Course Outline and Syllabus for Students

Coordinator Names: Carlo DeAngelis & Mova Leung

Course Number: PHM 301H1

Course Title: Pharmacotherapy 6 - Oncology, Hematology & Immunology Pharmacotherapy

Course Description: This course is designed to provide pharmacy students with the knowledge in pathobiology, pharmacology, pharmacotherapy, clinical pharmacokinetics required to be a practitioner in oncology, haematology & immunology therapeutics. The course will be taught using a variety of techniques including on-line lectures, case-based learning and small interactive group learning.

Required: Yes

Elective: No

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

Oncology – Knowledge

1. Describe the pathophysiology of cancer including the hallmarks of cancer, the metastatic process, tumour biology, tumour markers, and mechanisms of resistance. [INTERMEDIATE]

2. Discuss the epidemiology of cancer including various causative factors (environmental versus non-environmental)

3. Evaluate the role and appropriateness of various screening methods (self-examination, clinical examination, mammography, Fecal Occult Blood Test, colonoscopy, sigmoidoscopy biological markers, CT scan, MRI, etc.,) for people of varying risks of developing various cancers (e.g. breast, colon, cervical, prostate) including the benefits/risks, limitations, age groups affected, frequency of screening and cost. [INTERMEDIATE]

4. Identify the main treatment modalities of cancer (surgery, radiation and systemic therapy) including their role and use at various stages of the disease process.

5. Categorize the different intents of treatment with chemotherapy and radiation, including neoadjuvant, adjuvant and palliative treatment. [INTERMEDIATE]

6. Compare and contrast the antineoplastic agents utilized in the treatment of various cancers, based on the following criteria: mechanism of action, mechanism of resistance, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

7. Explain the rationale for combination chemotherapy to treat various types of cancer. [INTERMEDIATE]

8. Explain the mechanism of action, place in therapy and role in conjunction with chemotherapy. of targeted therapies (e.g., vascular endothelial growth factor inhibitors, epithelial growth factor receptor inhibitors,), [INTERMEDIATE]

9. Explain how the formulation and design of drug dosage forms can affect drug delivery and anti-cancer efficacy [INTERMEDIATE]

10. Discuss for the following chemotherapy-induced non-hematological adverse effects (nausea/vomiting, mucositis), the pathophysiology, epidemiology, clinical presentation, consequences, risk factors and natural history. [INTERMEDIATE]

11. Describe the mechanism of various adverse effects related to biologic/targeted therapies (e.g., vascular endothelial growth factor inhibitors, epithelial growth factor inhibitors, monoclonal antibodies), including epidemiology, clinical presentation, consequences (clinical impact) risk factors, as well as non-pharmacological & pharmacological management. [INTERMEDIATE]

12. Compare and contrast the relevant available classes of antiemetics used for the treatment of chemotherapy-induced nausea and vomiting based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

13. Compare and contrast the relevant available pharmacological and non-pharmacological treatment options used for the prevention and treatment of chemotherapy and radiation-induced mucositis based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE

14. Develop prevention and management strategies for common non-hematological adverse effects of systemic anticancer treatment

15. Discuss the pathophysiology, epidemiology, clinical presentation, consequences, risk factors and natural history for pain related to cancer. [INTERMEDIATE]

16. Compare and contrast the relevant available classes of analgesics used for the treatment of pain related to cancer based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

17. Develop a therapeutic plan for the management of cancer induced pain

Hematology – Knowledge

1. Explain the normal process of hematopoiesis including the formation of red and white blood cells and platelets

2. Identify various disorders of abnormal hematopoiesis including Thalassemia, Sickle Cell disease, Hemochromatosis, Thrombocytopenia, Aplastic Anemia

3. Discuss for the following chemotherapy-induced haematological adverse effects (anemia, neutropenia), the pathophysiology, epidemiology, clinical presentation, consequences, risk factors and natural history. [INTERMEDIATE]

4. Compare and contrast the relevant available classes of granulocyte colony-stimulating factors (filgrastim, pegfilgrastim) used for the treatment of chemotherapy-induced neutropenia, based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

5. Compare and contrast the relevant available classes of erythropoiesis stimulating agents (epoetin-alfa, darbepoetin) used for the treatment of chemotherapy-induced anemia, based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

6. Develop a therapeutic plan for the prevention and management of neutropenia and anemia associated with anticancer treatment [INTERMEDIATE]

7. Discuss the pathophysiology, epidemiology, clinical presentation, consequences, risk factors, natural history and management of common haematological malignancies (e.g. lymphoma, leukemia, multiple myeloma). [INTERMEDIATE].

Immunology - Knowledge

1. Discuss the pathophysiology, epidemiology, clinical presentation, risk factors, drugs that may cause/exacerbate, natural history, diagnosis and differential diagnosis for the following conditions: inflammatory bowel disease and rheumatoid arthritis. [INTERMEDIATE]

2. Identify the appropriate (laboratory, clinical biochemistry, pathology, histology, medical imaging) findings use in the diagnosis and on-going monitoring of inflammatory bowel disease and rheumatoid arthritis. [INTERMEDIATE]

3. Explain the importance of the immune system in solid organ transplantation. [INTERMEDIATE]

4. Compare and contrast the relevant pharmacological and nonpharmacological treatment options used for the treatment of inflammatory bowel disease, including 5-ASA, corticosteroids, immunosuppressants, antibiotics, and tumour necrosis factor antagonists, based on the following criteria: indications, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, drug interactions (drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability, and with special attention to geriatrics. [INTERMEDIATE]

5. Compare and contrast the relevant pharmacological treatment options for rheumatoid arthritis including the place in therapy of non-steroidal anti-inflammatory agents, DMARDs and tumour necrosis factor antagonists, based on the following criteria: indications, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, drug interactions (drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability, and with special attention to geriatrics. [INTERMEDIATE]

6. Compare and contrast the relevant pharmacological treatment options used to prevent rejection in solid organ transplantation, based on the following criteria: indications, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, drug interactions (drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility. [INTERMEDIATE]

7. Describe the non-pharmacologic management for the selected conditions. [INTERMEDIATE]

Skills

1. Select relevant data from: review of systems, laboratory tests, medical imaging to assess drug therapy needs. [INTERMEDIATE]

2. Apply relevant findings from review of systems, laboratory tests and medical imaging to determine actual and potential drug therapy needs. [INTERMEDIATE]

3. Analyze relevant information from subjective and objective sources (ROS, medical imaging, diagnostic test, biochemical markers) to determine drug therapy problems, urgency, and priority for a given clinical situation. [INTRODUCTORY]

4. Demonstrate the ability to critique and interpret results from observational studies, randomized controlled trials and meta-analyses in hematology/oncology/immunology. [INTRODUCTORY]

5. Interpret various prognostic factors related to cancer and their impact on treatment approaches. [INTERMEDIATE]

6. Justify the selection of a preferred antiemetic regimen for a selected chemotherapy regimen based on assessment of its emetogenic potential. [INTERMEDIATE]

7. Assess the use of granulocyte colony-stimulating factors (filgrastim, pegfilgrastim) for patients receiving selected chemotherapy regimens, based on patient risk factors, disease-related factors and treatment-related factors, in the prophylactic and treatment settings. [INTERMEDIATE]

8. Assess the use of erythropoiesis stimulating agents (epoetin-alfa, darbepoetin) for patients receiving selected chemotherapy regimens, based on patient risk factors, disease-related factors and treatment-related factors in the prophylactic and treatment settings. [INTERMEDIATE]

9. Develop and justify a care plan with follow up for a given clinical situation. [INTERMEDIATE]

10. Evaluate the quality, accuracy, and completeness of the care plan. [INTERMEDIATE]

Attitudes/Values

1. The student will undertake assessment and care plan development activities in a manner respecting patient autonomy and the individual therapeutic goals. [INTERMEDIATE]

2. The student will use interprofessional patient centered care principles to reach decisions for therapeutic alternatives. [INTERMEDIATE]

3. The student will demonstrate respect and collaboration in team functioning. [INTERMEDIATE]

2. Rationale for Inclusion in the Curriculum:

According to Health Canada cancer is the number one killer of Canadians and it is projected that as the population ages and advances in therapy are made more patients will be living with the disease in the coming years. Traditional cancer therapies have been delivered in the hospital setting because of the need for intravenous administration. However, increasingly new therapies for cancer will be orally administered. Because of cancer prevalence and changing therapeutic strategies aimed at making cancer a chronic disease, pharmacists will be called upon more often to become involved in the care of patients with cancer. It is essential that the graduating pharmacists of the future have a sound foundation in cancer pathophysiology and management. Not only is a greater understanding of the immunological basis of cancer leading to new therapies; but immunological based therapies are increasingly seen as the backbone of disease management for irritable bowel disease (IBD) and rheumatoid arthritis (RA). An understanding of the use of biological agents in cancer complements and will aid pharmacy students in their support of patients with IBD and RA. Hematology is the study of cellular blood components (red and white blood cells and platelets) and, coagulation. An understanding of various disease states and drugs affecting the cellular components of blood is essential to daily pharmacy practice. The key components of the body's immune response are white blood cells and their function. While the immune response is essential in preventing and combating various diseases; its disregulation can result in diseases such as IBD and RA. Modifying the immune response has become the mainstay of therapy for these conditions. Another therapeutic area where regulation of the immune response is critical is the prevention of rejection following transplantation (solid organ and allogeneic bone marrow/stem cell). Finally, there is a growing body of literature linking cancer and the immune system. New therapies are being developed to modulate the immune system which cross the traditional therapeutic boundaries of oncology, haematology, rheumatology, gastroenterology, etc. We have developed this course to help students understand the commonality which exists across traditional therapeutic areas so that knowledge in one area can be applied in another. While the primary focus of the lectures are oncology related many of the principles learned can be applied to the other areas of haematology and immunology. In selecting topics for the course we also did not want to duplicate content from previous courses (e.g. anaemia management). We also feel that the relative weight given to the various therapeutic areas is also reflective of the likelihood a practicing pharmacist is to encounter these patients in day to day practice.

3. Pre-requisites:

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

5. Co-requisites: (for the current and subsequent year)

PHM305H1 – Medication Therapy Management 4 (MTM 4)

6. Statement of agreement from coordinators of courses for which this course is a co-requisite:

7. Course Contact Hours and Teaching Methodologies:

Didactic (lecture)	**21** hours
Large group problem-based or case-based learning	**12** hours
Large Group Size	**60** persons
Experiential	
On-line	**6** hours
Other (please specify)*	
* Other specific information:	
Total course contact hours	**39** hours

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

Review on-line lectures (captured as part of course hours)

Review learning objectives, recommended readings (if any) + prepared materials by classmates (3 –7 hrs/ week)

9. Course Coordinator and contact information:

Carlo De Angelis – carlo.deangelis@sunnybrook.ca;

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2075 Bayview Avenue
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10. Course Instructors and contact information:

Same as above

11. Required Resources/Textbooks/Readings:

Pharmacotherapy: A Pathophysiologic Approach, seventh edition, J DiPiro, et al.
Selected readings from Journal articles and other resources as deemed necessary

12. Recommended Resources/Textbooks/Readings:
As provided by course lecturer

13. Topic Outline/Schedule: For each, indicate level of knowledge, skills and attitudes learning objectives

After completing each of the following topics, the students will be able to perform the following objectives:

Week 1

- Overview, introduction & Oncology Basics (didactic – 2 hr)
  - Review the course and workshop outline
  - Discuss the importance of cancer to Canadians
  - Describe the basic principles of cancer treatment
  - List the Hallmarks of cancer
  - Discuss the differences between traditional anticancer therapy and targeted therapy

- Pharmacology of Cancer Therapy (Didactic – 1 h)
  - Explain the process of development of cancer
  - Discuss the evolution of anticancer drug development
  - Describe the different classes of anticancer therapy and their mechanisms of action
  - Distinguish and discuss the major mechanisms of action, drug interactions and toxicities of conventional antineoplastics
  - Distinguish and discuss the major mechanisms of action, drug interactions and toxicities of targeted therapies

- Pharmaceutics of Chemotherapy (didactic – 1 hr)
    - Acquire basic knowledge of various formulations for cancer (chemo)therapy
    - Understand the problems of cancer chemotherapy
    - Understand how nanoparticle formulations can enhance cancer chemotherapy while reducing toxicity to normal tissue

Week 2 and 3

- WORKSHOP 1 CYCLE: Oncology basics – pharmacology, screening and treatment principles (online – 1 hr, group-based learning: 2 hr)
    - Discuss the importance of screening for cancers such as colon or breast
    - Outline the principles of cancer therapy
    - Identify resources to determine best management of cancer based on clinical, pathology and patient characteristics

- Pediatrics (didactic – 2 hr)
    - List common types of pediatric cancers and their prognosis.
    - Describe drug administration techniques which are relatively unique to childhood cancer:
        - Routes of drug administration: intrathecal, Ommaya reservoir
        - Central venous catheters, subcutaneous catheters
    - List actual and potential applications of pharmacogenetics in childhood cancer and describe how they are/might be used to modify treatment.
    - Describe procedures for safe administration of chemotherapy at home.
    - Discuss the impact of adherence on overall survival and mechanisms that pharmacists can apply to improve adherence.
    - Justify the recommended long term follow-up guidelines for childhood cancer survivors who have received anthracyclines.

- Monoclonal antibodies and small molecule inhibitors (didactic – 1 hr)
    - Describe the development and research of Mabs and small molecule inhibitors
    - Advanced Cancer management– focus on breast cancer (group-based)Compare and contrast general pharmacokinetics and pharmacodynamics of Mabs and small molecule inhibitors

Week 4 and 5

- WORKSHOP 2 CYCLE: Advanced Cancer management– focus on endocrine therapies (e.g. for breast cancer) (online - 1 hr, group-based learning: 2 hr)
    - Review the epidemiology and risk factors of breast cancer
    - Outline the role of gonadal hormones on cancer pathology
    - Discuss the epidemiology of HR+ breast cancer
    - Explain the implication of ER, PR status on treatment decisions
    - List the prognostic and predictive factors for gbreast cancer treatment
    - Discuss the role of endocrine agents in early and advanced stage breast cancer
    - Discuss the principles of multiples lines of therapy in advanced cancer
    - Outline the principles of breast cancer therapy
    - Review the role and pharmacology of endocrine therapy for breast cancer

- Personalized Medicine (didactic – 1 hr)
    - Discuss the basics of cellular processes that contribute to cancer growth and proliferation, considering extracellular and intracellular signals for proliferation, apoptosis, invasion and migration
    - Contrast pharmacogenetics and molecular aberrations and how treatment choice and dosing decisions can be guided by their presence or absence
    - Review the role of genetic polymorphisms in treatment response and toxicities
    - Role of cytochrome and p-glycoprotein in drug resistance

- Pharmaceutics of biologic agents (didactic – 1 hr)

    - List the therapeutic uses for key monoclonal antibodies
    - Discuss the pharmacology of monoclonal antibodies
    - Outline the historic and current processes for producing monoclonal antibodies

- Pharmacokinetics of biologic agents (didactic – 1 hr)
    - List the therapeutic uses for key monoclonal antibodies
    - Discuss the absorption of monoclonal antibodies and how the characteristics of absorption and bioavailability may be altered depending on the route of administration
    - Discuss considerations that must be taken when a monoclonal antibody such as rituximab is changed from IV administration to SC
    - Describe the distribution and elimination pathways of monoclonal antibodies such as trastuzumab and rituximab, and the role of the immune system in these processes
    - Discuss how the pharmacokinetics of mAbs can impact dosing decisions (eg. need for loading doses, dosing by weight versus body surface area)
    - List mechanisms for potential interactions (if any) that must be considered in patients receiving mAbs

- Pain Basics (didactic– 1 hr)
    - Compare and contrast acute pain, chronic non-cancer pain, chronic cancer pain
    - List the different classes of drugs used for managing pain
    - Discuss the role of pharmacotherapy in pain management
    - Discuss the pathophysiology of pain
    - Discuss the different types of pain

Week 6 and 7

- WORKSHOP 3 CYCLE: GI Toxicities of Chemotherapy CINV and diarrhea (group-based learning: 2 hr, online – 1 hr, didactic – 1 hr)
    - Identify the phases and corresponding mechanisms behind chemotherapy-induced nausea and vomiting
    - Describe the risk factors for predicting nausea/vomiting chemotherapy-induced nausea/vomiting
    - Develop appropriate anti-emetic regimens to prevent CINV
    - Review pharmacological strategies to manage breakthrough CINV
    - Make pharmacological and non-pharmacological recommendations to prevent, treat or support patients experiencing CINV
    - Describe the pathophysiology, epidemiology and risk factors of mucositis
    - Recommend measures to limit or prevent mucositis
    - Describe the pathophysiology, epidemiology and risk factors of chemotherapy- and immunotherapy-induced diarrhea
    - Recommend measures to limit or prevent chemotherapy- and immunotherapy-induced diarrhea
    - Make pharmacological and non-pharmacological recommendations to prevent, treat or support patients experiencing mucositis or diarrhea
    - Develop a therapeutic plan for patients CINV prophylactic regimen, for the treatment of CINV, mucositis or diarrhea

- Advanced Symptom Management – Pain (didactic – 2 hr)
    - Discuss the pathophysiology, epidemiology, clinical presentation, consequences, risk factors and natural history for nociceptive and neuropathic pain specific to cancer and palliation
    - Make a proper assessment of pain in a patient with cancer
    - Compare and contrast the relevant available classes of adjuvants and analgesics used for the treatment of pain related to cancer based on the following criteria: indication,mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, drug interactions (drug-drug, drug-food, drug-laboratory), convenience, cost
    - Develop and justify a rational pain regimen depending on the clinical presentation of a patient's pain
    - Review methadone in the use of cancer pain and common dosing strategies
    - Describe the non-pharmacologic management for the selected conditions
    - Develop a pharmacy care plan for the management of cancer induced pain

Week 8 and 9

- WORKSHOP 4 CYCLE: Hematology & Hematologic Toxicities of Chemotherapy (online – 1 hr, group-based learning: – 2 hr)
    - Explain the pathophysiology of common non-malignant disorders of red and white blood cells and platelets

- Identify various disorders of abnormal hematopoiesis including Thalassemia, Sickle Cell disease, Thrombocytopenia, Aplastic Anemia
- Distinguish their pathophysiology, epidemiology, clinical presentation, consequences, risk factors, natural history and management
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- Discuss the pathophysiology, epidemiology, clinical presentation, consequences, risk factors and natural history of anemia and neutropenia

- Compare and contrast the relevant available classes of granulocyte colony-stimulating factors (filgrastim, pegfilgrastim) used for the treatment of chemotherapy-induced neutropenia, based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility

- Compare and contrast the relevant available classes of erythropoiesis stimulating agents (epoetin-alfa, darbepoetin) used for the treatment of chemotherapy-induced anemia, based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility

- Develop a therapeutic plan for the prevention and management of neutropenia and anemia associated with anticancer treatment

- Malignant Hematology (didactic – 1.5 hr)
  Distinguish the difference between solid cancers and hematologic malignancies
  - Discuss the pathophysiology, epidemiology, clinical presentation, consequences, risk factors, natural history of common lymphomas, leukemias, and multiple myeloma

  - Outline the general principles of management and the role of surgery, radiation and/or chemotherapy for lymphomas, leukemias, and multiple myeloma

- Immune System Dysregulation, Disease and Therapy (didactic - 2 hr)
  - Describe the function of the immune system
  - Discuss the various components of the immune system
  - Describe how tumors avoid immune system destruction
  - Describe the pharmacology of cancer-immunotherapies

Week 10 and 11

- WORKSHOP 5 CYCLE: Adverse effects of Targeted Agents (online – 1 hr, group-based learning: 2 hr**)**
  - Describe fundamental principles of targeted therapy of molecular targets and their development
  - Discuss the expanded role of targeted therapies in cancer and other diseases
  - Review pharmacology of monoclonal antibodies, small molecule inhibitors
  - Compare and contrast the toxicities that are common to cytotxic agents compared to targeted therapy
  - Describe the mechanism of various adverse effects related to common classes of targeted therapies (e.g., vascular endothelial growth factor inhibitors, epithelial growth factor inhibitors, monoclonal antibodies), including epidemiology, clinical presentation, consequences (clinical impact) risk factors
  - Describe the clinical presentation (signs and symptoms, onset, duration), risk factors, complications and sequelae of EGFR inhibition.
  - Outline the pharmacologic and (where applicable) non-pharmacologic prevention and management strategies of EGFR-related toxicities

- Transplant and Graft versus Host disease (didactic – 2 hr)
  - Review the HLA system and principles of donor selection
  - Differentiate between autologous and allogeneic HSCT and peripheral blood and bone-marrow transplant
  - Review the complications associated with autologous and allogeneic HSCT
  - Explain the immunological mechanisms and risk factors associated with rejection and GVHD
  - Describe the clinical presentation of rejection and GVHD and GVL

- Discuss the goals of immunosuppression and the various immunosuppressive strategies utilized
- Compare and contrast the mechanisms, side effect profiles and drug interactions of the different immunosuppressants and anti-rejection agents
- Describe the most common complications associated with immunosuppression and preventative strategies (if any)
- Recommend patient-specific drug therapy to reduce morbidity associated with immunosuppression-related complications

Week 12 and 13

- WORKSHOP 6 CYCLE: Auto-immune Rheumatologic Disorders (didactic – 1 hr, 2 hr)
  - Differentiate between the musculoskeletal autoimmune diseases: lupus, spondylitis (axial spondyloarthritis, or axial SpA), and rheumatoid arthritis based on clinical presentation and diagnostic workup
  - Discuss the pathophysiology, epidemiology, clinical presentation, risk factors, natural history of rheumatoid arthritis
  - Describe how Rheumatoid Arthritis (RA) is diagnosed, the role of diagnostic tests, and differential diagnosis for RA
  - Compare and contrast the relevant available classes and agents for the treatment of rheumatoid arthritis based on the following criteria: indication, mechanism of action, efficacy, pharmacokinetics, pharmacodynamics, pharmacogenomics, adverse effects, contraindications, drug interactions,(drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability and sterility
  - Develop a therapeutic plan for the management of rheumatoid arthritis

- Inflammatory Bowel Disease (didactic – 0.5 hr)
  - Discuss the pathophysiology, epidemiology, clinical presentation, risk factors, drugs that may cause/exacerbate, natural history, diagnosis and differential diagnosis for the following conditions: inflammatory bowel disease
  - Identify the appropriate (laboratory, clinical biochemistry, pathology, histology, medical imaging) findings use in the diagnosis and on-going monitoring of inflammatory bowel disease
  - Compare and contrast the relevant pharmacological and nonpharmacological treatment options used for the treatment of inflammatory bowel disease, including 5-ASA, corticosteroids, immunosuppressants, antibiotics, and tumour necrosis factor antagonists, based on the following criteria: indications, mechanism of action, pharmacokinetics, pharmacodynamics, adverse effects, contraindications, drug interactions (drug-drug, drug-food, drug-laboratory), convenience, cost, onset of action, formulations, stability, and with special attention to geriatrics.
  - Describe the non-pharmacologic management for the selected condition

14. Assessment Methodologies Used:

Formative assessment

On-line self assessment multiple choice questions

Learning Objectives Addressed
Assessment 1: various depending on topics covered **Assessment 2:** various depending on topics covered **Assessment 3:** values/attitudes learning objectives **Assessment 4:**
Assessment Method Used
Assessment 1: Workshop rubric to assess knowledge, understanding and participation **Assessment 2:** Individual Assignments **Assessment 3:** Midterm #1 - Multiple choice questions **Assessment 4:** Final exam – Multiple choice questions **Assessment 5:**

When Administered **Assessment 1:** During workshop (for 4-out-of-6 workshops (instructor will pre-determine for ease and consistency of assessment, but student won't know the pre-assignment ahead of time)) **Assessment 2:** 2 submissions per student per year **Assessment 3:** Around week 7 **Assessment 4**: End of course
Percentage of Course Grade **Assessment 1:** 12 % % (2.25% for 4 LOs answered throughout the year = 9% PLUS 0.5% for workshop partcipation x 6) **Assessment 2:** 12 % (2 x 6%) **Assessment 3:** 38 % **Assessment 4**: 38 % **Assessment 5**:
Remediation Opportunities? **None**

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

15. Policy and procedure regarding make-up assignments/examinations/laboratories:

Missed Exam/Test Policy
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.

Missed Tutorial/Small group session Policy:
Students who miss a scheduled tutorial/small group session and who have a valid petition filed with the Registrar's office will be eligible to:

a. Attend a subsequent regularly scheduled small group session/tutorial (if space is available)
b. Complete assignment

*Note: this applies only for laboratories or tutorials where summative assessment occurs

Missed Assignment Policy:
Students who fail to submit an assignment by the specified due date, and who have a valid petition filed with the Registrar's office will be eligible to submit the completed assignment, or an alternative assignment based on course requirements, with no academic penalty.

Late Assignment Policy:
Students who fail to submit an assignment by the specified due date will receive a deduction of __10%___% for each day beyond the due date (including/excluding weekends/holidays), to a maximum of __50___%. Assignments will not be accepted for grading after __5___ late days.