New Course Outline

- The [PharmD Approval Process for New Course Outlines](#) document provides for more information on next steps and approval timelines.
- The [Course Outline Submission Overview](#) document provides more detailed guidelines on course learning objectives, topic outlines/scheduling requirements, and assessment methods.
- The [AFPC Educational Outcomes for Professional Programs](#) document provides complete information on roles and key competencies for Pharmacy Degree Programs.

**Course Number:** PHM240H1  

**Course Title:** The Science of Pharmacotherapy

**Outline Version Code:**

**Course Description:**
This course will build upon basic pharmacology and medicinal chemistry to make links between the basic sciences and demonstrate how basic principles can be used to improve clinical therapy. It will also include critical evaluation of evidence for specific mechanisms and therapies. The format of the course to address these issues will be an online questions, questions that are designed to illustrate these points. The questions will be either multiple choice or short answer and online feedback will be provided.

**Semester:**  
☐ Fall  ☒ Winter  ☐ Summer

**Course Type:**  
☐ Elective  ☐ Selective  ☒ Mandatory

1. **Course Learning Objectives:**
   Upon completion of this course, students will have achieved the following level of learning objectives:  
   Introductory = knowledge and comprehension of concepts, definitions  
   Intermediate = application of concepts to simple situations  
   Advanced = application of concepts to more complex situations with ability to synthesize and evaluate

**Knowledge**  
Introductory Level:
Intermediate Level:
To reinforce basic pharmacology and medicinal chemistry knowledge by using basic principles to solve clinical problems.

Advanced Level:

Skills
Introductory Level:
To be able to use the structure of a drug to predict simple properties of a drug such as pKa, solubility, oral bioavailability, and ability to cause central nervous system effects.

Intermediate Level:
To be able to use basic principles to solve clinical problems that often involve analogy or extrapolation to a related problem rather than reiteration of the problem discussed in class. To be able to critically evaluate the medical literature

Advanced Level:

Attitudes/Values:
Introductory Level:
Intermediate Level:
To promote critical evaluation and skepticism – Science is not a body of knowledge; it is a method to determine what is true. Some of what is written in textbooks is wrong. The conclusions reached by much of the medical literature are wrong. There is no good evidence to support virtually any “complementary” therapies, and they have the potential to do harm. Many therapies that were accepted in the past have been shown to be wrong and much of pharmacotherapy as currently practiced is inappropriate. Therefore, being skeptical of the medical and other literature is an important attitude because it promotes critical evaluation. However, it is essential that a patient who may hold what appear to be illogical beliefs be treated with respect.

Advanced Level:

2. Rationale for Inclusion in the Curriculum:
The basic sciences are often taught in isolation and it can difficult for students to understand how the basic sciences that they learn can be used to improve drug therapy. This course is designed to make these links with an emphasis on chemical structure and mechanism. In addition, it is often difficult for students to assess the medical and other literature because much of it is incorrect and/or conflicting. One illustration of this point is that most of the questions that are discussed remain the same each year but the “correct answer” often changes from year to year. This course will prepare students to critically evaluate conflicting data on the efficacy of specific therapies.

3. Pre-requisites:
PHM140H1: Molecular Pharmacology
PHM144H1: Pharmacokinetics
PHM 142H1: Metabolic Biochemistry and Immunology
PHM112 - Clinical Trials section

4. Co-requisites:
Statement of agreement from course coordinators of courses for which this course is a pre-requisite:

Coordinator's Name and course name and/or number:
Jim Wells
Carolyn Cummins
Jeff Henderson
Anna Taddio
### 5. Course Contact Hours and Teaching Methodologies:

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didactic (lecture)</td>
<td>1</td>
</tr>
<tr>
<td>Large group problem-based/ case-based learning</td>
<td></td>
</tr>
<tr>
<td>(group size: 240+ )</td>
<td></td>
</tr>
<tr>
<td>Laboratory or Simulation</td>
<td></td>
</tr>
<tr>
<td>Hours:</td>
<td></td>
</tr>
<tr>
<td>Tutorial/Seminar/Workshop/Small Group</td>
<td>3</td>
</tr>
<tr>
<td>(group size: 60 )</td>
<td></td>
</tr>
<tr>
<td>Experiential</td>
<td></td>
</tr>
<tr>
<td>On-line</td>
<td>25</td>
</tr>
<tr>
<td>Other (please specify):</td>
<td></td>
</tr>
<tr>
<td>Total Course Contact Hours</td>
<td>29</td>
</tr>
</tbody>
</table>

### 6. Estimate and description of student's weekly out-of-class preparation time excluding exam preparation:

Almost all of the work is out-of-class. Students will go through a total of 50 modules or about 4/week. The modules are on Blackboard and consist of questions in the form of an ungraded quiz. The students can search for answers from textbooks or the literature to answer the questions, but they will be given feedback at the end of each module. This will require about 5-10 hours of work outside of the classroom. They are free to study as a group if they wish to.

### 7. Topics Covered and Lecture Specific Learning Objectives

**Week 1**

**Lecture Topic:** Overview of Objectives and Procedures

**Lecture Learning Objectives:**
- In class overview of objectives and procedures.
- To examine irrational behaviour and therapy with an emphasis on homeopathy and to examine the limits of our knowledge.
- To examine structural determinants of drug absorption and distribution and how to use this information to solve clinical problems.

**Week 2**

**Lecture Topic:** Effect of structure and metabolism on drug response and drug interactions

**Lecture Learning Objectives:**
- To study the effects of structure and metabolism on drug response and factors that influence drug metabolism and kinetics; Interactions of drugs with receptors, genetic differences in response, and mechanisms of tolerance.
Week 3  
Lecture Topic: Antimicrobials and Antineoplastics  

Lecture Learning Objectives:  
− To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

Week 4  

Lecture Learning Objectives:  
− To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.  
− In addition to examine the issues related to pharmacotherapy in the perinatal period.

Week 5  
Lecture Topic: Antithyroid Drugs, Drugs to Treat Diabetes, and Corticosteroids  

Lecture Learning Objectives:  
− To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

Week 6  
Lecture Topic: Eicosanoids, Antihyperlipidemic Drugs, and Vitamins  

Lecture Learning Objectives:  
− To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

Week 7  
Lecture Topic: Drugs Affecting Bone Metabolism, Cholinergic Agonists and Antagonists  

Lecture Learning Objectives:  
− To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.
**Week 8**
**Lecture Topic:** Adrenoreceptor Agonists and Antagonists, Agents Affecting Muscles and Movement, Opioids

**Lecture Learning Objectives:**
- To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

**Week 9**
**Lecture Topic:** CNS Organization, Anticonvulsants, Anesthetics, and Anxiolitics

**Lecture Learning Objectives:**
- To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

**Week 10**
**Lecture Topic:** Antipsychotics, Antidepressants, Inotropic Agents, Antiarrhythmic Drugs, Diuretics

**Lecture Learning Objectives:**
- To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

**Week 11**
**Lecture Topic:** Anti-inflammatory Drugs, Respiratory Drugs, Immune System Organization

**Lecture Learning Objectives:**
- To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

**Week 12**
**Lecture Topic:** Drugs to Treat Acid-Peptic Disorders, Intestinal Motility Disorders, and Inflammatory Bowel Disease

**Lecture Learning Objectives:**
- To study the structure, characteristics, and mechanisms of drugs in these drug classes, and how to use this information to solve clinical problems.

**Week 13**
**Lecture Topic:** Adverse Drug Reactions and Poisoning

**Lecture Learning Objectives:**
– To combine lessons from previous modules to understand adverse drug reactions and poisoning.

8. Assessment Methodologies Used:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Course Learning Objectives Addressed</th>
<th>Assessment Method Used</th>
<th>Percent of Course Grade</th>
<th>For Group Work: Individualized or same mark for all group members</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Assignment ☐ Presentation ☐ Participation ☒ Mid-term ☐ Final Exam</td>
<td>The ability to answer factual questions or critically evaluate a point from the literature that has been discussed will make up a major part of the exam but there are always questions that require the use of principles to solve problems that have not been discussed. This assessment tests both factual knowledge and the ability to use this knowledge to solve clinical problems. It also assesses critical evaluation but that is more difficult to test with a short answer examination.</td>
<td>Short answer exams</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>☐ Assignment ☐ Presentation ☐ Participation ☒ Mid-term ☐ Final Exam</td>
<td>The ability to answer factual questions or critically evaluate a point from the literature that has been discussed will make up a major part of the exam but there are always questions that require the use of principles to solve problems that have not been discussed.</td>
<td>Short answer exams</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>☐ Assignment ☐ Presentation ☐ Participation ☐ Mid-term ☒ Final Exam</td>
<td>The ability to answer factual questions or critically evaluate a point from the literature that has been discussed will make up a major part of the exam but there are always questions that require the use of principles to solve problems that have not been discussed.</td>
<td>Short answer exams</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Assignment</td>
<td>Presentation</td>
<td>Participation</td>
<td>Mid-term</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

*Expectation for pass grades for all Pharmacy courses is 60%*

9. Policy and procedure regarding late assignments/examinations/laboratories:
Supplemental examinations will be offered as per Faculty policy.

10. Policy and procedure regarding missed assignments/examinations/laboratories:
**Missed Exam Policy:**
Students who miss one term test and who have a valid petition filed with the Registrar’s office will have the other test and final grade reweighted to 40%, 60% respectively. If more than one term test or the final exam are missed and a valid petition has been filed with the Registrar’s office the student will be eligible to complete a make-up examination. The format of this examination will be at the discretion of the course coordinator, and may include, for example, an oral examination.

11. AFPC Education Outcomes addressed (check all those that apply):
- Refer to [AFPC Educational Outcomes for Professional Programs](#) for further information about the role and key competencies.

As Care Providers, pharmacy graduates:

**CP1 – Practice within the pharmacist scope of practice and expertise**

- **CP1.1** Apply knowledge from the foundational sciences to make decisions relevant to the contemporary and evolving scope of pharmacist practice;
- **CP1.2** Integrate AFPC Communicator, Collaborator, Leader-Manager, Health Advocate, Scholar, and Professional roles in their practice of pharmacy;
- **CP1.3** Recognize and respond to the complexity, uncertainty and ambiguity inherent in pharmacy practice;
- **CP1.4** Explain the benefits, risks and rationale associated with pharmacist-provided care as an important step in obtaining and documenting consent to pharmacist care;
- **CP1.5** Recognize and take appropriate action when signs, symptoms and risk factors that relate to medical or health problems that fall into the scope of practice of other health professionals are encountered.
CP2 – Provide patient-centred care

☐ CP2.1 Collect, interpret, and assess relevant, necessary information about a patient’s health-related care needs;

☐ CP2.2 Formulate assessments of actual and potential issues and in collaboration with the patient and other health team members as appropriate, prioritize issues to be addressed in a given patient encounter;

☐ CP2.3 Create and document plans in collaboration with the patient and other health team members as appropriate, and make recommendations to prevent, improve or resolve issues;

☐ CP2.4 Implement plans in collaboration with the patient and other health team members as appropriate, including:

CP2.4.1 obtaining consent
CP2.4.2 making a referral or consulting others
CP2.4.3 adapting, initiating, renewing/continuing, discontinuing or administering medication as authorized
CP2.4.4 dispensing and/or
CP2.4.4a dispensing and/or
CP2.4.4b compounding and/or
CP2.4.4c delegating/authorizing such tasks to others appropriately
CP2.4.5 engaging the patient or care-giver through education, empowerment and self-management, and
CP2.4.6 negotiating the role of pharmacy and non-pharmacy team members in continuity and transitions of care.

☐ CP2.5 Follow-up by monitoring, evaluating progress toward achievement of the patient’s goals of therapy, adjusting plans in collaboration with the patient and health team members across the care continuum.

CP3 – Actively contribute, as an individual and as a member of a team providing care, to the continuous improvement of health care quality and patient safety

☐ CP3.1 Recognize and respond to harm and potential harm from health care delivery, including patient safety incidents;

☐ CP3.2 Adopt strategies that promote patient safety and address human and system factors;

As Communicators, pharmacy graduates:

CM1 – Communicate in a responsible and responsive manner that encourages trust and confidence

☐ CM1.1 Select and use oral, non-verbal and written communication strategies (tools, techniques, technologies, etc.) effectively so that the patient’s best interests are foremost;
☐ CM1.2  Provide timely, clear responses that are tailored to the context and audience;

☐ CM1.3  Express facts, evidence, opinions and positions accurately and effectively, with clarity and confidence;

☐ CM1.4  Listen, actively solicit and respond appropriately to ideas, opinions and feedback from others;

☐ CM1.5  Use language, pace, tone, and non-verbal communication that is suitable for:
   a) the intended outcomes of the communication, and 
   b) the complexity, ambiguity, urgency and/or difficulty of a situation, conversation or conflict

☐ CM1.6  Seek and synthesize relevant information from others in a manner that ensures common understanding and where applicable, clarifies and secures agreement and/or consent;

☐ CM1.7  Compose and share oral, written, and electronic information in a manner that optimizes patient safety, dignity, confidentiality, and privacy.

CM2 – Communicate in a manner that supports a team approach to health promotion and health care

☐ CM2.1  Engage in respectful, empathetic, compassionate, non-judgmental, culturally safe, tactful conversations with patients, communities, populations, and health team members;

☐ CM2.2  Demonstrate awareness of the impact of one’s own experience level, professional culture, biases and power and hierarchy within the health team on effective working relationships, communication and conflict resolution with health team members and adapt the approach to the situation appropriately;

☐ CM2.3  Demonstrate accuracy and appropriateness of communication as well as respect for the role of other health team members when disclosing information about harmful or potentially harmful situations;

☐ CM2.4  In word and in action, convey the importance of teamwork in patient-centred care, patient safety, health care quality improvement and health program delivery.

As Collaborators, pharmacy graduates:

CL1 – Work effectively with members of the health team including patients, pharmacy colleagues and individuals from other professions

☐ CL1.1  Establish and maintain positive relationships;

☐ CL1.2  Recognize, respect and negotiate the roles and shared/overlapping responsibilities of team members;

☐ CL1.3  Join with others in respectful, effective shared decision-making.
CL2 – Hand over the care of the patient to other pharmacy team members and non-pharmacy team members to facilitate continuity of safe patient care

☐ CL2.1 Determine when and how care should be handed over to another team member;
☐ CL2.2 Recognize, respect and honour the negotiate shared and overlapping responsibilities of patients, pharmacy team members and other health members when handovers occur;
☐ CL2.3 Demonstrate safe handover of care, using oral, written, and electronic communication, during a patient transition to a different care provider or setting.

As Leader-Managers, pharmacy graduates:

LM1 – Contribute to optimizing health care delivery and pharmacy services

☐ LM1.1 Work with others to apply quality improvement strategies and techniques to optimize pharmacy care;
☐ LM1.2 Contribute to a culture of patient safety;
☐ LM1.3 Confirm the quality, safety, and integrity of products;
☐ LM1.4 Use health informatics to improve the quality of care, manage resources and optimize patient safety.

LM2 – Contribute to the stewardship of resources in health care systems

☐ LM2.1 Apply evidence and management processes to achieve cost appropriate care;
☐ LM2.2 Allocate health care resources for optimal patient care;
☐ LM2.3 Contribute to the management of finances and health human resources in pharmacy practice settings;

LM3 – Demonstrate leadership skills

☐ LM3.1 Demonstrate leadership skills to enhance pharmacy practice and health care.

LM4 – Demonstrate management skills

☐ LM4.1 Work with others to apply the principles of effective management and supervision of health human resources and medication use systems;
☐ LM4.2 Use effective strategies to manage and improve their own practice of pharmacy.

As Health Advocates, pharmacy graduates:
HA1 – Respond to an individual patient’s health needs by advocating with the patient within and beyond the patient care environment

☐ HA1.1 Work with patients to address determinants of health that affect them and their access to needed health services or resources;

☐ HA1.2 Work with patients to increase opportunities to adopt healthy behaviours;

☐ HA1.3 Incorporate disease prevention, health promotion and health surveillance into interactions with individual patients.

HA2 – Respond to needs of communities or populations they serve by advocating with them for system-level change in a socially accountable manner

☐ HA2.1 Work with community or population to identify the determinants of health that affect them;

☐ HA2.2 Participate in health promotion and disease prevention programs.

As Scholars, pharmacy graduates:

SC1 – Apply medication therapy expertise to optimize pharmacy care, pharmacy services and health care delivery

☐ SC1.1 Use knowledge and problem-solving to arrive at recommendations and decisions that are appropriate, accurate, and practical;

☐ SC1.2 Use professional experience to solve routine, previously encountered problems;

☐ SC1.3 Use established decision-making frameworks and apply learning required to manage new situations and problems.

SC2 – Integrate best available evidence into pharmacy practice

☐ SC2.1 Generate focused questions related to needs for information, recommendations and decisions in practice;

☐ SC2.2 Use systematic approaches in the search for best available evidence;

☐ SC2.3 Critically appraise health-related research and literature;

☐ SC2.4 Incorporate best available evidence in the decision-making process.

SC3 – Contribute to the creation of knowledge or practices in the field of pharmacy

☐ SC3.1 Apply scientific principles of research and scholarly inquiry;

☐ SC3.2 Apply ethical principles that underlie research and scholarly inquiry.
SC4 – Teach other pharmacy team members, the public and other health care professionals including students

☐ SC4.1 Provide effective education to others;
☐ SC4.2 Employ appropriate teaching roles when teaching others;
☐ SC4.3 Deliver effective feedback in teaching and learning situations;
☐ SC4.4 Use appropriate learning assessment and evaluation strategies when working with patients, team members, students and teachers.

As Professionals, pharmacy graduates:

PR1 – Committed to apply best practices and adhere to high ethical standards in the delivery of pharmacy care

☐ PR1.1 Exhibit professional behaviour whether face-to-face, in writing, or via technology-enabled communication. Professional; behaviour includes, but is not limited to:
  a) demonstrating honesty, integrity, humility, commitment, altruism, compassion, respect for diversity and patient autonomy;
  b) being accessible, diligent, timely and reliable in service to others;
  c) abiding by the principle of non-abandonment;
  d) maintaining appropriate interpersonal boundaries;
  e) maintaining professional composure, demeanor, and language even in difficult situations, and;
  f) maintaining privacy and confidentiality;
☐ PR1.2 Use ethical frameworks as one component of professional judgment;
☐ PR1.3 Recognize and respond to situations presenting ethical dilemmas, including conflicts of interest;
☐ PR1.4 Engage in activities that:
  a) protect the public, and;
  b) advance the practice of pharmacy.

PR2 – Able to recognize and respond to societal expectations of regulated health care professionals

☐ PR2.1 Take responsibility and accountability for actions and inactions;
☐ PR2.2 Demonstrate a commitment to patient safety and quality improvement;
☐ PR2.3 Honour the laws, ethical codes, and regulatory requirements (by-laws, standards, policies) that govern the self-regulated profession of pharmacy;
PR2.4 Demonstrate an understanding of federal, provincial/territorial, and municipal laws, policies and standards that apply to pharmacy workplaces;

PR2.5 Demonstrate an ability to maintain competence to practice through evaluating areas for improvement and planning, undertaking learning activities to address limitations in competence and/or performance and incorporating learning into practice;

PR2.6 Identify and respond to unprofessional, unethical, and illegal behaviours in pharmacists, other pharmacy team members, and other health professionals.

PR3 – Committed to self-awareness in the management of personal and professional well being

PR3.1 Set professional and personal goals, priorities, and manage their time to balance patient care, workflow, and practice requirements;

PR3.2 Examine, reflect upon, and manage personal attributes (knowledge, skills, beliefs, biases, motivations, emotions, etc.) that could influence self-development and professional performance;

PR3.3 Adapt their practice of pharmacy to fulfill evolving professional roles;

PR3.4 Recognize and respond to self and colleagues in need.