



UNIVERSITY OF TORONTO

# PHARMACOLOGY & TOXICOLOGY

STUDENT ASSOCIATION

## Course Commentary 2016- 2017

*A guide to surviving pharmacology &  
toxicology!*

### Courses Included

PCL102 PCL465  
PCL201 PCL469  
PCL297 PCL470  
PCL302 PCL472  
PCL345 PCL473  
PCL362 PCL474  
PCL366 PCL475  
PCL376 PCL477  
PCL389 PCL481  
PCL402 PCL486  
PCL461

This Course Commentary is a compilation of course-specific tips from previous students. For the numerical breakdown of the course evaluations, please check out the "Faculty of Arts & Science Course Evaluations Feedback" link on <https://portal.utoronto.ca>. Please contact other student unions regards to courses under other codes.

## **PCL102: The Art of Drug Discovery**

Many students found this course to be very interesting and enjoyable. Students felt that this course was very suitable for students who were interested in the field of Pharmacology or the pharmaceutical industry. It is important to note that the required readings are testable in addition to the lecture material. The lectures tend to build on one another: students should try to stay on top of course by reviewing the content from previous lectures. It is advised that students attend class and pay attention to demonstrations.

## **PCL201: Introduction to Pharmacology and Pharmacokinetic Principles**

A solid and favourite introductory course to Pharmacology and Toxicology. Content is challenging, yet interesting. The professors are very clear with their content and what they would like students to learn. Make thorough and detailed notes; review them constantly over the semester. The key to success in PCL201 is the ability to understand and apply the content, rather than memorizing and rewriting content. Clinical Pharmacokinetics and Liver-Drug Metabolism highlight this course, many previous students suggest to study these concepts with extra vigor. However, very limited Toxicology-content. Self-learning is required, very few tutorials and dense content over two 2-hour blocks makes discipline and focus essential.

## **PCL297: Research Experience in Pharmacology & Toxicology**

Previous students have found this course to be a fun and amazing experience. It is a pass/fail course which provides hands-on experience helping to develop laboratory research skills, and strengthens your ability to analyze scientific literature alongside a research supervisor. Choose a professor whose work you're interested in! Do your research on their research ahead of time before approaching them and contact either through E-mail or in person. Definitely make your letter personal and be passionate about their work! Once a supervisor is found, a form will need to be completed and returned to the department main office. It is highly recommended to start looking early when finding a professor. It may take a long time to find one, but keep trying!

## **PCL302: Pharmacodynamic Principles**

Try not to fall behind and really understand the mechanisms of certain group of drugs discussed in class. It is a challenging course, but there is a great deal of applications of material covered. There are many drugs to remember and starting early in terms of midterm and exam preparation would really help. Try to review every week because the material builds up quickly. Also take the time to understand the calculation questions.

Don't be afraid to ask questions! For many students their third year will most definitely be one of the hardest years in their university life. There seems to be a jump from second year to third year in terms of level of details covered in the courses and PCL302 is one of those courses. In the first few lectures, there is a very brief reminder of concepts of PCL201, very quickly new concepts and materials build up.

Do not miss out the small details and information which will be covered, usually those details are on the exams. Many students could remember the concepts better by re-listening to lecture audios. Flashcards are your best friends when it comes to learning the drugs' names and mechanisms of action, and medical uses. Many students in PCL302 struggled with graphing questions and the major concepts covered in the first couple of classes due to the presumption that they understood it from PCL201. These topics included things such as drug binding assays, pharmacokinetics and absorption and etc. For a lot of students, re-writing these major concepts again and again was a great way of practicing for exams.

The textbook found in Gerstein (short loan section) would help students for the assignment as the questions are drawn from this book and generally will help them finalize their understanding of the concepts.

## **PCL345: Experimental Approaches in Drug Discovery**

Previous students have found this course to be relatively not as intensive as other pharmacology courses, albeit it does demand the ability to think critically and to integrate and connect knowledge learned from each lecture. It is like a seminar course, where each week a guest lecture would present on their research. It is imperative to organize your notes based on the main themes outlined in each lecture. This will come in handy when writing your 2 assignments for this course. 2 scientific manuscripts are assigned each week. It is advisable to take notes as you read them. You will be tested on them as well as on the lecture material. The lecture is followed by an interactive discussion with the guest lecture, where a selected group of students prepare 5 questions based on the assigned scientific manuscripts. Overall, this course is very engaging and if you stay on top of the assigned readings and take good lecture notes, you should comfortably do well in this course.

## **PCL362: Introductory Toxicology**

This course covers an extensive range of material and introduces real-life cases in the field of Toxicology. Different lecturers are brought in throughout the courses to discuss different mechanisms of toxicity and targeted areas in the body. It should also be noted that this course is a joint course with Pharmacy students; therefore, its content is very in-depth. Students found this course very interesting, but challenging at the same time. The material is very dense and detail-oriented, as there are many different mechanisms that students need to memorize.

This course requires a lot of memorization: students are encouraged to focus on every detail of mechanisms/diagrams or lectures in general. A tip for writing the midterms or the exam is to not be afraid of being redundant or too detailed. As long as students are able to write everything they know about the given topic in the question, they are sure to touch on most of the important concepts that the TAs are looking for. Professors will often mention if certain sections of their lectures are important, so make sure to pay attention for these clues in class. Due to a very specific marking scheme, students should be careful with their wording when writing their midterms or exam. Many found it helpful to go over past tests, re-listen to lectures, and to be able to explain whole lectures and mechanisms verbally.

## **PCL366: Basic Pharmacology and Toxicology Laboratory**

Students thought that the material taught in this course was interesting as well as engaging. The lab techniques taught were thought to be useful, as they are common in the world of research. However, students felt that it was difficult to prepare for exams, as the outline given was vague. Working in groups of 4-5 students was felt to be helpful, especially in the first few weeks while still adjusting to the unique nature of lab courses. Additionally, the first week of class is an introduction to lab, where how to write a good lab report was explained in detail, making it easier to do well. Furthermore, the first lab report is written as a group and is weighted less than subsequent lab reports, allowing you to learn from your mistakes without having huge consequences. Overall, this course was perceived as relatively difficult and time-intensive.

Read the entire lab manual before beginning the modules—this will help put things into context especially with the long 6 week breast cancer module. Reading the entire lab manual will prevent you from feeling lost during lab, as well as help you prepare for quizzes and write a good lab report. When studying for exams, students found it helpful to not only study from the lab manual but also from their lab reports as well as the PowerPoints presented at the beginning of each lab.

Do not leave your lab report for the last minute. Many parts of the lab report can be written before the module is even complete: the introduction and methods can be written solely by referring to the lab manual as well as doing literature searches beforehand. The results and discussion depend on how the experiment went. However, if your group doesn't get good results or if the experiment doesn't work out, you can ask to borrow the data from another group without being penalized.

The TA's are very helpful and knowledgeable—don't hesitate to ask them for help or clarification at any point during the lab or while you're writing your lab report.



# **PCL376: Experimental Design and Data Analysis for Pharmacology and Toxicology**

This course starts off misleadingly slow, but don't forget to review frequently. Students found the concepts to be similar to STA220 and prior knowledge was helpful, but not necessary. Rather than mathematical skills, emphasis on understanding concepts and ideas were the main focus of this course. Don't be afraid to ask questions during office hours and approach the prof after lectures – many students found this was helpful in preparing for midterms and understanding concepts further. Finish the SPSS assignments early and get them out of the way as they do take up a sufficient amount of time to finish. Overall, many students found this course to be interesting and applicable to real life research situations.

# **PCL389: Understanding the Role of Pharmacology and Toxicology in Society**

Students enjoyed the opportunity for self-reflection and class interaction. The small class size was found to be conducive for learning and allowed individuals to participate in class through discussions. Students also appreciated the ability to practice their presentation skills. In addition, students found that the community service component of the course may be time-consuming. However, if time is well-planned, the experience is very rewarding and students found the reflections good practice on how to properly articulate your thoughts and demand deeper insight and perception.

# **PCL402: Pharmacology and Toxicology in Drug Development**

This course is suitable for students who are interested in doing clinical research or getting involved with a private industry. Students should go over assigned readings before class and participate in class discussions. Avoid procrastinating on assignments, and ask for feedback on your drafts whenever possible.

It is helpful to go to tutorials to get important tips for assignments. Make sure to include all information that is relevant for each particular subsection in assignments, and keep your work organized and professional.

## **PCL461: Advanced Pharmacology Lab**

Many students have felt that this course had unclear expectations and criteria. As such, it is imperative to not be afraid of asking questions! Talk to your TA's and ask questions to understand their expectations and how to write your report. Take notes during group presentations and during pre-lab talks. Start your reports early, and get as much background information as you can! Report due dates can come up fast so coordinate well with your group members to meet the deadlines. Rat handling is also involved in this course so be weary of any individual aversions and coordinate roles well with your groups. Overall, students have found the material of this course to be interesting and useful.

## **PCL465: Advanced Toxicology Laboratory**

This course was noted to be more manageable than PCL461 due to the shorter modules. However, the modules being shorter means that there is less time to write each lab report. The last month of the course is a little stressful due to having presentations, a lab report due and two tests. The oral presentation is a good opportunity to practice your public speaking, which is something that not many courses in the pharmacology/toxicology department have.

The shorter modules mean you have to stay on top of writing lab reports, like in PCL366, do not wait until the last minute to start writing. Do not go over the page limit for the lab report—marks will be deducted for this. Students felt that marking for the lab reports was sometimes unfair and inconsistent due to the fact that different TA's evaluated each report and they had different expectations. If you feel that you were not marked fairly, talk to the professor. For the presentation, be prepared to answer questions on your topic (asked by both the professor and TA as well as you classmates). Additionally, stay within the time limit or marks will be deducted.

## **PCL469: Systems Pharmacology I**

Systems Pharmacology may provide an overwhelming amount of information, which can be intimidating for most students. While this course does require a lot of memorization of drugs, it is imperative to have a deeper understanding of the material and apply it! It is important to always come to class and take detailed, organized notes. Reviewing material frequently during the week helps to alleviate stress before midterms – cramming is NOT an option. Identify the main concepts mentioned in class and go over prototypical examples.

Take notes during Small Group Sessions (SGS) and engage in the conversation with your peers. Marks are based off of participation so now is not the time to be shy! Students found the SGS to be interesting and helped when studying the bigger concepts for midterms. Many students struggled with the two-minute quizzes – as such, it is important to do weekly reviews to prepare for these!

Overall, many students found this course to be interesting and applicable, despite the overwhelming amount of information.

## **PCL470: Systems Pharmacology II**

This course requires a lot of revision as each lecture presents a significant amount of information. Students found it helpful to use flashcards and tables when studying for this course. Students are advised to keep their notes organized and to understand why each topic is being discussed to make it easier to remember. It is useful to take note of prototypical drugs or examples covered in class and their characteristics.

Since there are a lot of CNS topics covered in this course, students should be careful not to mix up neurotransmitters and brain structures. It helps to know which receptors the drugs work at as it will make it easier to understand their side effects. Make a table to organize drugs from each unit and know your antimicrobials well.

# PCL472/474: Project in Pharmacology and Toxicology

## *How did you choose your professor?*

The process of selecting your prof has changed over previous years. You will now be given a list of profs, and must choose and rank your top 5. Based off your ranked list, the department will choose 3 professors for you to interview. Once you've been given your 3 professors, it is advisable to contact them as soon as possible, so make sure you've read their research background and papers by then. You can also do your course project with a prof not mentioned on the list, but you need an approval from the department.

## *Summer vs. year-long research*

Summer is a 9-to-5 daily investment if you want to get really involved in your project. Doing it during the year may make you feel less immersed in your research. It's much simpler to coordinate and design your own schedule on daily experiments because you don't have to work around your course schedules and assignment deadlines. This choice depends on what type of project you want to do and what results you want to get. Cell work would be a good match for summer projects, while animal work might be better in the fall, just due to how long it takes animals to grow so you can get your results. The downside to a summer project is that it will be difficult to balance a part-time job and you won't be eligible for summer research awards. As well, if your project requires you to collect data over time then a summer project may be difficult, as you would have to condense your experiment.

## *Quotes and Tips from upper years*

Communicate often with your supervisor.

Think early on about what kind of research you want to take on (e.g. wet lab, clinical, field of study...). If you're in an earlier year, remember to rack up more research experience, so that when you're contacting a professor for your final thesis project, you'll get your top choice because you've got experience. Don't be afraid to ask for help from the members in your lab, if you're confused about an experiment -- it's better to make sure you know everything for certain, or you'll waste resources if you make a mistake or assumption.

Maintain communication with your PI. Don't be afraid to report any mistakes you made - remember, it's a learning experience. Keep organized notes so you can refer back to



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them. I also found that writing weekly summaries was very helpful when writing the interim and final reports.

From the list of professors in the departmental package, narrow it down to ones that are in fields you are interested in. Go in and chat with some of them and ask what projects they can offer you. Also, don't be afraid to suggest a project/idea that you may be interested in! Professors (usually) love this, and will appreciate this innovative mentality. Especially if you want to do graduate school.

Go on their websites and read about their research, and if you're interested in their field or the techniques they use in their lab. Find some other students who have worked with the professor in the past and get some other opinions. Look up a few professors ahead of time and see if you can meet them earlier -- such as at the PTSA Prof Student Luncheon.

Quote from student: "I chose from the list of provided professors by thinking about whether I wanted to gain clinical, benchwork, peer reviewing, etc., experience, and then narrowing down the list by looking up whether the focus of their lab was something I could see myself being interested in."

## **PCL473: Interdisciplinary Toxicology**

Students found the structure of the course to be a good learning environment and conducive to asking questions. Many students enjoyed being exposed to a wide range of toxicological concepts however some found the depth of material was superficial due to the broad range of topics are covered. Additionally, the topics tended to overlap with other 400-level Toxicology courses. Some students found the rubric for marking midterms relatively unyielding and harsh. They believed that the expectations for short answers were not clear, required critical thinking beyond basic memorization and the questions were too vague. However overall, it was found to be an interesting course.

## **PCL475: Neuropsychopharmacology**

Many students found this course fascinating and they mention it as one of their favorite courses at UofT by far. This course emphasizes on critical thinking ability and challenges what is already "known" in the research. Having some background in pharmacology and some background in neuroscience would be helpful. Don't worry if you don't have enough background because this course covers a lot of background for every topic before going deeper into the topics. It is very interesting that CNS pathology and drugs' mechanism of actions in relation to the pathology are discussed. It is vital to regularly review in order to keep up with the heavy course load. Many students followed this simple recipe, and could do very well by reviewing regularly and staying on top of the materials. Students find this course to be straightforward, well-organized, and clear both in terms of lectures and evaluations. Keep in mind PCL475 is a yearlong course, hence it covers a large volume of material. It would be very helpful to start studying early.

## **PCL477: The DNA Damage Response in Pharmacology and Toxicology**

The lectures taught throughout this course are very concise and thorough: difficult concepts are explained in a way that is easy for students to understand. Dr. McPherson usually indicates whenever information is testable or important to remember, so make sure to pay attention to these clues in class. Although it is very important to supplement the slides in class with personal notes, students should make sure to pay extra attention to the details provided on slides as they are very likely going to reappear on tests. Be sure to understand "the bigger picture" and be able to apply the information from class to real-life cases.

It is advised that students review lectures throughout the duration of the course, and to clarify any confusing material with Dr. McPherson as early as possible. The exam covers a wide range of topics, so it is important not to fall behind in your studying. Also, it is helpful to go over any questions you may have with Dr. McPherson regarding the assignment: he will tell you exactly what he is expecting from you, and he is often able to look-over any drafts you have. With that said, it would be a good idea to start writing the assignment early so that you can go over any details with Dr. McPherson before the due date. If students ever have any questions about the material taught in class, they should ask Dr. McPherson to help clarify as he is very good at explaining concepts. It is definitely helpful for students to go to pre-test or pre-exam tutorials as Dr. McPherson will answer any questions from past slides and will definitely clarify what kind of material will be tested.

## **PCL481: The Molecular and Biochemical Basis of Toxicology**

This course is a review of toxicological principles—with each week focusing on a new body system. Dr. Grant is a great and organized lecturer which makes it easy to follow along during class and to go back and study for exams. This course is a memorization based course, and requires you to know in detail molecular mechanisms of how each drug works. However, if you study it is possible to do very well on the midterm. There is also a research essay where students are given a topic and asked to do a review of the current research and knowledge on the selected topic. However, be sure to not only repeat what you've read while doing your research but also to put your own opinion into the essay as well. Some students found the final exam difficult, as it did not only test memorization but also included questions that required critical thinking and creativeness. Overall, this course is taught once a week for two hours. Given the small amount of lecture hours, students found the course to be manageable and enjoyable.

Make sure to take detailed notes in class as this is what you will be tested on, if you don't understand something or need clarification don't hesitate to ask the professor. The class size is very small so it's very easy to ask questions. Don't memorize the names of each drug that is listed in the PowerPoints (these aren't tested) —only know the ones he goes into detail about. With regards to the essay, Dr. Grant specifies a limit for references. Make sure to keep within this limit and to include your own judgement on the research you talk about.

## **PCL486: Pharmacology of Cancer Signaling**

This course is for all you cancer enthusiasts out there. In general, most lectures are split into two halves: first half is an introduction to a commonly cancerous signaling pathway, while the second half involves carcinogenic mutations and current treatments related to that pathway, as well as problems and potential strategies to tackle drug resistant mutations. There is a lot of information taught in this course, so it is very easy to get bogged down in the tiniest details. Therefore, it is advisable to understand and keep notes of the big concepts and ask yourself questions when studying (e.g. 'what happens when I block this pathway', or 'what does this protein do', 'how will that affect the system?'). There will be a take home midterm, which can be challenging and will take up a lot of your time, so make sure you start writing it very early on before the deadline. Students found that Dr. Salmena's lecture slides and overall course was organized, clear and interesting.