



SCHOOL OF PHARMACY AND HEALTH SCIENCES

COURSE : PHM 4451: Fundamentals of Pharmacognosy

CREDIT : 4.5

PRE-REQUISITE : PHM 3451, CHE 2304, BOT 3353

Lecturer: Dr. MUNGAI

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1. COURSE DESCRIPTION

This course introduces the student to drugs from natural sources; main classes being, **Miscellaneous Isoprenoids, volatile oils and resins, alkaloids and Hallucinogens & naturally-occurring (plant-based) drugs of abuse, Teratogenic and Other toxic plants.**

Link to the University mission and program learning outcome

1. **Higher order thinking:** The ability to collect, analyze and evaluate information and formulate conclusions. Students develop and demonstrate the ability to think critically, analytically and creatively.
2. **Literacy:** Competence in oral, written, quantitative, and technological skills. Students develop and demonstrate competency in oral and written communication as well as demonstrate scientific, quantitative and technological literacy.
3. **Global understanding and multicultural perspective:** Awareness, knowledge and appreciation of both the diversity and commonality of cultures. Students acquire these perspectives through formal study of languages, history, literature and the arts and through working, studying and living cooperatively in a racially, ethnically, and culturally

diverse environment. Further, students acquire an understanding of economic, historical, political, geographic and environmental relationships on a global basis.

4. **Preparedness for career:** Mastery of a field of knowledge and its multi-cultural and multinational application. Such mastery is accomplished through both formal study and various experiential forms of learning such as internships and field experiences.
5. **Leadership and ethics:** As part of their growth and development, students formulate and articulate the ethical standards and develop the leadership skills which will guide their professional and personal lives. This is accomplished through formal courses in discipline areas and active engagement of students in leadership roles both inside and outside the classroom.
6. **Community service and development:** A sense of being part of a community and a desire to be of service to it. Students are given opportunities to participate in community service, citizenship, or social action projects or activities.

The Mission of the School of Pharmacy and Health Sciences is to provide diverse, state of the art, rigorous and innovative approaches to healthcare training, practice and research through the use of a holistic view of health, focus and commitment to excellence.

This course will equip students who wish to pursue careers in different pharmacy practice settings, management and research.

2. EXPECTED COURSE LEARNING OUTCOMES (CLO)

At the end of the course, you will be able to:

1. Identify the most common isoprenoids of pharmaceutical importance
2. Define, Classify, Identify and analyze the most common volatile oils and resins of pharmaceutical importance
3. Outline and differentiate pharmaceutically important alkaloids
4. Classify and assess hallucinogens and the most common naturally -occurring (plant) drugs of abuse, allergenic, teratogenic and other toxic plants

MATRIX of Course Learning Outcomes (CLOs) & University Mission and Programme learning Outcomes (PLOs)

CLO	1.High order thinking	2.Literacy	3.Global & Multicultural Perspective	4.Preparedness for Career	5.Leadership & Ethics	6.Community service & Development
1.Identify Isoprenoids of Pharmaceutical importance	X	X	X	X		X
2.Classify, identify and analyze the volatile oils and resins of Pharmaceutical importance	X	X	X	X	X	X
3.Outline and differentiate pharmaceutically important alkaloids	X	X	X	X	X	X
4.Classify and assess the most common naturally-occurring (plant) drugs of abuse, allergenic, teratogenic and other toxic plants	X	X	X	X	X	X

Week	Course content	PRACTICALS
1-3	1. Isoprenoids Sources, physical and chemical properties; formulae of the active principles; detection, extraction and isolation; pharmacological action and uses of: a. Monoterpenes b. Sesquiterpenes c. Diterpenoids d. Sesterterpenoids e. Triterpenoids f. Tetraterpenoids-Carotenoids g. Polyterpenoids	
4-6	2. Volatile Oils and resins Sources, physical and chemical properties; formulae of the active principles; detection, extraction and isolation; pharmacological action and uses of: a. Peppermint leaf and peppermint oil b. Sage leaf, thyme oil c. Lavender, caraway and Dill oil d. Coriander, aniseed oil e. Orange oil, lemon peel and lemon oil f. Nutmeg, cinnamon, clove oil g. Camphor, Eucalyptus oil	P1.Extraction Methods & P2.Extraction & identification of alkaloids (group assignment)
	3. Resins: a. Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony	
8-10	4. **Alkaloids Sources, physical and chemical properties; formulae of the active principles; detection, extraction and isolation; pharmacological action and uses of: a. Ornithine derived alkaloids • Tropane alkaloids • Pyrrolizidine alkaloids • Lysine derived alkaloid • Phenylalanine, tyrosine and dihydroxyphenylalanine derived alkaloids • Tryptophan derived alkaloid • Ergot alkaloids • Miscellaneous alkaloids • Indolizidine alkaloids • Imidazoline, purine, terpenoid, steroidal alkaloids	
12	5. Plant drugs of abuse a. Natural hallucinogens and drugs of abuse including • opium, cocaine, cannabis, Khat, lysergic acid and	Group presentations

Week	Course content	PRACTICALS
	related derivatives, • psilocybe species, cactus alkaloids, alcohol and tobacco; b. Role of pharmacist in drug education and drug abuse prevention of these products	

List of practicals'

1. Extraction of volatile oils and detection of phytoconstituents by TLC
2. Extraction & detection of alkaloids
3. Tests for alkaloids e.g. Atropine from Datura stramonium
4. Test for glycosides-Sennosides from Senna spps.
5. Exercise involving isolation & detection of tannins

GROUP ASSIGNMENT:

The following groups will make the presentation as follows;

1. PHM 4451-1 -: Commercialization of Herbal products based on Miscellaneous isoprenoids in the Kenya market
2. PHM 4451-2: Contribution of Volatile oils and resins-in Health Care- highlighting any current trends and applications
3. PHM 4451-3: Role of alkaloids as exploited in pain management
4. PHM 4451-4: Role of alkaloids in the current management of cancer
5. PHM 4451- 5: Public Health Education on: Hallucinogens (drugs of abuse), allergenic, teratogenic and other toxic plants. State any laws and guidance policy/policies of the land that one may need to observe.

ALL PRESENTATIONS SHOULD BE SUBMITTED BY END OF WEEK 10.

ONLY ONE MEMBER SHOULD SUBMIT ON BEHALF OF THE GROUP

3. MODE OF DELIVERY

3.1. Teaching Methods (Face -to- face- both lectures & Practicals)

- **Interactive presentations, and class discussions.** These will take a participatory approach.
 - Interactive Presentation with Discussion
 - Case study
 - Small Group Discussion, Large group discussion
 - Reflective learning, Student presentation
 - Role Play, Card game exercise
- **Video demonstrations and/or CD-Roms** when available, after the relevant topic has been covered.

3.2. Assessment criteria

- You will be given several individual and group assignments on topics relevant to the course. These could include lectures, discovery learning, problem-based learning, experimental learning, group-based learning, independent studies and e-learning.
 - Assignments- will be submitted through blackboard.
 - Written examinations like quizzes, mid semester exams and final exams will be conducted face-to-face at the moment
 - You should be familiar with the details regarding Respondus lock down browser.

3.3. Instructional Materials and/or Equipment;

- Lecture notes or power points for presentation;
- Video demonstrations; CD-Roms;
- Images of medicinal plants, plant tissues and products in the market

4. COURSE TEXT AND OTHER READINGS

4.1. Core Reading Materials for the Course

- 4.1.1. [Evans](#), W. C. (2009). Trease and Evans' Pharmacognosy. 16th Edition. Elsevier Health Sciences, Harcourt Brace
- 4.1.2 [Shah](#), B., Seth, A. (2012). Textbook of Pharmacognosy and Phytochemistry. Kindle

Edition. Elsevier India, Delh

4.2. Recommended Books

- 4.2.1 Bruneton, J., (1995). *Pharmacognosy, phytochemistry, medicinal plants*. 2nd ed. Lavoisier, Paris
- 4.2.2 Ganora, L. (2009) *Herbal Constituents: Foundations of Phytochemistry*. Herbalchem Press, Louisville
- 4.2.3 [Heinrich](#), M., [Barnes](#), J., [Gibbons](#), S., [Williamson](#), E. M. (2012). *Fundamentals of Pharmacognosy and Phytotherapy*. 2nd Edition. Churchill Livingstone, London
- 4.2.4 Mills, S. and Bone, K., (2000). *Principles and practice of phytotherapy*. Churchill Livingstone, London
- 4.2.5 Willard, T. (1992). *Textbook of advanced herbology*,. Wild Rose College of Natural Healing, Alberta.
- 4.2.6 Yarnell E (2004) *Phytochemistry & Pharmacy for Practitioners of Botanical Medicine*. Healing Mountain Publishing, East Wenatchee, WA

4.3 Recommended Journals

- 4.3.1 Journal of Ethnobiology And Ethnomedicine
- 4.3.2 East and Central African Journal of Pharmaceutical Sciences
- 4.3.3 Afr. J. Traditional, Complementary and Alternative Medicines
- 4.3.4 Molecular Medicine Reports

5. COURSE EVALUATION

Distribution of Marks

Attendance and participation	10 %
Quizzes.....	10 %
Assignment/Term paper and Presentation.....	10 %
Lab Practical's.....	10 %
Oral Examination.....	5 %
Mid-semester Examination.....	20 %
Practical exam.....	10 %
Final Examination.....	25 %
Total	100%

6. KEY INSTITUTIONAL POLICIES

Students should note the following are key policies as outlined in the university catalogue and student's handbook.

1. Academic dishonesty

- a. Any intentional giving or use of external assistance during an examination without the express permission of the faculty member giving the examination.
- b. **Fabrication**; any falsification or invention of data, citation or other authority in an academic exercise
- c. **Plagiarism**: any passing off of another's ideas, words or work as one's own;
- d. **Previous submitted work**: Presenting work prepared for and submitted to another course;

2. Class attendance

Students are expected to attend all classes. Upon being absent from more than **seven** classes on a **4.5** credit unit course or from more than **three** classes for those that meet once a week, the instructor will give student an **"F"** grade for that course.

7. USIU Grading

90 – 100	A
87 - 89	A ⁻
84 - 86	B ⁺
80 - 83	B
77 - 79	B ⁻
74 - 76	C ⁺
70 - 73	C
67 - 69	C ⁻
64 - 66	D ⁺
62 - 63	D
60 - 61	D ⁻
00 - 59	F