attending the lab!!!! You're usually not allowed to bring pre-made notes into the lab!!!!). **EXAM (70%):** For condensed studying: devote ~2 full days before the final exam to study each of the 5 experiments thoroughly on the Virtual Lab. Make sure you understand all key terms/concepts that are explained on the Virtual Lab (perhaps make flashcards for each important term/concept). Review the five lab reports that you submitted during the semester (they will be returned to you by the TAs). For studying throughout the semester: after the TAs

return each lab report, review all questions and answers and make sure you understand your errors on the report (perhaps consult the Virtual Lab to help you find your mistakes). Finally, practice with old PHGY 212 final exams (uploaded onto www.docuum.com/McGill).

ANAT 261: Intro to Dynamic Histology (Fall 2014)

Topics Covered: Microscopy techniques, skin, cartilage, bone, muscles, blood vessels, respiratory system, digestive system, urinary system, nervous system. However, this is not gross anatomy, but *histology*! It's all about those cells and tissues.

The Professors:

Dr. Mandato: A hilarious, passionate, intelligent professor who knows his material but presents it in a straightforward and understandable manner! He takes time to explain the concepts so they make sense while in lecture, while still leaving time to answer questions. Professor Mandato is going to teach you the alphabet of histology, so internalize it because after his section, things get quite complicated quite quickly.
Dr. Morales: An intelligent man, Professor Morales will teach you more about the structure of the human body than you ever wanted to know. A very thorough professor, Professor Morales does cover his material fairly quickly, but this is due to the sheer amount of material that he has to cover. Within a few weeks of starting with Dr. Morales, you'll have gone from learning the alphabet of histology to writing essays.

How to do well: In order to understand the difficult concepts of organ system organization, you first must understand the basics. Internalize the first section that Dr. Morales teaches as they are components which will be present in EVERY SECTION FOR THE REST OF THE COURSE! To do this, ask questions in Mandato's section (just make sure they're relevant to the course), listen intently to Morale's, use the labs to cement knowledge not learn it for a first time, and learn to DRAW! On the final, drawing is worth about half of your marks. As you're studying, draw out the histological slides and be able to know the differences which appear as you progress through a system. Also, the lab exam gets a bad rap for being killer – but it's not if you prepare adequately. Use the labs to really test your knowledge, not learn for the first time. When prepping for the final, use the digital slide box and play histological "Where's Waldo?" Also, utilize your TAs for practice questions! Lastly, there is a 10% assignment which you should use to boost your grade - do not procrastinate and let it damage your mark. Get started early and ask your TAs for guidance, they're great for that!

Text: Junqueira's Basic Histology, 13th edition (Supplemental, required)

BIOL 200 (Bureau/Roy): Molecular Biology (Fall 2014)

Topics Covered: DNA basics, DNA repair, transposable elements, molecular biology techniques, transcription, mRNA processing, mRNA export, translation, post-transcriptional modification, chromatin modification,

The Professors:

Dr. Bureau: A good-natured man who cares passionately about mobile DNA. His section is more about memorization then application, so really study the details of his section, but not necessarily applying them (e.g. know how many base pairs coil around a histone).
Dr. Roy: Very charismatic, Professor Roy makes you apply your knowledge of molecular biology. His section is all about teaching you techniques to accomplish something in biology. Understand and know how to apply his techniques instead of just memorizing his facts.

How to do well: For Bureau, memorize everything. Very specific details, little numbers and facts, even the examples are significant. Nothing is too small or insignificant to be tested on. Focus mainly on the transposable elements of DNA as that is Bureau's field of interest and he does enjoy testing those sections thoroughly. For Roy, focus on being able to put MANY TECHNIQUES TOGETHER in order to accomplish something (i.e. Purify a specific strand of mRNA, turn it into DNA, cut that DNA and insert it into a vector for protein expression). OVERALL NOT A BAD COURSE, VERY FAIR, AIM TO TAKE THIS SECTION IF POSSIBLE!!!

BIOL 202: Basic Genetics (Winter 2014)

Topics Covered: Mono- and Dihybrid crosses; Mendelian genetics rules; Sex linkage; Cytoplasmic inheritance; Genes, chromosomes, and patterns of inheritance; Organelle genomes; Linkage and recombination; Linkage mapping; From genes to phenotypes; Molecular markers; chromosomal changes; Immunogenetics; Somatic cell genetics and gene therapy; Cancer genetics; Genetic basis of quantitative traits; Population Genetics; Mutation Genetics of Transposable Elements; Genetics & Gene Regulation; Bioinformatics & Functional Genomics; Genetic Dissection; Genetics of Development; Non-Mendelian Inheritance & Disease.

The Professors:

Dr. Schoen: Great prof. He goes fast but you're able to understand everything he says clearly. His section is the easiest and his questions are straightforward.
Dr. Chevrette: Awesome guy, he's very funny, sometimes his class feels like a stand-up comedy routine, which is awesome at the beginning, but it eventually gets a little boring. His section is not that hard, but it can sometimes be hard to follow what he's talking about.
Dr. Hipfner: His material resembles BIOL 200 a lot but it's still pretty challenging. He skips over a lot of stuff though, and tells you to read it from the textbook, so you have to crack open the textbook for his section, but when he goes over something, it is clear and easy to understand. His final questions were very challenging, however.

How to do well: The exams are not going to be easy! Especially with Dr. Hipfner. Buy the NTCs, since they are very helpful, and do problems from the textbook. The more problems you do the better (they are at the end of every chapter). Also go over the textbook for Dr. Hipfner, but you don't have to go over the entire chapter, just the sections he doesn't cover. In summary: NTCs or lecture notes, textbook for the sections Dr. Hipfner doesn't cover, and as many problems as you can.

Text: Custom version of: Introduction to Genetics Analysis, 10th edition, by Anthony Griffiths et al , and Genetics: A Conceptual Approach, 2nd edition, by Benjamin Pierce, with a solutions manual.

PHGY 210: Mammalian Physiology 2 (Winter 2014)

Topics Covered: Endocrinology, The Respiratory System, The Cardiovascular System, The Digestive System, The Renal System.

The Professors:

Dr. White: He's a very good teacher, cracks funny jokes sometimes, and he provides excellent notes on his slides. His section is not easy however, because it requires a lot of memorization, and he also goes over the material a little too fast sometimes.
Dr. Lauzon: Her section is a bit difficult, but she provides great notes on everything.
Her exams questions are a little on the difficult side.
Dr. Guevara: A great prof. He keeps the class engaged by asking a lot of questions. A lot of his lectures are in the form of questions to students. His section isn't hard and requires very little memorization, but you have to understand his

material very well. His slides provide useful information for studying his material, but be careful, his exam questions are challenging.
Dr. Wechsler: Absolutely amazing, she goes over everything very slowly and very clearly, and her slides provide all the information you need to study. Her section, however, has a lot of detailed information, and thus requires a lot of memorization; she asks detailed questions on her exams.
Dr. Takano: She's an MD! What more do you want? Her presentation of the material is incredibly clear and her exam questions are very fair.

How to do well: Study the notes and slides well, either take notes for the sections that don't have provided notes, or buy the NTCs. For Dr. Guevara's section make sure you have a thorough understanding of the concepts studied, and for Dr. Wechsler's section make sure you know the material somewhat in detail (i.e. some memorization has to be done). The same goes for Dr. White's section; you have to do some memorization of his material, especially the diseases caused by the lack or overproduction of certain hormones, since he loves to ask those types of questions.The textbook is not needed to do well, although it could be useful for explaining some concepts if you didn't understand them in class.

Text (if any): Vander's Human Physiology – The Mechanisms of Body Function.

PHGY 213: Introductory Physiology Lab 2 (Winter 2014)

Topics Covered: The CNS lab, Endocrinology Lab, Cardiovascular Lab, Exercise Lab, Respiration Lab.

The Professors:

Dr. Vollrath: Great lecturer, with straightforward exam questions. Her lecture is not related to PHGY 210 and provides little help with the lab.
Dr. White: A great prof, his lecture is simple and similar to his material in PHGY 210 and it provides a lot of help with the lab, his questions on the final are mostly theory questions.
Dr. Guevara: Awesome guy, he engages the students by asking a lot of questions. He has a lot of information in his lecture that is not needed for the lab, but it does provide help with the lab. His exam questions are a little challenging; he actually shows up to the lab and asks you a few questions to help explain the material more, and provides assistance with the lab when needed.
Dr. Magder: Good lecturer, clear presentation of the material, his lecture is helpful for the lab, and his section is very interesting. He shows up to the lab.
Dr. Mortola: Do not come late to his lab because he might not like it! He also doesn't allow any talking in the lab. His lecture is actually a post-lab lecture in which

he presents the results of the lab and explains them. He is a good lecturer, and his section is easy.

How to do well: Before every lab, go over the lab manual and the virtual physiology lab which is very helpful. The lectures are less important for the actual labs, but you should go over them quickly as well, know well what you'll be doing in the lab. Since students are put into groups, you can always rely on your group if you get confused. As for the final go over the lectures and the virtual physiology labs along with the lab manuals; you might be asked you some questions about the actual procedures. Most importantly, go over the lab reports and have a very clear understanding of each question and the reason for its respective answer. Have a clear understanding of the concepts presented in every lab; those will come from the lecture and the virtual labs. Memorize all the equations because you won't be given any equations on the final.

CHEM 222: Introduction to Organic Chemistry 2 (Fall 2014)

Topics Covered: HNMR, CNMR, IR, Mass Spectroscopy, Reactions of alcohols, ethers, carboxylic acids, aldehydes, ketones, and amines.

The Professors:

Dr. Harpp: An excellent professor who knows what he's teaching inside and out. Professor Harpp's mastery of chemical spectroscopy is evident in the depth of his teaching as he goes into the great detail of chemical spectroscopy. While he teaches at a good pace, sometimes the material can be a little dry. The spectroscopy taught is completely new, so it does take some effort to grasp, but once you understand it, it becomes very straightforward.
Dr. Perepichka: Also a good instructor, Professor Perepichka cares about his students and wants them to succeed. He teaches synthetic organic chemistry in a very interesting manner, using many intriguing real life examples. While the sheer number of reactions taught may seem overwhelming, there is a method to understanding them, which lies in understanding the concepts of electrophilic addition and substitution.

How to do well: Practice, practice, practice! Simply going to class will not do you much good, as the exams are 90% based on identification or reactions. Use questions from the textbook, especially the higher numbered questions which combine spectroscopy AND synthesis AS THEY WILL MOST LIKELY BE ON YOUR EXAM! For Dr. Harpp's section, really know how to derive structures from Mass Spectroscopy. For Dr. Perepichka's section, practice the examples which he goes over in class, especially "pharmaceutical examples".

Text: Solomons Organic Chemistry (11th Edition)

BIOL 201: Cell Biology and Metabolism (Winter 2014)

Topic covered: Enzymes, glycolysis, TCA cycle, ETC, gluconeogenesis, glycogen metabolism, regulation of metabolism, fatty acid oxidation, ATPase, redox reactions, photosynthesis, vesicular transport and protein trafficking, actin, muscle contraction, microtubules, mitosis, cell cycle, extracellular matrix, signaling, nervous system, cell death.

- **Dr. Greg Brown:** Nice prof, talks slowly and clearly. Material is a bit challenging because you have massive respiration and photosynthesis pathways to memorize and understand. A lot of effort and some extra work are required.
- **Dr. Gary Brouhard:** Excellent prof, responsible, lectures are very clear and easy to follow. He presents challenging material in a very pleasant and concise way and so is easy to understand and is unlikely to make you confused. Moreover, he's a humorous and pleasant prof so attending his lecture is enjoyable.

How to do well:
- The midterm is reasonable, but the final is very challenging, especially Dr. Brouhard's section, because Dr. Brown's section is mostly memorization. The final exam requires both detailed memorization of knowledge, and a thorough understanding of concepts in a very accurate and clear way. However, the final's grading scheme is usually adjusted to keep an average of 70+ if the final is too challenging.
- The course also has short quizzes every 2 weeks online. They're not hard but you have to fully grasp the points in the lecture and read the question very carefully in order to score 100% on it.
- Overall, the course has to do with a lot of molecular mechanisms so the workload is relatively large. However the class average is high, so most people manage to do well with help from the two profs.

Typical U2 courses

PSYC 305: Statistics for Experimental Design (Fall 2014)

PSYC 305 will prepare you to decode all of those intimidating numbers that appear in academic papers, reviews, and articles. Dr. Amsel makes the course very easy to follow by creating a course pack with all of the notes already in them. All you have to do is show up to class and fill in the calculations that she goes through, and voilà! There are 3-4 assignments throughout the whole semester, and they are designed to be able to get 100% (meaning you can resubmit until they're perfect). The secret to success in this class is to go to the conferences (more like tutorials) held by the TAs. They go over how to set up problems and what steps to follow when solving them on your own. If you go to the conferences and do the problems in the course pack you will be sure to do well on the midterm and conquer the sometimes-tricky-final-exam like a piece of cake. Amsel is also half-prof and half-comedian, making statistical analysis a very fun affair.

BIOC 311: Metabolic Biochemistry (Fall 2014)

Topics covered: regulation of glycolysis, dietary carbohydrates, pentose pathway, glycogen synthesis/degradation, regulation of glycogen pathway, pyruvate dehydrogenase, TCA cycle, Redox reaction, oxidative phosphorylation, amino acid metabolism, urea cycle, fatty acid synthesis/degradation, lipoproteins and membrane lipids, hormone action and gluconeogenesis.

Professors:

- **Dr. St. Pierre:** An excellent professor, and explains her material well mostly. Material is not hard but requires hard work to memorize. Can be very confusing if not well memorized. Exam questions are straightforward and mostly involve memorization.
- **Dr. Huang:** His slides are long and repetitive, and sometimes confusing. You may find yourself confused and may not understand anything when you first attend his lectures but when you review his material, you will realize it's actually simple and well explained.
- **Dr. Scheming:** Awesome prof, short lectures, usually scribbles on his slides, explanation is clear and easy to follow, and final exam questions are reasonable.
- **Dr. Kiss:** Uses printed slides and projector instead of Powerpoint slides. He teaches very well and tells you exactly what you need to know for the final. Willing to help after class.

- **Dr. Trembley:** First time teaching this course; lectures and slides are long and a bit messy. He can be unclear sometimes, but his lectures contain more and harder info than what is tested.

How to do well:
- The lectures are recorded. There is 1 midterm and 1 final exam.
- Tutorials held by TAs are very helpful, so attend them!
- Material overlaps with previous courses (Org Chem, BIOL 201) but focuses on regulation of pathways. Although the material is not hard to understand, all of it requires hard work and memorization.
- Both midterm and final are reasonable and straightforward; they're detailed but not tricky. You're almost guaranteed a good grade if you put in the effort for memorization. Overall, BIOC 311 is not a hard course.

PHGY 311: Channels, Synapses, and Hormones (Fall 2014)

Topics: Synaptic transmission, Pre- and Postsynaptic mechanisms and synaptic plasticity, Voltage-gated ion channels and Neuronal Excitability, Mechanosensory Transduction and Pain.

Professors:

- **Dr. Haghighi:** Lectures are very challenging and require advanced knowledge in order to understand. His material is very closely related to electrical physics and hard even if explained. Questions are very hard, both the final exam and the quiz.
- **Dr. Cooper:** An excellent and experienced prof, lectures are well organized and well explained. The concepts of his lectures are easy to get, but application can be hard. Final exam questions are challenging and often require knowledge from another prof's lectures (Dr. Haghighi's mostly).
- **Dr. Sjostrom:** Excellent prof, lectures are clear and well organized. Material is relatively advanced but is presented nicely so it's not very hard to grasp. He answers student's questions and clarifies people's confusion. Exam questions are detailed and require thorough understanding of the material.
- **Dr. Sharif:** Excellent prof, has a lot of material but he explains most of it quite well. Both calculation and concepts are tested, but the math is very simple and straightforward.

How to do well:
- 6 quizzes (only top 5 counted in your grade), 1 term paper. There is no recording for this course, but there is an audio recording provided by PULS. There are no TAs for the course, but tutorials held by PULS before each quiz are very helpful. Dr. Haghighi's quiz and final are both very challenging. Dr. Cooper has a

reasonable quiz but challenging final exam (only calculation questions for the first 2 profs). A Physics background would be helpful in doing well on the final. Dr. Sjostrom also has relatively easy quizzes but challenging final questions, but he tests both conceptual questions and calculation questions. Dr. Sharif has both easy quizzes and reasonable finals; both concepts and calculation are tested. Make sure to go over all the details in Dr. Sharif and Dr. Sjostrum's lectures, and make sure you can manipulate the concepts taught by Dr. Cooper and Dr. Haghighi.

PHGY 314: Integrative Neuroscience (Fall 2014)

Topics covered: The visual system, organization of perception and movement, organization and movement, Vestibular system, computational vision, physiological bases of cognition, the learning and memory, somatosensory system, auditory system and resting state networks (functional MRI).

The Professors:

- **Dr. Cullen:** Lectures are long, have a lot of information and are complicated. She explains the material well most of the time, but it takes effort to understand and memorize everything.
- **Dr. Pack:** Excellent prof, relatively straightforward and easy to understand, and material is interesting; still, it takes effort to understand and memorize.
- **Dr. Martinez:** His material is long and a bit complicated. He sometimes couldn't explain it clearly and his lectures were a bit messy, so you need extra effort in order to do well.
- **Dr. Chacron:** Material overlaps with Dr. Sjostrom's material from PHGY 311. He's well-organized and straightforward at first but in the last 2 lectures, the concepts get challenging. Final exam questions are challenging.
- **Dr. Vollrath:** Lectures are well organized and well explained. Material is moderately difficult.
- **Dr. Sharif:** Material overlaps a little bit with what he teaches in 311, but more focused on the physiology part rather than the neuroscience.
- **Dr. Shmuel:** Lectures are challenging and hard to understand; however, his final exam questions are easier than what's taught in class.

How to do well:

- 1 term paper, 1 midterm and final
- Make sure you thoroughly understand and memorize Dr. Martinez and Chacron's lecture because the questions can be tricky and very detailed. For Dr. Cullen and Dr. Vollrath, their lectures have massive information that may make you feel

overwhelmed but the exam questions are reasonable. Other than that, going over all the notes with great detail would make you good to go. Make sure you grasp the overall idea before going into the details. Moreover, Dr. Cullen as well as some of the other profs like to test on the assigned readings, but those questions are very general.

BIOL 301: Cell and Molecular Laboratory (Fall 2013)

Topics Covered: Molecular biology, Genetics, Bioinformatics, Experimental design.

The Professors:

Dr. Moon: He goes over the concepts fairly well. He can be hard to understand at times, but you can always rewind when listening to the lecture recordings. His exam material is pretty challenging.
Dr. Vogel: A friendly and funny prof, probably unlike any you've had before. She isn't overly concerned about comprehension but that's OK, it's mostly covered in the slides and the coursepack. Going to the lecture is entertaining and you might even learn something.
Dr. Harrison: There's only one lecture with Dr. Harrison; he sounds smart and teaches a lot of material, and it's fairly basic.
The TAs: You'll mostly be interacting with the TAs in this class! They range from friendly to shy, serious to funny, and helpful to confusing. They alternate marking each person's lab report so don't worry, it's fair!

How to do well: 1. Pick a good partner (this lab is a great opportunity to make friends)! 2. Study the lab ahead of time. 3. Get last year's labs from a friend if possible; this gives you an idea of how much detail is expected for the answers. 4. Even though the midterm is open-book, study hard; it's definitely not easy, but it's only worth 10%. Use it as practice for the final! Make a chart of all the experiments, and their controls and uses. 5. Finish labs ON TIME and CLEAN UP! 6. The final can be tough, but chances are you won't need a high exam mark to do well overall.

BIOL 309: Mathematical Models in Biology (Fall 2013)

Topics Covered: Nonlinear dynamics, Mathematical models, Functions, Differential Equations, Graphical analysis.

The Professors:

Dr. Glass: He is the only professor for the class; he wrote the textbook and has been teaching it for 30 years: it even includes some of his research. His lectures are interesting and thought provoking but they are meant to be just a supplement to the textbook, which contains the essential information. He covers a lot of material and you'll definitely apply some of the concepts, like graphical analysis, in the future. He's eccentric, and has a few surprises up his sleeve for the class. When the class is writing the exam, he writes it too, and sometimes he gets less than 100%!
The TAs: Their tutorials are really helpful, especially for the first assignment or two. They also mark the assignments quite leniently.

How to do well: This is a class where you really don't want to fall behind; it moves fast. Also, try to get perfect marks on all the homework; get help and work with classmates. The midterm is challenging but not impossible, manage your time wisely and don't skip any questions (read closely and carefully!). Don't go overboard on the paper, Glass says outright that almost all of the class gets a B. The key to an A is near-perfect homework grades and doing well on the exams. Calculating accurately is not crucial, but you do have to think mathematically.

PHYS 413: Physical Basis of Physiology (Fall 2013)

Topics Covered: Fick's Law, Cable Equation, Regulation of Glycolysis, Passive Electrical Properties of the Membrane, Hodgkin-Huxley Model, Membrane Excitability, Calcium Dynamics, Chemical Master Equation, and Stochastic Chemical Kinetics.

The Professors:

Dr. Mackey: He's an excellent professor. There's even an equation named after him (the Mackey-Glass equation)! His lectures are clear, but he expects a lot of hard work from you, since his material is very challenging (but doable). His assignments require a lot of Math, as well as a clear understanding of the underlying Physiology.
Dr. Khadra: A great prof, but he goes really fast. His material is also relatively advanced, and requires a thorough understanding of Nonlinear Dynamics, which most students are usually taking concurrently with PHYS 413. However, when Dr. Khadra comes along, you've already learned enough from 326 to tackle his material.
Dr. Santillan: His material is the easiest out of all the profs, but it's still pretty challenging. His lectures can be a bit unclear sometimes, but he provides very well-written notes in the form of a book.

How to do well: The 3 assignments require a lot of dedication with the Math and derivations, as well as some knowledge of computer programming with MATLAB and XPP (a very cumbersome program). The TA is pretty helpful, so it's very doable to succeed on the assignments. For the exam, make sure you go over all the notes in detail and fill out the details of the algebra the profs skip. If you study your notes, and re-derive them well, you'll do well. Finally, for the term paper, be detailed and make sure to prepare your presentation because Dr. Khadra will ask you a lot of questions about your work.

PHGY 312: Renal, Cardiovascular, and Respiratory Physiology (Winter 2014)

Topics Covered: Cardiovascular physiology, Renal physiology, Respiratory physiology.

The Professors:

Dr. Magder: A clinician/investigator with many interesting clinical examples and stories. A good teacher too, there's only a few concepts and they seem simple but they can be conceptually difficult and he explains them well.
Dr. Shrier: Friendly professor. His slides are a little disordered and sparsely labelled, but he teaches electrophysiology well and the cardio exam questions are pretty fair.
Dr. Hanrahan: Also a friendly guy. Very easy to understand, but some lectures are a bit disorganized. A lot of interesting material is covered, and his midterm exam is tough.
Dr. Mortola: A brilliant researcher whose captivating respiration lectures include interesting cross-species comparisons. Thankfully he provides hundreds of practice questions, because the exam requires knowledge beyond the lectures. He is also very helpful outside of class time. Go to his "Discussions on Respiration" sessions to ponder the eccentricities of our breathing apparatus with an expert!

How to do well: Cardio is challenging, but understand Magder's equations conceptually and know the properties of the channels Shrier discusses and you'll do fine. Renal is hard; ensure you really understand every concept that arises in class, and look out for tricky questions. Before the final, try to sort out Mortola's practice questions in study groups (may require Google and PubMed!), and ask him for help. Know the answers well. The other sections on the final are straightforward (easier than the midterm!). Good news: all 4 professors are very friendly at the presentations and most people get high marks!

PHGY 313: Blood, GI, and Immune Systems Physiology (Winter 2014)

Topics Covered: Blood & stem cell physiology, Immunology, and Gastrointestinal (GI) physiology/pathophysiology.

The Professors:

Dr. Nijnik, Dr. Blank, Dr. Dos Santos: The slides for blood, stem cells and hemoglobin are well organized, but numerous. Some material is not that interesting, but it is fairly easy to learn.
Dr. Jones: This professor is very enthusiastic about immunology. A very likeable guy; he teaches the concepts well and gives relevant, interesting applications. His lectures are interesting with a logical progression.
Dr. Trujillo-Martinez: He mostly teaches the textbook (not a great textbook) and GI is not his field of study, so he doesn't know the material that well. However the clinical perspective of this unit of the course is refreshing, which mostly includes case studies of GI diseases. He's also a pretty funny guy.

How to do well: There are 2 midterms, a cumulative final (all MCQ) and a paper. Midterm 1 (blood) is straightforward—just memorize the material. Midterm 2 requires a good conceptual understanding of immunology; most questions require application of the material to a new situation. There are also some tricky questions, so read closely. The GI material on the final requires good memorization of the cases covered from the textbook–you do actually have to read the indicated green boxes! The papers are graded fairly, and you get to write it in pairs.

PHGY 351: Research Techniques: Physiology (Winter 2014)

Topics Covered: Molecular biology, Stem cells, Genetics, Microscopy, Experimental design.

The Professors:

Dr. Lukacs: This professor is serious about science. He can be hard to understand at times but has a good critical mind and lots of knowledge. The lab project is useful and applicable to a lot of research.
Dr. Haghighi: Loves to challenge students to help them learn. He has an interesting and engaging teaching style. Sometimes he's unclear about what he's looking for in assignments. Forces you to think for yourself to solve problems.
Dr. Vollrath: Very friendly prof with a fairly easy lab project. Mostly teaches things from PHGY 314.
Dr. Nijnik: Her lectures are fast and crammed with material, but you will have learned most of it from PHGY 313. The lab is interesting and fairly simple.

Dr. Stochaj: She is a serious scientist and gives lots of opportunities for critical thinking. She's nice, don't be afraid to participate in class! Her lab is pretty straightforward.

How to do well: You work with a small group; make sure you find people who will contribute equally to your lab reports! The course is a little unstructured but also very flexible. If you make the effort to do the lab well, write the lab report well and study for the tests, you will do fine. Ask the professors to go into detail about what they look for in the assignments; it sometimes wasn't clear. You'll also have to come in outside of class time and some labs will go overtime, just like real research!

PHGY 359: Tutorial in Physiology (Full Year)

Topics Covered: Reading scientific literature, topic depends on mentor.

The Professors:

Dr. ?: This professor is the one you will select as your mentor for this class. Pick someone who is in a field that interests you, and possibly someone you'd like to work with on your Honours project next year. They must be affiliated with the Department of Physiology.

How to do well: This course is pass/fail. Ask not what you can do for this course, but what this course can do for you! You get out of it what you want; it's a valuable opportunity to pick a professor's brain. Some students select a clinician/investigator to get a medical perspective on physiology. As soon as you can (even before September!), pull up the list of researchers on McGill Physiology's website and email the profs that interest you. Then get ready to read and discuss some papers, but no pressure! Don't forget the first 4 summaries are due in December.

Typical U3 Courses:

MATH 437: Mathematical Methods in Biology (Fall 2014)

Topics Covered: Delay Differential Equations, Regulation of Arterial CO2, Intrinsic and Extrinsic Noise, Inducible and Repressible Operons, Age Structure Models, Regulation of Erythropoiesis, Type 1 Diabetes, Antigen Presentation, pMHC-TCR interactions, Macrophage Markov Models.

The Professors:

Dr. Mackey: He's an excellent professor. There's even an equation named after him (the Mackey-Glass equation)! His lectures are clear, but he expects a lot of hard work from you, since his material is very challenging (but doable). His assignments require a lot of Math, as well as a clear understanding of the underlying Physiology.
Dr. Khadra: A great prof, but he goes really fast. His material is less advanced than it was in 413, but it's still quite heavy on ODEs and Nonlinear Dynamics. You need a solid understanding of the Physiology and the assumptions used in constructing the models, as well as a good intuition to tackle the problems he asks.

How to do well: The 3 assignments require a lot of dedication with the Math and derivations, as well as some knowledge of computer programming with MATLAB and XPP (a very cumbersome program). The TA is pretty helpful, so it's very doable to succeed on the assignments. For the midterm and final, make sure you go over all the notes in detail and fill out the details of the algebra the profs skip. If you study your notes, and re-derive them well, you'll do well. Finally, for the term paper, be detailed and make sure to prepare your presentation.

Text (if any): None, but much of the material is based off of past research papers (provided by the profs and available from a simple Google search), so if you study those, you'll strengthen your understanding of the material and clarify concepts in the lectures.

BMDE 519: Biomedical Signals and Systems (Fall 2014)

Topics Covered: Basic Signal Types, Amplitude Structure, Frequency Structure, Filtering, Sampling and Quantization, Correlation Analysis, Basic System Types, Least Squares Fitting, Impulse Response Functions, Frequency Response Functions.

The Professors:

Dr. Kearney: His 2 hour lectures usually comprise a 1 hour question-answer session, which is quite helpful and can help you understand the techniques used in Signals and System Analysis, so make sure that you come prepared with questions because he and the TA are pretty helpful when it comes to clarifying the concepts taught in the lectures and used in the assignments. The second hour of the lecture involves Dr. Kearney going through 40-70 slides pretty quickly, so it unfortunately isn't terribly helpful.

How to do well: The material itself isn't too daunting, but the way the course is structured makes it the most insane class in the entire joint major program. There are 10 assignments (50%), a 72-hour midterm (15%), and a 72-hour final (35%). Know MATLAB really well, and know how to present your work clearly because you are expected to hand in publication-quality work at the end of the week. It's extremely hectic for the first 6 assignments or so, when you'll be spending 20 hours a week on average for every assignment. For the later part of the class, things become *relatively* easy. The midterm and final are similarly hectic; don't expect to have any spare time for the entire 72 hours.

PHGY 425: Analyzing Physiological Systems (Fall 2014)

Topics Covered: Basic plotting and data extraction in MATLAB, mathematical modeling, action potentials, extracellular membrane potentials.

The Professors:

Dr. Cook: He's a great professor. His lectures and assignments are straightforward. Like the other professors, he uses data from his own lab. He covers tracking eye movements of monkeys.
Dr. Khadra: He covers modeling T cell populations using differential equations. His material is quite challenging to most people because he expects physiology and neuroscience students to know ODEs and modeling. His assignments take some time to figure out but most of the code is given. As long as you understand his lectures, you will be fine.
Dr. Chacron: He only has two lectures that cover action potentials. They are quite dense, like his assignments. Make sure you understand everything in the lectures because that directly translates into doing well on the assignments (the other profs' lectures are mostly complementary to the assignments). He tends to prefer students figuring things out on their own, which is helpful for learning.
Dr. Glavinovic: I find his material the most interesting. He uses a computational approach to examine physiological systems. The math is straightforward, like his

lecture material and assignments. He is more than happy to help and is an excellent prof.

How to do well: Since this is a PHGY course and not a COMP course, the focus is on understanding the concepts presented in lectures rather than actual MATLAB syntax. Don't worry if you have never used the software before as the first week will be basic MATLAB tutorials. The workload is light because there are no exams. There is a term paper but you will get a lot of help from the professors. Make sure to understand everything in the lectures and start assignments early.

PHGY 451: Advanced Neurophysiology (Fall 2014)

Topics Covered: Sensorimotor Integration, Experience Dependent Synaptic Plasticity and Structural Synaptic Plasticity of Central Synapses, Nerve-Muscle Synaptogenesis, Neurophysiology of Osmoregulation, and Synaptic Competition/Elimination.

The Professors:

Dr. Cullen: She really takes the time to go over concepts if someone doesn't understand but sometimes rushes through her material. Her material seems daunting at first because it does include a physics component, but there's an optional supplemental reading that she wrote, which is an outstanding source of information and helps resolve any problems.
Dr. Chen: He has an unorthodox teaching method since he posts video recordings of his lectures and expects you to watch them before class and then come prepared for in-class discussion.
Dr. Cohen: Very clear and straightforward lectures, so just sit back and take notes.
Dr. Bourque: Lectures in a straightforward manner, a bit too fast at times. His assigned readings are his own papers which set the basis for his lectures.
Dr. Cooper: His teaching style is very literature-based since he assigns papers to read beforehand. He will go into details figure by figure. Be ready to participate in class!

How to do well: This class comprises of five class tests worth 20% each (no final!). The exams are all short answers/essays based on lectures, so in order to do well, understand the lecture material and be able to discuss it analytically. It's best to go to class, record lectures if possible, and do as much of the assigned readings. While Dr. Cohen's section is more memorization based, the other professors like to provide scenarios and ask what kind of experiments you would apply in order to test a hypothesis.

PHGY 459: Physiology Seminar (Full Year)

Topics Covered: Recent articles and reviews chosen by each professor, writing a mock grant application and summary

The Professors:

Drs. Cohen, Lukacs, White, Brown, Chen, Pack, Rousseau, Philip, Finnson: As you can see, there are a lot of professors for this course. Since each professor is only present in two or three seminars, a general overview is that they are there to guide the class through the paper and to foster discussion. Each professor wants to see that you've read the paper and tried to understand the concepts.
Drs. Shrier, Hanrahan: These professors teach you about the process of writing a grant summary and application. They will provide you with helpful feedback during your summary presentation and try to simulate the experience of writing and submitting a CIHR grant application.

How to do well: Each professor presents two or three papers of their choice that are given to students a week before the seminar. Since 50% of the mark is based on class participation, you should ensure that you read the paper thoroughly and pay special attention to the figures. A grant summary presentation and application also make up 30%, and it's important you start early to work out details. Demand examples of summary pages and applications! Finally, the last 20% is an in-class final, which is based on questions regarding the papers covered over the year. It would be a good idea to print off each paper and make notes directly on the paper, so you can refer back to them during your studying.

PHGY 461 Experimental Physiology (Full Year)

Topics Covered: Individual research project – writing/presenting an abstract and final report, and presenting a poster of your findings during Undergraduate Research Day (URD).

The Professors: Any member or associate member of the Department of Physiology.

How to do well: Given that this course is essentially an independent research project, you may be paired with any of the professors (of your choice) in the Physiology Department. However, here are some general guidelines to do well:

- Read papers relevant to your project *consistently*. This will allow you to generate ideas and give yourself direction in the project.

- Plan your experiments thoroughly. This includes the hypothesis, methods, and expected outcomes. Your supervisor will expect you to be self-sufficient and able to overcome obstacles yourself.
- Keep up the communication! If you come up with any new ideas, it's always a good idea to run it by your supervisor first and they can set you on the right direction.
- Most importantly, don't be discouraged by poor results. Research requires a lot of patience, but the more time you invest into planning your experiments, the better those experiments will go. And remember – a negative result is still a result!

EXMD 506: Advanced Applied Cardiovascular Physiology (Fall 2014)

Topics Covered: Blood flow, Vascular endothelium, Conduction of the heart, Cardiac electrophysiology, Coronary artery disease, Hyperlipidemia, Ischemic revascularization, Hypertension, Pulmonary vasculature, Myocardial failure, Mitral regurgitation, Biomedical engineering and heart repair, and Atherosclerosis.

The Professors: Dr. Schwertani (course coordinator), Dr. Guevara, Dr. Goldsmith, Dr. Shrier, Dr. Genest, Dr. Dandona, Dr. Dorleans-Juste, Dr. Rose, Dr. Rohlicek, Dr. DeVarennes, Dr. Shumtim.
Dr. Schwertani: Gives the first and last lecture of the course. He is very nice and emphasizes that he really wants the students to leave the course with a greater understanding of the cardiovascular system. He will say that the course is extremely easy, but make sure that you still put in a lot of work; the final isn't as easy as he says. The other professors are decent overall.

How to do well: The marking scheme for the course includes a 30-minute presentation (15%), 10-15 page term paper (30%), participation and attendance (5%), and a final exam (50%). Make sure to start your term paper early and discuss your chosen topic with the professor before you start writing. A lot of the professors will emphasize the important material to know for the final exam. Class is once a week in the Montreal General, 2 hours of lecture followed by 1 hour for student presentations and discussions, so bring snacks; 3 hours is a long time!

PHGY 508: Advanced Renal Physiology (Fall 2014)

Topics covered: Function and Physiology of the Glomerulus, The Glomerular Mesangium: Structure & Function, Metabolism of filtered protein by the tubules, Interpretation of Electrolyte and Acid-Base Parameters in Urine, Renal Autacoids, Renal Cell Biology, Physiology of dialysis, Acid – Base Balance, Renal Epithelial

Transport, Renal Tubular Handling of uric acid and amino acids, Renal Transport of Phosphate and Divalent Cations, Renin-angiotensin System.

Professors: PHGY 508 goes in detail over most of the renal concepts covered in PHGY 312. Each lecture is given by a new prof every week. There are 10 profs who are very knowledgeable and teach their area of expertise. 8 of the profs are clinicians or clinician-scientists from McGill's nephrology department and will give you a perspective which involves the diseases they deal with in their practice. However, they also cover some niche topics like the mesangium or tubular amino acid handling. The two other profs are scientists and will cover renal cell biology and transport mechanisms. They will cover the normal physiology and diseases associated with embryonic kidney development and sodium/water homeostasis.

How to do well: Seminar (20%): Each student will have a seminar presentation on a topic covered in class reviewing a paper assigned by a prof. There will be no questions directly from these presentations on the midterm or the final exam. They are meant to reinforce the concepts learnt in class; so, you can sit back, relax, and get a perspective of the cutting edge research in the field. **Midterm (20%):** Midterm exam is all multiple choice and to do well you'll need to know and understand the fundamental concepts and memorize the details in the lectures. However, most profs ask questions that require you to apply what you've learned to a clinical setting (some questions about acid-base disturbances and dialysis management can be difficult and need an in depth understanding of the lectures). **Final (60%):** Final exam is cumulative; it has a multiple choice and a long answer component. The multiple choice questions are similar to the midterm. For long answer, you will choose about 7 out of 10 questions to answer. These long answer questions do not require you to know the minute details of the lectures. They tend to be easy if you understood the main concepts of each lecture and are able to clearly explain in your own words the 'take-home message' of every lecture.

PHGY 518: Artifical Cells (Fall 2014)

Testable class material includes: Artificial Cells, their basics, production, and practical applications. Other class material, not tested, includes: cardiovascular approaches utilizing artificial cells, kidney approaches using artificial cells (replacements for dialysis).

The Professors:

Dr. Chang: Known as one of the most famous McGillians of all time, the founder of Artificial Cells, straight from his dorm room during his undergraduate years. He's quite old now, so it's hard to hear his raspy voice in class sometimes. But he is

very passionate about this field (not surprisingly, because he created it). Only the lectures that come from him will be tested, and are essentially lectures on the textbook that he wrote. Know the textbook, and you will be fine on all testable material. All the other professors give one lecture each, and are only there for your curiosity. Their material isn't tested, but gives a comprehensive and practical aspect to the class as they will present various medical advances using the concept of artificial cells.

How to do well: Seminar questions are essentially the exam, where Dr. Chang will ask people at random about the section from the 2007 textbook specific to that seminar. As long as you read the 2007 textbook sections prior to each seminar that Dr. Chang runs (Dr. Prakash also did a few seminars, but no questions were asked in those) you will do fine on that part. The presentation is simple, not much advice to give there, be confident, and know your presentation material since you will be quizzed (for marks) on various aspects of your presentation. The paper, on the other hand, is probably the key between the easy A- and the much harder A in the class. If you're really good at writing papers, you have a chance at that A. Otherwise, you're much more likely to end up with the A-.

PHGY 524: Chronobiology (Fall 2014)

Topics Covered: Regulations and mechanisms behind the body's natural rhythms; temporal dependence of metabolic, endocrine, and autonomic behaviour; sleep cycles.

The Professors:
Dr. Cermakian: One of the main instructors along with Dr. Storch. Helpful and provides consistent feedback on your grade breakdown. Explains material relatively well, and will review difficult concepts before exams.
Dr. Storch: One of the other course coordinators with Dr. Cermakian. Very enthusiastic about the material, but may at times be difficult to understand. His questions on the exams tend to be more difficult.
Dr. Bernard: Gives one lecture in the course about the effects of drugs on the body's clock and vice versa. Explains concepts in a straightforward manner, and has reasonable questions on the exam.
Dr. Mongrain: Gives one lecture and article discussion regarding sleep cycles. The lecture is very interesting but also dense.

How to do well: The course grade breakdown has several components (20% midterm, 30% final, 20% paper, 15% article presentation, 5% class participation, 10% article discussions). Since 30% of the grade including the presentation is compared to everyone else and relies on your in-class involvement, you have to

consistently express your enthusiasm and make attempts to foster discussion. Don't be afraid to ask any questions. Study the experimental approaches and findings of Dr. Storch's lectures as his short answer questions on the exam tend to focus in those areas.

PHGY 550: Molecular Physiology of Bone (Fall 2014)

Topics Covered: Bone cell differentiation & function, Matrix mineralization, Bone degenerative diseases & therapeutic strategies, Techniques to analyze bone, Disorders of calcium metabolism, Osteogenesis Imperfecta, Vitamin D disorders, Bone cancer, and Bone pain.

The Professors:
Dr. Monzur Murshed, Dr. Kerstin Tiedemann, Dr. Pierre Moffatt, Dr. Geoffrey Hendy, Dr. Frank Rauch, Dr. Rene St-Arnaud, Dr. Peter Siegel, and Dr. Laura Stone.
Each professor is responsible for at least one lecture and one discussion in the course, with the exception of Dr. Murshed, Dr. Hendy, and Dr. St-Arnaud who each have two lectures and discussions. The course is well taught overall.
Dr. Murshed: He is the course coordinator for PHGY 550, and a very helpful professor. He only teaches the first two lectures of the course, but is always available via e-mail to help with any aspect of the course. I would recommend communicating with him prior to starting your first short essay, as he will guide you through the entire process and give a lot of tips towards writing the best essay possible.

How to do well: This course has no midterm and no final! The grades are evaluated based on 12 one page summaries of weekly papers assigned by the professors (30%), 2 presentations of the respective weekly paper in groups of 2-4 (30%), and 3 short essays (5 pages double spaced), which are essentially mock grants where you must choose a topic and idea that has not been previously studied and propose how you would analyze that topic (40%). It is very easy to do well in this class if you start your essays early, and ask the professors for assistance before you start writing. All the professors are very helpful, and will do whatever they can to help you succeed in this course. The summaries and presentations are straightforward and marked fairly.

PHGY 560: Light Microscopy for the Life Sciences (Winter 2014)

Topics Covered: Image formation, optical light path components and alignment, resolution & sampling, contrasting techniques, reflected light microscopy,

fluorescence microscopy, detectors, quantitative image processing, presentation of figures for publication, 3D optical sectioning, protein dynamics, nanoscopy.

Professor:
Dr. Brown: As the director of the Imaging facility, Dr. Brown is a master of the material and does a good job teaching it. The class only has 12 people so you get a lot of one-on-one time and opportunity to participate in class. The lectures are a little long (usually a full 2 hours) and content heavy, so it's important to attend and be engaged. The material can get quite complex at times, but don't be afraid to ask Dr. Brown questions! She is very dedicated to her students and has excellent TA's helping her. As for the labs, they are run by the TAs but are mainly self-guided with a manual. You get the opportunity to work with very complex programs and different microscopes. Her exam questions are not tricky, but they do require a complete understanding of the material.

How to do well: There's a quiz every 3 lectures and it's a good idea to study hard and ace them! With limited testable content, you can figure out what's important very easily. The tests themselves are all short/long answer with only a handful MC, so practice explaining all the concepts in your words. You need to know the material completely, which sounds daunting but the quizzes keep you on track. The labs are straight forward, just don't underestimate formatting. Give yourself time to do the seminar.

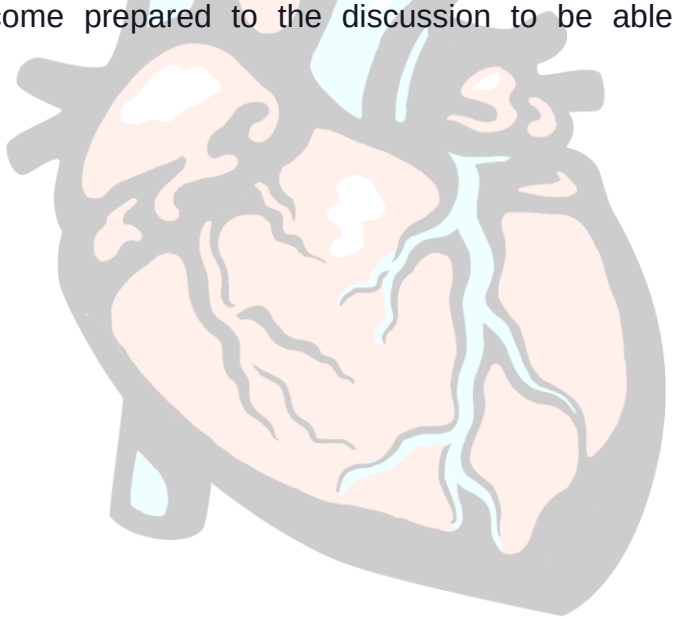
PHGY 513: Cellular Immunology (Winter 2014)

Topics covered: Experimental therapies for MS, IBD, TB, vaccines, SLE, arthritis, antibody mediated autoimmune disease, innate immunity, antibodies, immunodeficiencies, host resistance to HIV, mechanisms of cardiovascular disease, Cancer and the immune system, Immunotherapy.

Professors: Each lecture in this course is a "stand-alone" lecture by a different professor. In total you hear from 14 different lecturers, each on their own specialty. Overall, their teaching styles are different but all the content is contained within the slides. The course director is Dr. Jones, who leads 2 of the lectures and all 4 of the discussion seminars. Dr. Jones is an excellent professor and human being. He really likes making the material applicable and really questions you to ensure you know it. It's important to come prepared to his discussion seminars since it's a good opportunity to be able to discuss current literature in immunology with Dr. Jones and your classmates.

How to do well: There are 2 non-cumulative exams in the course, with one long answer question per lecture. Since each lecture is a "stand-alone" topic, it's fairly

easy to figure out what main points will be tested. This gives you the opportunity to narrow down your studying. Overall, there were 7 questions per exam, and you only had to answer 5 of them. Although you may think that you only have to study 5 lectures and skip 2 of them, it's not a good idea to put all your eggs in one basket! Study all the lectures, then read all the questions on the exam, and answer the 5 that you know best. For the term paper, start early and contact your topic's instructor for help. Finally, come prepared to the discussion to be able to participate!



Step 3: Get involved with PULS!

Just as a pulse is what sustains life within a human body, PULS is the source of student life in the department of Physiology. The Physiology Undergraduate League of Students (PULS) is a team of 14 dynamic students that have a passion for pathways and student life. We do everything from planning wine and cheese with professors, talent shows, Ski Trip, tutorials, NTC's (read more about NTCs in the U2 and U1 reps page), apartment crawl, clothing...and so much more. We are also the student voice in meetings with administration, and work together to bring you Undergraduate Research Day, and Physiology Career Day. Most importantly, we are located in the Physiology Student Lounge, equipped with couches, a microwave, a toaster, a Keurig, a full sound system, and a room full of friendly people to hang out with. Whether you're looking to get involved, make friends, or get some support in Physiology PULS is the perfect place to start! Here are your wonderful council positions:

President: One of the primary responsibilities of the President is to ensure that everything in PULS runs smoothly. That means trusting other members to fulfill their duties and directing business at all council meetings and with external organizations. The POPULS also coordinates several events with the Physiology department, such as Undergraduate Research Day, the U2-Professor mentoring program, and the Career Event.

Vice-President: As vice-president, you probably have at least one year of experience on council and know how things work. You use your wisdom to help guide the other execs in organizing their events, planning their meetings, and dealing with everyday PULS life. You get to work very closely with the president regarding issues that concern the council itself as well as representing the president at meetings when they cannot. Most importantly, you go to the Science Undergraduate General Council meetings twice a month and represent PULS

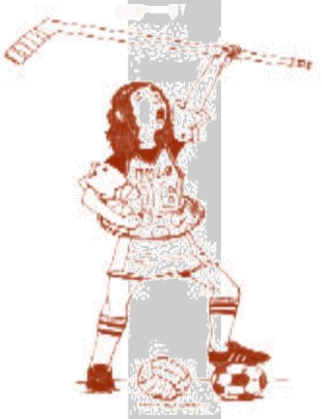
on a faculty-level. If you have initiative, are a good delegator, enjoy working closely with others, and have a knack for student politics then this position might be for you!

VP Finance: Most people don't know that the VP Finance is one of the most, if not *the* most, important positions in PULS (full disclosure: this was written by the sitting VP Finance). In short, the VP Finance is responsible for managing PULS' funds and allocating them to the various PULS events. Duties include creating budgets at the beginning of each semester, keeping a record of all transactions and submitting monthly reports to SUS, handling the organization's cash, and paying off the liabilities.

VP Academic: The VP Academic is the neighborhood nerd of PULS. His job, in a nutshell, is to make sure that the academic affairs of PULS are in order. This means that the VP Academic has to organize tutorials for PHGY 311, to ensure that JUMPS and the PULS PHGY Handbook are published in an orderly and efficient fashion, and to lead the Synapse program and ensure its success.

VP Social: The VP Social is responsible for making sure that your Physiology degree is as rewarding intellectually as it is socially. Balance between work and play is one of the most important, yet arguably one of the most difficult things to master not only as a student, but in life as well. Your degree in Physiology is an incredible opportunity to get to know people who, simply based on their being in our program, are driven and hard-working just like you. This is all the more reason to get to know them. PHGY has a deep roster every year, filled with talented students with a variety of experiences and interests beyond the confined boundaries of the classroom. VP Social is here to make sure you have every

opportunity to interact with one another and even interact with your professors. VP Social is the bridge between you and your fellow PHGYs and your department. Each year the VP Social will organize a Ski Trip, a Talent Show, a Wine and Cheese with the PHGY Faculty and an all important U1 Breakfast for incoming students. So take a break from the books for a few hours and make sure you attend as many PULS events as you can throughout the year because you deserve it and you never know who you might meet.



VP Athletics and Publicity: The role of VP Athletics & Publicity is to provide fun sporting events for everyone in PHGY! We provide opportunities to join intramural teams, and many sporting events against other science departments like soccer and hockey.
In order to show off that you're a part of the best department you need some awesome PHGY swag. VP Athletics organizes all the clothing orders so you can get hoodies, sweatpants, I <3 PHGY t-shirts, and best of all crewnecks! Overall, VP Athletics is here to provide you with a lot of fun sporting activities and sick swag to wear while you're studying and partying hard!

U3 Representatives: As U3 Representatives, our job is to serve as liaisons between PULS and U3 Physiology students. We provide updates regarding events happening at McGill that are either sponsored by PULS or other organizations. Overall, our main effort goes towards planning events for graduating students to make sure they don't miss out on other aspects of physiology life and to get to know other people within the program outside of the classroom setting.

U2 Representatives: The U2 representatives are responsible for many things, both academic and social, to enhance and bring enjoyment to the U2 year for Physiology students. Academically the U2 reps handle class recordings, NTCs, coursepacks, organization of tutorials and student-professor communication to maximize the U2 class' academic success. Socially the U2 representatives hold a Physiology event each semester to bring together peers in an out-of-school context.

U1 Representatives: The role of the U1 rep is do exactly as it states: represent the U1 Physiology students. This means advocating on their behalf to the council, planning at least one event for U1 students per semester, advertising

upcoming PULS events to the PHGY classes, write and send U1 ListServs with all of the information that pertains to U1s, and assisting with the council in their events. The U1 Rep is appointed by the PULS council in September after an application and interview process. If you're interested in getting started in your new department's student government, join PULS to get started as U1 Rep!

Charity Director: The charity director is responsible for coordinating philanthropic events on behalf of the physiology student body. Those may include fundraising events such as samosa and bake sales, or other charitable efforts like the delivery of roses to hospital patients on Valentine's Day. In addition, he or she is to coordinate and oversee various fundraising events during SUS charity month, in hopes of securing the SUS charity month award for PULS – a tradition we like to maintain! Finally, the charity director is responsible for choosing one or more organizations to which raised funds will be directed on behalf of the department.

Computer Director: The Computer Director essentially manages three things: the weekly newsletter (The Beat), updating the PULS website, and voting when election period comes up. Voting is done through CTF, but the computer director is responsible for setting up the voting page. The website is powered by WordPress, so knowledge of CSS and HTML is not necessary but is a very useful asset. As for the Beat, all you need to know is how to use MS word or any other program that lets you format things easily.

PULS Events and Services!

NTCs: The Note Takers Club (NTCs) are student-written notes made for certain classes managed by PULS. These classes include PHGY 210, PHGY 311/312/313/314, and PATH 300. The U1 and U2 reps are responsible for managing the NTCs provided by PULS each semester. For each lecture, writers assemble notes based on class material, editors proofread the notes, and the U-reps ensure everything is printed and delivered to the students via CopiEUS (located in the McConnell engineering building). NTCs cost $40 covering the whole semester's lectures. NTCs serve as a great study aid to most students at McGill. Before the semester begins, the U-reps issue announcements looking for writers and editors, which anyone currently taking the class can sign up for! The position is paid too, which is an added perk of being part of the NTC group! Course-packs are also available for PHGY 209/210/312/313, so if you think you need some more helpful material to go over, come by the PULS office and we'll be happy to show you what we have!

U-rep Events:

- **U3 Rep Events:** So what are these events that we speak of? For one, there's always a U3 Welcome Event to usher in the new school year and allow for everyone to see each other! This is especially important because many students are not in the same courses as in previous years. Our other events have included a festive party combining lasagna and sangria, which we appropriately named Lasangria, and a Bar Night Out at Bifteck; both of which were a big hit and allow for U3 students to enjoy some great food and good company! At the end of the year, we also plan the Physiology Grad Dinner to celebrate our final year together!
- **U2 Rep Events:** In the first semester of U2 we held a U2 beer pong night at BDP where duos competed for the title of PHGY Pong Champion. Our second semester had a more laidback night at ACE bar after a midterm was the event of choice where physiology students could hang out and unwind after a tough exam. The U2 reps also host PHGY Fridays which is at Gerts after PHGY 311 tests giving U2s a chance to talk about the class and/or relax with free beverages sponsored by PULS.
- **U1 Rep Events: Fall, U1 Movie Night:** This event was the first one that the U1 reps planned. We rented out FDA, put Contagion up on the big screen, and brought in free food and drinks, such as freshly popped popcorn, water and pop. A very relaxed evening, this event offered U1's chance to relax and unwind during midterms while still feeling productive

(Contagion is an awesome movie about a pandemic). **Winter, Trivia Night:** The week before the PHGY 210 midterm, the U1 Reps held an event at Gert's. It was a Trivia Night which was composed of questions, written by the U1 Reps and read by the USCAs, which covered questions that may appear on their upcoming PHGY 210 midterm. With a large turnout and early registration, the event was a huge success. Most of the budget itself went to buying curly fries and beverages for the students! This event was such a success because it catered to the very specific needs of PHGY students; the desire to have fun and be social, while still studying to achieve those pre-med level marks!

Synapse Program: As aspiring medical school applicants, U1 Physiology students naturally have a lot of questions coming into the program. These questions may be related to their chances at medical school, how to maintain a high GPA, which courses to take, what 48 extracurricular activities to pursue for the OMSAS autobiographical sketch, and whether Boustan's chicken pita really is better than Basha's. Your U3 counterparts know the answers to all of these questions and more! The Synapse program pairs you up with these U3s and gives you a chance to communicate with them easily in case you need any help. The synapse leaders (the U3s) usually send regular emails but the VP Academic also organizes two synapse events every year to give U1s a chance to see their U3s in person. These events usually involve food and give you a great time to mingle and have your questions answered.

JUMPS: The Journal of Undergraduate McGill Physiology Students (JUMPS), is a great chance for PHGY students to show off their research to other students and to gain valuable insight into the research going on around McGill, and particularly in the Department of Physiology. Any PHGY student can submit an original research paper on a lab project they've worked on, which could be a summer project, a 396 course, or even a 461 course. The only requirement is that the research be completed at least 1.5-2 years prior to the publication date of JUMPS, which is usually by Undergraduate Research Day every year. It's also possible to get involved with JUMPS as an editor, so you get to learn what goes on behind the scenes between the submission of the paper and its final appearance in the journal. There are older copies available in the PULS office, if you're willing to take a look.

Ski-Trip: The annual PULS ski-trip involves a weekend ski trip to Mont Saint Anne. The trip involves three fantastic days on the slopes with your best buddies and some requisite frat-clubesque partying. Regardless of your skill level, and dare we say it, your department, you are bound to have a memorable, safe and

exhilarating time! This year, we had discounted prices for the ski-trip, so that you could easily go on the weekend trip for less than $200! There were also beginner lessons and rentable equipment for people who didn't have any experience, thus providing students with a prime opportunity to take part in one of the best experiences of their undergraduate career!

Apartment Crawl: This year, PULS organized an apartment crawl in collaboration with NUM (aka. the neuroscience n00bs). This apartment crawl involves hopping through different apartments/frat houses, and participating in fun games related to Science in teams in a night jam-packed with free booze and debauchery. The event is usually held in the Fall semester right during midterm season, which is great for those willing to procrastinate and unwind before getting back to that oh-so-wonderful study routine!

Wine and Cheese: Some of us love wine; some of us love cheese. But the two together? The Wine and Cheese (held during second semester usually), allows PHGY students to mingle with fellow students and de-stress in a wonderful auction event where the auctioneer doesn't speak nearly as fast as most movies show. What's unique about Wine and Cheese is that professors from the Physiology department offer various prizes involving them as part of a silent auction. Past prizes include a squash game with Dr. Orlowski, lunch for two with Dr. Martinez, and a shadowing opportunity from Dr. Magder.

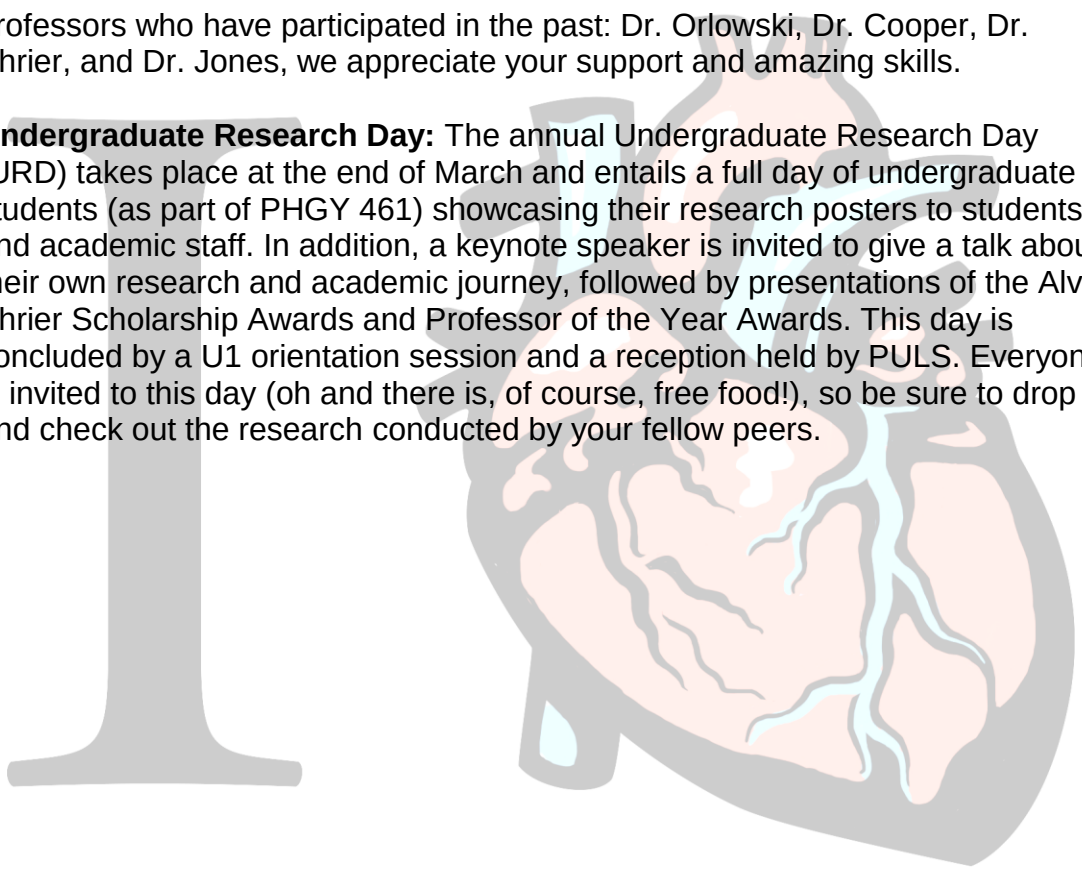
Talent Night: The Talent Night is usually hosted by PULS in collaboration with multiple other departments. This year, the talent night was held at Café Campus, and involved a night of music, interpretive dance, spoken word, fire juggling (maybe) and other forms of entertainment! It's a great chance to meet students and to also showcase your talent to (potential) employers in case you want to drop everything related to science and start a fire-juggling interpretive dance career!

ANAT vs. PHGY Soccer Game: This was a new event in 2014, where we yet again showed our dominance over anatomy! Organizing a soccer game allowed for a more conclusive event for all PHGYs to participate in. Playing on Molson Stadium was awesome, and the amazing Dr. Sharif showed off his skills as a part of the PHGY team! We ended up tying 2-2, but that just gives us more of a drive to beat them next year!

ANAT vs. PHGY Hockey Game: This annual event is a thriller you don't want to miss! Anatomy and Physiology students and professors go head to head in the most entertaining hockey game you'll ever witness. This year, PHGY pulled out

the best comeback in history, down 4-8 in the 2nd to come back 10-9 in the last minute of the 3rd! You don't want to miss out on this event! Shout-out to all the professors who have participated in the past: Dr. Orlowski, Dr. Cooper, Dr. Shrier, and Dr. Jones, we appreciate your support and amazing skills.

Undergraduate Research Day: The annual Undergraduate Research Day (URD) takes place at the end of March and entails a full day of undergraduate students (as part of PHGY 461) showcasing their research posters to students and academic staff. In addition, a keynote speaker is invited to give a talk about their own research and academic journey, followed by presentations of the Alvin Shrier Scholarship Awards and Professor of the Year Awards. This day is concluded by a U1 orientation session and a reception held by PULS. Everyone is invited to this day (oh and there is, of course, free food!), so be sure to drop by and check out the research conducted by your fellow peers.



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Nancy Duan (CHEM 203, CHEM 212)

Kavya Anchuri (PHGY 209, 212, CHEM 204)

Frank Battaglia (CHEM 222, ANAT 261, BIOL 200)

Mira Katz-Egorov (PSYC 305)

Tianci Wang (PHGY 311/314, BIOC 311, BIOL 201)

Jonathan Reid (PHGY 312/313/351/359, BIOL 301/309)

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