New Course Outline

Course Number:       PHM146
Course Title:       Fundamentals of Pharmacology

Outline Version Code:

Course Description:
This course will introduce students to fundamental principles of pharmacology. Students will be introduced to the basic factors involved in drug and receptor interactions including physical chemical considerations and enzyme kinetics. The pharmacology of drugs that modify fundamental physiological processes such as the autonomic nervous system and endocrine and autocrine pathways will also be examined to serve as a background for future pharmacotherapy modules.

Semester: ☒ Fall ☐ Winter ☐ Summer

Course Type: ☒ Mandatory ☐ Elective ☐ Selective

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:
– Recall various examples of drug-protein interactions (enzymes, substrates, inhibitors)
– Recognize how chemical interactions (covalent, ionic, hydrogen bonding etc…) are central to the drug receptor interaction and are important determinants of drug-receptor binding
– Describe various types of molecular interactions between ligands and receptors (eg. Agonists, antagonists, inhibitors etc.)
– Recognize the cellular effects of receptor agonists and antagonists
– Identify the physiological effects of the sympathetic and parasympathetic nervous systems
– Extend their knowledge of the pharmacology of drugs that modify the autonomic nervous system to appreciate the rationale for their use in cardiovascular, respiratory, ocular and behavioral pharmacotherapy
– Identify the physiological effects of various hormones including; oxytocin, vasopressin, growth hormone and cortisol
– Recognize the cellular and physiological effects of the prostaglandins, other autacoids and histamine
– Predict the physiological effects of drugs that either inhibit or mimic the activity of prostaglandins, autacoids and histamine

Intermediate Level:
- Predict the molecular, cellular and physiological effects of agonists or antagonists
- Provide examples of drugs that act as agonists or antagonists of adrenergic and cholinergic receptor subtypes
- Predict the physiological effects of drugs that bind to adrenergic or cholinergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity
- Provide examples of drugs that modify the activity and effects of hormones such as oxytocin, growth hormone, vasopressin and cortisol
- Predict the physiological effects of drugs that modify hormone activity (inhibitors or mimetics)

Advanced Level:
- Extend their knowledge of the pharmacology of hormone inhibitors or mimetics to appreciate the rationale for their use in hormone-dependent pathological states

Skills
Introductory Level:
- Upon completion of this course students will be able to locate reliable sources of information in the area of pharmacology

Intermediate Level:

Advanced Level:

Attitudes/Values:
Introductory Level:
- Students will be introduced to the idea that the rationale for the use of certain drugs in a given therapeutic context is based on the pharmacological principles of drugs.
**2. Rationale for Inclusion in the Curriculum:**
Foundational concepts in pharmacology are necessary to provide students with a strong background in topics that they will apply in their pharmacotherapy modules. This course will also provide a standard pharmacology foundation for all students with diverse academic backgrounds.

**3. Pre-requisites:**
Relevant content in Anatomy and Physiology (may also be covered concurrently)

**4. Co-requisites:**
This course will serve as a prerequisite for all future pharmacotherapy courses

**5. Course Contact Hours and Teaching Methodologies:**

<table>
<thead>
<tr>
<th>Didactic (lecture)</th>
<th>Hours: 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large group problem-based/ case-based learning (group size: )</td>
<td>Hours:</td>
</tr>
<tr>
<td>Laboratory or Simulation</td>
<td>Hours:</td>
</tr>
<tr>
<td>Tutorial/Seminar/Workshop/Small Group (group size: )</td>
<td>Hours:</td>
</tr>
<tr>
<td>Experiential</td>
<td>Hours:</td>
</tr>
<tr>
<td>On-line</td>
<td>Hours:</td>
</tr>
<tr>
<td>Other (please specify):</td>
<td>Hours:</td>
</tr>
<tr>
<td><strong>Total Course Contact Hours</strong></td>
<td><strong>Hours: 13</strong></td>
</tr>
</tbody>
</table>

**6. Estimate and description of student's weekly out-of-class preparation time excluding exam preparation:**
1 hour to complete readings
7. Topics Covered and Lecture Specific Learning Objectives

**Week 1**
**Lecture Topic:** Course Overview-Pharmacology Mapping-Bonding

**Lecture Learning Objectives:**
- Recall various examples of drug-protein interactions (enzymes, substrates, inhibitors).

**Week 2**
**Lecture Topic:** Determinants of binding-Drug-Receptor Interactions, Binding Site, Free Energy

**Lecture Learning Objectives:**
- Recognize how chemical interactions (covalent, ionic, hydrogen bonding etc...) are central to the drug receptor interaction and are important determinants of drug-receptor binding.

**Week 3**
**Lecture Topic:** Drug Targets-Biological Response-Receptor-Ligand-Agonist-Antagonist-Signal Transduction

**Lecture Learning Objectives:**
- Describe various types of molecular interactions between ligands and receptors (eg. Agonists, antagonists, inhibitors etc.).
- Recognize the cellular effects of receptor agonists and antagonists.
- Predict the molecular, cellular and physiological effects of agonists or antagonists.

**Week 4**
**Lecture Topic:** Overview of the Autonomic Nervous System; Cholinergic Agonists

**Lecture Learning Objectives:**
- Identify the physiological effects of the sympathetic and parasympathetic nervous systems.
- Provide examples of drugs that act as cholinergic agonists.
- Predict the physiological effects of drugs that bind to cholinergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity.

**Week 5**
**Lecture Topic:** Cholinergic Antagonists-Skeletal Muscle Relaxants

**Lecture Learning Objectives:**
- Extend their knowledge of the pharmacology of cholinergic antagonists to appreciate the rationale for their use in cardiovascular, respiratory, ocular and behavioral pharmacotherapy.
- Provide examples of drugs that act as cholinergic antagonists.
- Predict the physiological effects of drugs that bind to cholinergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity.
Week 6  
Lecture Topic: Adrenergic Agonists

Lecture Learning Objectives:
− Extend their knowledge of the pharmacology of adrenergic agonists to appreciate the rationale for their use in cardiovascular, respiratory, ocular and behavioral pharmacotherapy.
− Provide examples of drugs that act as adrenergic agonists.
− Predict the physiological effects of drugs that bind to adrenergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity.

Week 7  
Lecture Topic: Adrenergic Antagonists I

Lecture Learning Objectives:
− Extend their knowledge of the pharmacology of adrenergic antagonists to appreciate the rationale for their use in cardiovascular, respiratory, ocular and behavioral pharmacotherapy.
− Provide examples of drugs that act as adrenergic antagonists.
− Predict the physiological effects of drugs that bind to adrenergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity.

Week 8  
Lecture Topic: Adrenergic Antagonists II

Lecture Learning Objectives:
− Extend their knowledge of the pharmacology of adrenergic antagonists to appreciate the rationale for their use in cardiovascular, respiratory, ocular and behavioral pharmacotherapy.
− Predict the physiological effects of drugs that bind to adrenergic receptors based on their effects on the receptor (agonist or antagonist) and their subtype-selectivity.

Week 9  
Lecture Topic: Introduction to Endocrine Pharmacology; Growth Hormone

Lecture Learning Objectives:
− Identify the physiological effects of growth hormone and cortisol.
− Provide examples of drugs that modify the activity and effects of growth hormone.
− Predict the physiological effects of drugs that modify growth hormone activity (inhibitors or mimetics).
**Week 10**
**Lecture Topic:** Pharmacology of Vasopressin and Oxytocin

**Lecture Learning Objectives:**
- Identify the physiological effects of oxytocin, vasopressin.
- Provide examples of drugs that modify the activity and effects of oxytocin and vasopressin.
- Predict the physiological effects of drugs that modify hormone activity (inhibitors or mimetics).

**Week 11**
**Lecture Topic:** Pharmacology of Autacoids (including antihistamines)

**Lecture Learning Objectives:**
- Recognize the cellular and physiological effects of the prostaglandins, other autacoids and histamine.
- Predict the physiological effects of drugs that either inhibit or mimic the activity of prostaglandins, autacoids and histamine.

**Week 12**
**Lecture Topic:** Prostaglandins; Other Autacoids

**Lecture Learning Objectives:**
- Recognize the cellular and physiological effects of the prostaglandins, other autacoids and histamine.
- Predict the physiological effects of drugs that either inhibit or mimic the activity of prostaglandins, autacoids and histamine.

**Week 13**
**Lecture Topic:** Catch-up

**Lecture Learning Objectives:**
- Recall the major classes of drugs covered in the course, their effects and their therapeutic uses.
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</td>
<td>☐ Presentation</td>
<td>☐ Participation</td>
<td>☒ Mid-term</td>
<td>☐ Final Exam</td>
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**Expectation for pass grades for all Pharmacy courses is 60%**

9. Policy and procedure regarding late assignments/examinations/laboratories:

10. Policy and procedure regarding missed assignments/examinations/laboratories:
Students who miss an examination or a test and who have a valid petition filed with the Registrar’s office will be eligible to complete a make-up examination or test. The format of this examination or test will be at the discretion of the course coordinator, and may include, for example, an oral examination.

Students who miss a quiz will not write a makeup. The first quiz that is missed will have their other three contribute to their final grade. Students who miss two or more quizzes will have a maximum of 10% added weighting to their final exam.
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 compounding and/or 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;
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.