

CHEM-1081: MEDICINAL PLANTS CHEMISTRY

Cuyahoga Community College

Viewing: CHEM-1081 : Medicinal Plants Chemistry

Board of Trustees:

January 2021

Academic Term:

Fall 2021

Subject Code

CHEM - Chemistry

Course Number:

1081

Title:

Medicinal Plants Chemistry

Catalog Description:

The course aims to provide a scientific basis for the use of plants for medicinal purposes, and to describe the main characteristics of herbal medicines and their use. Definition of the term "natural product", the regulatory dilemma, the marketing of herbal products, the use, risk, safety and interactions of herbal preparations are covered. Important plant extracts, and plant-derived chemical compounds are discussed. The course also provides an overview of ethnobotany and ethnopharmacology.

Credit Hour(s):

3

Lecture Hour(s):

3

Requisites

Prerequisite and Corequisite

ENG-1010 College Composition I, or ENG-101H Honors College Composition I, or departmental approval.

Outcomes

Course Outcome(s):

Apply knowledge of herbal medicine to the use of herbal products as complementary and alternative therapies.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Written Communication: Demonstrate effective written communication for an intended audience that follows genre/disciplinary conventions that reflect clarity, organization, and editing skills.

Objective(s):

1. Discuss how and why herbs are being utilized by the general public in the U.S. and other countries.
 2. Describe the various dosage forms of herbs and phytomedicinals.
 3. Describe and explain the medicinal effects of the commonly used herbal products for digestive system problems; kidney, urinary tract, and prostate problems; respiratory tract problems; cardiovascular system problems; nervous system disorders; endocrine and metabolic problems; arthritic and musculoskeletal disorders; skin and mucous membrane problems; and performance and immune deficiencies.
 4. Discuss the proposal for standardization of herbal products.
 5. List and describe the toxicity of the most commonly encountered toxic/poisonous plants/herbal products.
 6. Explain and provide examples of herb/drug interactions.
 7. Discuss the role of the ethnobotanist in the search for new medicines from plants.
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Course Outcome(s):

Apply fundamental knowledge of the differences between herbs and other drugs to analyze the potential problems with herbs.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Objective(s):

1. Discuss and debate the proposals for reforming the current herbal regulatory policy.
2. Explain the difficulty to establish a specific dose of an herbal product in the U.S. market.
3. Discuss the difference between "herbalism" and "paraherbalism".
4. Discuss the different contaminants in herbal products and their consequences.
5. Discuss adulteration of herbal products and its consequences.
6. Explain how misidentification of plant species can occur in commercially sold and self-selected herbs.
7. Compare and contrast herbal medicine, homeopathy and Ayurvedic medicine.
8. Describe the evidence-based approach to natural product drug discovery.
9. Explain the differences between herbs and purified therapeutic agents.
10. Discuss the current regulation of herbal products in the U.S. and discuss the lack of legal standards for identity and quality for herbal products.
11. Explain why the concentration of chemical constituents in different lots of supposedly identical plant material is highly variable.

Course Outcome(s):

Analyze information from sources to reach an informed conclusion regarding the safety and efficacy of herbal products.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Objective(s):

1. Demonstrate the ability to assess the accuracy/credibility of online sources on herbal products.
2. Discuss the importance of accurate scientific/evidence-based information when using herbal products for medicinal purposes.

Methods of Evaluation:

1. Quizzes
2. Homework assignments
3. Discussion board participation
4. Exams
5. Written assignments
6. Research paper

Course Content Outline:

1. Introduction
 - a. Terminology and definitions
 - b. Practices and therapies included in the complementary and alternative medicines
 - c. The reasons for using complementary and alternative medicines
 - d. Herbal products
 - e. Chemical ecology
2. Basic principles
 - a. Definitions
 - b. Difference between herbs and other drugs
 - c. Herbal quality
 - d. Rational herbalism
 - e. Homeopathy
 - f. General guidelines in the use of herbal medicine
 - g. Herbal dosage forms

- h. Herbal medicine information sources
 - i. The herbal regulatory system (US, Canada and European Union)
- 3. Herbs for digestive system problems
 - a. Nausea and vomiting- ginger
 - b. Appetite loss- gentian and wormwood
 - c. Constipation- psyllium seeds, cascara, buckthorn, senna, aloe and rhubarb
 - d. Diarrhea- blackberry roots and blueberry
 - e. Indigestion- peppermint, chamomile, anise, coriander and fennel
 - f. Hepatotoxicity- milk thistle and schizandra
 - g. Peptic ulcers- licorice and ginger
- 4. Herbs for kidney, urinary tract, and prostate problems
 - a. Infections and Kidney stones- goldenrod, parsley, and birch leaves
 - b. Anti-infective herbs- cranberry
 - c. Benign prostatic hyperplasia- saw palmetto, and nettle root
- 5. Herbs for respiratory tract problems
 - a. Bronchial asthma- Ephedra
 - b. Colds and flu- Iceland moss, marshmallow root, plantain leaf, thyme and eucalyptus leaf
- 6. Herbs for cardiovascular system problems
 - a. Congestive heart failure- herbs containing potent cardioactive glycosides, and hawthorn
 - b. Arteriosclerosis- garlic, green tea and ginkgo
- 7. Herbs for nervous system disorders
 - a. Anxiety and sleep disorders- valerian, kava, passion flower, and melatonin
 - b. Depression- St. John's Wort
 - c. Pain- capsicum and willow bark
 - d. Headache- feverfew
 - e. Toothache- clove oil
 - f. Sexual impotence- yohimbe
- 8. Herbs for endocrine and metabolic problems
 - a. Gynecological disorders- black cohosh, evening primrose oil and borage seed oil
 - b. Hyperthyroidism- bugleweed
 - c. Diabetes mellitus- ginseng
- 9. Herbs for arthritic and musculoskeletal disorders
 - a. Arthritis- willow bark and feverfew
 - b. Muscle pain- methyl salicylate, menthol and turpentine oil
 - c. Gout- colchicum
- 10. Herbs for skin, mucous membranes and gingiva problems
 - a. Dermatitis- witch hazel, and oak bark
 - b. Burns, wounds and infections- aloe gel, comfrey
 - c. Lesions of the oral cavity- goldenseal and sage
- 11. Herbs for performance and immune deficiencies
 - a. Stress- ginsengs and sarsaparilla
 - b. Cancer- Catharanthus, Podophyllum and pacific yew
- 12. Contamination and adulteration of herbal products
 - a. Chemical contaminants
 - b. Biological contaminants
 - c. Adulteration
 - d. Evaluation of quality of herbal products
- 13. Food-herb and drug-herb interactions
 - a. Pharmacokinetic interactions
 - b. Pharmacodynamic interactions
 - c. Levels of severity of interactions
- 14. Protocols standardization and documentation of herbal medicine
 - a. Introduction
 - b. Current status
 - c. Protocols for standardization
 - d. Constraints and challenges

Resources

Dennis Awang. (2009) *Tyler's Herbs of Choice*, CRC.

Amitava Dasgupta; Catherine A. Hammett-Stabler. *Herbal Supplements: Efficacy, Toxicity, Interactions with Western Drugs, and Effects on Clinical Laboratory Tests*. 1st. Wiley, 2011.

Giancinto Bagetta, Marco Cosentino, Marie Tiziana Corasaniti, Shinoby Sakurada. *Herbal Medicines: Development and Validation of Plant-derived Medicines for Human Health*. 1st. CRC, 2011.

Heinrich, Barnes, Garcia, Gibbons and Williamson. *Fundamentals of Pharmacognosy and Phytotherapy*. 3rd ed. Elsevier, 2018.

Zhang. *Pharmacognosy: Current Herbal Medications and Natural products for a PharmD curriculum*. First edition. Cognella Academic Publishing, 2020.

Resources Other

National Center for Complementary and Integrative Health website:

<https://nccih.nih.gov/>

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