

MEDICINAL HERBS

New Mexico State University

Syllabus – Spring 2022 January 12, 2022 – May 6, 2022

Instructor: Jose L. Ortega-Carranza

Office Location:

Skeen Hall W329

Email: jortegac@nmsu.edu

Phone: 575 646 5453

Office Hours:

Tuesday, Thursday 10:15 am - 11:15 am

Student's email communications are expected to be responded within 24 hours

Additional Instructors:

Dr. Laura Rodriguez-Uribe. Research Scientist. NMSU. Plant and Environmental Sciences

Course: HORT 310G M01

Credit Hours: 3.0

Delivery method: Face to face

Class Meeting Days and Times

Tuesday, Thursday 9:00 am - 10:15 am

Class Meeting Location

Skeen Hall W138

Lab Information

Tuesday, Thursday 9:00 am - 10:15 am. Skeen Hall W138

Required Texts

The Constituents of Medicinal Plants. 3rd Edition. By: Andrew Pengelly (Maryland University of Integrative Health, USA). May 2021. Paperback. 232 pages. ISBN 9781789243079. CABI.

Optional/Recommended Texts and Materials

Plants, People, and Culture. The Science of Ethnobotany. 2nd Edition. By: Michael J. Balik and Paul Alan Cox. 2021. Paperback. 222 pages. ISBN 9780815345909. CRC Press.

Medicinal Plants of the American Southwest. By: Charles W. Kane. August 2011. Paperback. 364 Pages. ISBN 0977133370. Lincoln Town Press.

Course Overview

The course is designed to teach students the methods used to identify medicinal plants and to identify the chemical constituents associated with biological activity. Southwestern medicinal plants will be featured, but also plants and practices from around the world will be discussed. The functions of the chemical constituents in the plant, their sites of synthesis and accumulation will also be presented. Students will participate in activities to extract and analyze chemical constituents in selected plants. Students will learn to work on scientific teams and to report results to peers.

Course Organization

The course will include lecture, discussions, student presentations and few sessions of lab work, in which the students will learn to extract and analyze bioactive compounds.

The course is organized in three different modules:

Module 1: The first third of the course addresses ethnobotany, herbal safety issues, plant collection methods, effects of the environment on accumulation of bioactive compounds, as well as select examples of traditional knowledge systems for medicinal plants. The readings for this portion of the course will be provided on the course Canvas site. During this portion of the course students will learn how to conduct bioassays and how to design experiments based on ethnobotanical information.

Module 2: The second third of the course will introduce extraction and analysis methods to detect medicinal compounds in plant material. Essential oils as a general class of medicinal compounds will be described and a basic introduction of functional groups in bioactive compounds will be demonstrated. Students will learn to run thin layer chromatography plates to resolve different compounds from medicinal plants and how to interpret analytical data. Lab time will be included to conduct team phytochemical extraction projects. They will also learn which

plants are rich in antioxidants and phenolic compounds and learn the application of those compounds for treatment of human diseases. Most of this section of the course is covered in the course textbook.

Module 3: The third of the course includes time to present their team phytochemical extraction project as well as presentations on additional classes of medicinal compounds: alkaloids, steroids, and phenylpropanoids. These topics are covered in the course textbook.

Course Learning Objectives

At the end of the course the students will be prepared to identify the relevance of herbalism or traditional herbal medicine in the advancement of science and the role of science in the validation of the traditional use of medicinal plants.

General Education course learning objectives: Area III - Science

All general education courses are required to include instruction and evaluation of a variety of essential skills. There are three such skills associated with this course:

- Critical Thinking
- Personal and Social Responsibility
- Quantitative Reasoning

Course Schedule

Tuesday	Thursday
	1/13 Introduction
1/18 Ethnobotany	1/20 Medicinal Plants of the Southwest
1/25 Ethnobotany. Plants that Heal	1/27 Bioassays
2/1 Ethnobotany. Plants that Harm	2/3 Reading assignment
2/8 Plant collection and identification. Plant anatomy	2/10 Plant anatomy. Herbal safety regulations
2/15 Herbal Safety Regulations. Growing medicinal plants.	2/17 Herbs and Spices. EXAM 1
2/22 Introduction to phytochemistry. Environmental effects.	2/24 Chemical extraction, separation and detection methods
3/1 Traditional methods of extraction. Volatile or essential oils	3/3 Phenols and Flavonoids
3/8 Spring Break	3/10 Spring Break
3/15 Literature review presentations. Environmental effects.	3/17 Literature review presentations. Terpenes and Saponines.
3/22 Alkaloids. Plant conservation and biopiracy	3/24 Glycosides and Tannins. EXAM 2

3/29 Phytochemistry lab work	3/31 Phytochemistry lab work
4/5 Phytochemistry lab work	4/7 Phytochemistry lab work
4/12 Phytochemistry lab work	4/14 Phytochemistry lab work
4/19 Medical Marijuana. Team reports	4/21 Hallucinogenic plants. Team reports
4/26 Team reports	4/28 Team reports
5/3 EXAM 3 during exams week	

NOTE: The deadline for withdrawing from a course to receive a refund is **January 28, 2022**. Students may withdraw from a course and receive a "W" (no refund) by **March 17, 2022**. The last day to withdraw from the university is **April 29, 2022**. All important dates can be found at <https://records.nmsu.edu/important-dates-students/>.

Assignments & Exams

Exams: There are three in-class exams, each covering the material presented in each of the three sections of the course. There is not a comprehensive exam. The third exam is held during exams week. The third exam covers the material covered in module 3 of the course.

Quizzes: Six short quizzes based on the reading assignments and lectures will be given to determine what information needs further explanation in class.

Assignments: There will be reading assignments. All students are expected to read the assignments before class and be prepared to contribute to group discussions.

Literature research and Phytochemical Report: Teams comprised of **two** students will be formed and each team will select a medicinal plant to study. Students will research the literature about the plant, **the progress on the literature research will be presented by the team to the class prior to the lab work, all members of the team have to participate.** Students will obtain samples in advance and perform extractions on usually dried preparations of these plants. The extracts will be analyzed and their phytochemical activities and composition interpreted. **The final report will be presented to the class** and submitted as a written document styled around a standard short journal review journal article and include the following sections: Introduction, Native Region and Habitat, Historical Ethnobotanical Uses, Current Uses, Phytochemistry, Pharmacological Research, Conclusion. The report should include figures with captions, all figures and text should be cited correctly with references. This report is due before the final exam date. Each student will submit a report. Time for team discussions and lab activity is scheduled during the term, although **time outside of class time will be needed** to complete this assignment. Detailed instructions will be provided in class.

Late Assignment and Make-up Work/Exams

There will be six quizzes during the semester but only five will count for 100 points of the final grade. The quiz with the lowest grade or a missing grade will not be included. There will be no make up quizzes.

There will be three exams during the semester. The third exam will be during the final exams week. In the case of missing an exam, the student will be required to take a comprehensive exam during the final exams week.

Grades

Grading will consist of:

Exams (3 exams), 200 points

Quizzes (20 points each), 100 points

Phytochemical report, 200 points

Total, 500 points

Graduate students enrolled in the class, as Hort 500, will be required to perform additional work to justify the graduate credit level. The additional assignment is expected to be the presentation of one or two of the course lectures, selected from topics on ethnobotany. This additional task is to be discussed and approved with the instructor within the first three class periods of the course and will count for additional 50 points, **for a total 550 points**.

Note: Grades in this course are assigned without Fractional Grading

Six-Week Early Performance Grades

Lower division courses are required to submit grades for work completed as of the sixth (6th) Friday of the semester. These grades will be used to facilitate opportunities for students to address performance issues. This is optional for upper division courses. ([ARP 4.55, Part 5](#))

Syllabus Modifications Statement

This syllabus is subject to revision to best fit the educational needs of the class. Any changes or modifications will be announced in class and/or on Canvas.

Student Services and University Policies

Please visit <https://provost.nmsu.edu/faculty-and-staff-resources/syllabus/policies.html> for university policies and student services, including Discrimination and Disability Accommodation, academic misconduct, student services, final exam schedule, grading policies and more.

Discrimination and Disability Accommodation

Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act (ADA) covers issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact: **Main Campus** Disability Access Services Corbett Center Student Union Room 208 Aaron Salas, Director 575-646-6840 das@nmsu.edu New Mexico State University, in compliance with applicable laws and in furtherance of its commitment to fostering an environment that welcomes and embraces diversity, does not discriminate on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex (including pregnancy), sexual orientation, spousal affiliation, or protected veteran status in its programs and activities, including employment, admissions, and educational programs and activities. Inquiries may be directed to the Laura Castille, Executive Director, Title IX and ADA/Section 504 Coordinator, Office of Institutional Equity, P.O. Box 30001, E. 1130 University Avenue, Las Cruces, NM 88003; 575.646.3635; 575-646-7802 (TTY); equity@nmsu.edu. **Title IX prohibits sex harassment, sexual assault, intimate partner violence, stalking and retaliation. For more information on discrimination or Title IX, or to file a complaint contact:** Laura Castille, Executive Director and Title IX Coordinator Office of Institutional Equity (OIE) - O'Loughlin House, 1130 University Avenue Phone: (575) 646-3635 E-mail: equity@nmsu.edu Website: equity.nmsu.edu

Other NMSU Resources:

NMSU Police Department:	(575) 646-3311	www.nmsupolice.com
NMSU Aggie Health & Wellness	(575) 646-1512	https://
NMSU Dean of Students:	(575) 646-1722	
For Any On-campus Emergencies:		911