New Course Outline

Course Number: PHM143H1

Course Title: Pathobiology and Pathology

Outline Version Code:

Course Description:
This course is designed to introduce pharmacy students to the physiological and biochemical mechanisms which lead to pathological states, and includes the laboratory investigation and follow-up associated with specific diseases.

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:
The students will acquire a working knowledge of the basic mechanisms of disease, including the pathophysiology and biochemical changes that occur in specific disease states, and how diagnostic investigations (i.e., laboratory) can confirm the presence of these disease states. Students are expected to integrate knowledge from several sources, such that they can explain and interpret the disease state process present in specific cases to other health care professionals as well as to patients.
2. Rationale for Inclusion in the Curriculum:
Knowledge of the pathophysiology, clinical biochemistry, and other laboratory tests relating to diseases students will eventually encounter as practicing pharmacists is necessary to understand the rationale for pharmacotherapeutic intervention.

3. Pre-requisites:
Physiology, Anatomy, Molecular Biochemistry, Immunology

4. Co-requisites:
Physiology, Anatomy, Molecular Biochemistry, Immunology
5. Course Contact Hours and Teaching Methodologies:

<table>
<thead>
<tr>
<th>Didactic (lecture)</th>
<th>Hours: 34</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: 3</td>
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<tr>
<td>Experiential</td>
<td>Hours:</td>
</tr>
<tr>
<td>On-line</td>
<td>Hours:</td>
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<tr>
<td>Other (please specify):</td>
<td>Hours:</td>
</tr>
<tr>
<td><strong>Total Course Contact Hours</strong></td>
<td><strong>Hours: 37</strong></td>
</tr>
</tbody>
</table>

6. Estimate and description of student's weekly out-of-class preparation time excluding exam preparation:
Students will be expected to obtain and read over the notes prior to the lectures. Additional time may be required after the lecture to annotate/complete the notes with material derived from the lecture.

7. Topics Covered and Lecture Specific Learning Objectives

**Week 1**
**Lecture Topic:** No class

**Lecture Learning Objectives:**
n/a

**Week 2**
**Lecture Topic:** Introduction - Mechanisms of Cell Death and Genetic Disorders

**Lecture Learning Objectives:**
- Orientation to the course with an emphasis on the purpose/content, format, and the evaluation methods used.
- Outline the topics to be covered and lectures to be offered by invited clinicians.
  - Mechanisms of Cell Death (1 hr):
    - Describe the different forms of cell death and the outcomes associated with them.
    - Summarize the various degrees of damage associated with cell death and the diagnostic methods used to evaluate the consequences of cell death.
  - Genetic Disorders (1 hr):
    - Describe the rationale for prenatal screening.
    - Review the factors that lead to neural tube defects and its consequences, the biochemistry and management of PKU, and the potential of gene therapy.
Week 3
Lecture Topic: Carcinogenesis and Makeup Vitamin D & Calcium Disorders

Lecture Learning Objectives:
- Introduction to Carcinogenesis (2 hr):
  - Discuss the molecular basis of carcinogenesis.
  - Describe the epidemiology, pathogenesis, diagnosis, and clinical presentation of cancers and potential genetic causes for these conditions.
- Vitamin D and Calcium Disorders (2 hr):
  - Describe the role of calcium in healthy individuals.
  - Describe how calcium uptake and loss is regulated during a patient's life and how diagnostic tests can be used to monitor bone density and loss.

Week 4
Lecture Topic: Alcoholic Liver Disease

Lecture Learning Objectives:
- Alcoholic Liver Disease (1 hr):
  - Describe the spectrum of liver toxicities observed in patients, their causality (alcohol induced hepatic toxicity) and prevention, using specific examples and cases.

Week 5
Lecture Topic: Electrolyte Disorders and Acid Base Disorders

Lecture Learning Objectives:
- Electrolyte Disorders (2 hrs):
  - Discuss the consequences of volume depletion and abnormal sodium/ potassium levels.
  - Interpretation of laboratory tests will be used to allow the students to determine the underlying cause of disorders.
- Acid/Base Disorders (1 hr):
  - Compare and contrast the underlying basis for respiratory and metabolic acidosis and alkalosis.
  - Integrate the interpretation of laboratory test results and how appropriate interventions can be used to correct these imbalances

Week 6
Lecture Topic: Cardiovascular Disorder

Lecture Learning Objectives:
- Neurophysiology - Epilepsy, Alzheimer’s & Parkinson's Disease (3 hrs):
  - Overview of brain structure and function.
  - Describe the epidemiology, disease progression, diagnosis, biochemical causes, and potential treatment for neurological disorders.
Describe the causes of epilepsy and seizures, including triggering factors, diagnosis, pathogenesis, and clinical representation.

Compare and contrast the causes and symptoms of Alzheimer's, Parkinson's, and cerebrovascular diseases.

Tutorial - Midterm Review (1 hr):
- Describe the format of the exam, provide suggestions for effective exam preparation, and discuss relevant case studies.

Week 7
Lecture Topic: Gastrointestinal Pathology

Lecture Learning Objectives:
- Gastrointestinal Pathology (2 hrs):
  - Overview of Peptic Ulcer Disease, Inflammatory Bowel Disease, and Ulcerative Colitis.
  - Describe the epidemiology of GI bleeding, ulcers, and inflammatory bowel diseases including the etiology, pathology, diagnosis, clinical presentation, and complications.
  - Describe the factors that lead to GERD, its symptomatology, and complications.

Week 8
Lecture Topic: Family Day & Reading Week

Lecture Learning Objectives:
- n/a

Week 9
Lecture Topic: Hepatic Pathology

Lecture Learning Objectives:
- Disorders of the Cardiovascular System (3 hrs):
  - Compare and contrast the pathogenesis that leads to angina, atherosclerosis (i.e., plaque development molecular biology), myocardial infarction, and congestive heart failure.
  - Review the development of the human heart and describe common congenital defects that may result.
  - Summarize the integration and interpretation of diagnostic tests within these conditions.

Week 10
Lecture Topic: Neurophysiology and Respiratory Pathology: Asthma

Lecture Learning Objectives:
- Hepatic Pathology - Liver and Biliary Tract Liver Disease (2 hrs):
  - Describe the normal function of the liver.
  - Summarize the purpose and types of liver function tests.
  - Compare and contrast various mechanisms of damage, which lead to cirrhosis or portal hypertension.
– Respiratory Pathology - Asthma (1 hr):
  o Describe the prevalence, pathogenesis, clinical presentation, causes, and complications of asthma.

**Week 11**
**Lecture Topic:** Ophthalmology and Respiratory Pathology: COPD

**Lecture Learning Objectives:**
– Ophthalmology (2 hrs):
  o Describe the structure and function of the eye.
  o Describe common diseases of the eye and their causes.
  o Summarize the diagnosis and symptomatology of these conditions, and discuss the use of dilating agents, anti-bacterial agents, anti-viral agents, steroids, NSAIDS, and anti-VEGF as treatment options.
– Respiratory Pathology - Chronic Obstructive Pulmonary Disease (1 hr):
  o Describe the prevalence, pathogenesis, clinical presentation, causes, and complications of COPD.

**Week 12**
**Lecture Topic:** Diabetes Mellitus and Renal Physiology & Pathology: Acute and chronic dysfunction

**Lecture Learning Objectives:**
– Diabetes Mellitus (2 hrs):
  o Summarize the process of glucose homeostasis and how defects can produce hyper or hypo glycaemia or diabetes.
  o Describe diagnostic tests used to monitor glucose levels in diabetic patients.
– Renal Physiology (1 hr):
  o Describe the anatomy and physiology of the kidney.
  o Review the various qualitative and quantitative tests used to evaluate kidney function.

**Week 13**
**Lecture Topic:** Case Studies: Clinical investigation/ biochemical Tests-Drug Induced Nephrotoxicity

**Lecture Learning Objectives:**
– Renal Pathology – Acute and Chronic Dysfunction (2 hrs):
  o Contrast the etiology, pathogenesis, and clinical presentation and biochemical characteristics of acute and chronic renal failure.
  o Describe the basis of clinical investigation in renal disease.
– Drug-Induced Renal Toxicity (1 hr):
  o Discuss the mechanisms involved in drug-induced renal injury.
  o Identify which classes of drugs frequently induce renal toxicity and describe the mechanisms whereby this occurs.
– Renal Dysfunction - Clinical Investigation and Biochemical Tests (2 hrs):
  o Integrate diagnostic test results with impaired renal function and renal disorders.
Discuss several cases illustrating the pathogenesis, clinical presentation, and laboratory data of acute and chronic renal insufficiency.

Renal Dysfunction and Drug-Induced Renal Toxicity: (3 hrs):
- Discuss several cases illustrating the pathogenesis, clinical presentation, and laboratory data of acute and chronic renal insufficiency.
- Discuss relevant case studies of drug-induced renal toxicity.

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>Students are expected to answer factual questions and be able to apply concepts learned during the lectures and integrate knowledge in clinical case studies.</td>
<td>MCQ</td>
<td>40%</td>
<td>n/a</td>
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<tr>
<td>☑ Mid-term</td>
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<tr>
<td>☑ Final Exam</td>
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<tr>
<td>☐ Assignment</td>
<td>Students are expected to answer factual questions and be able to apply concepts learned during the lectures and integrate knowledge in clinical case studies.</td>
<td>MCQ</td>
<td>60%</td>
<td>n/a</td>
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<tr>
<td>☐ Mid-term</td>
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<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:
In the case of a missed examination, midterm or final exam, the regulations and policies established by the Faculty of Pharmacy will be applied. When an examination is missed, the student must file with the Faculty Registrar, a petition for consideration in respect to the missed examination. This petition, along with supporting documentation, must be filed within seven calendar days of the missed examination. For examinations missed during the regularly scheduled examination period (December and April), petitions must be submitted by the end of the examination period. In the case of a missed examination and when a reason deemed valid by the Faculty is presented, the student will be given a make-up examination (written or oral at the instructor’s discretion).
10. Policy and procedure regarding missed assignments/examinations/laboratories:
In the case of a missed examination, midterm or final exam, the regulations and policies established by the Faculty of Pharmacy will be applied. When an examination is missed, the student must file with the Faculty Registrar, a petition for consideration in respect to the missed examination. This petition, along with supporting documentation, must be filed within seven calendar days of the missed examination. For examinations missed during the regularly scheduled examination period (December and April), petitions must be submitted by the end of the examination period. In the case of a missed examination and when a reason deemed valid by the Faculty is presented, the student will be given a make-up examination (written or oral at the instructor's discretion).

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
CP2.4.4a 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.