

## Medicinal Plants

11:776:312 (3 credits)  
Fall Semester (yearly)

### CONTACT INFORMATION

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### COURSE DESCRIPTION

Use of plants for medicinal and other purposes; poisonous plants, cross-cultural aspects, chemistry and biological significance of natural products, and natural products from higher plants in modern medicine are discussed.

All lectures will be held in 138A Foran Hall except when noted. Lab demonstrations will be held in the New Use Agriculture labs on the 3rd floor of the new wing in Foran Hall (Room 394-396) and will focus on natural products extraction (hydrodistillation, solvent extraction, and quality control), assessment of dried botanicals, and quality assessment and sensory analysis of essential oils. A greenhouse demonstration will introduce students to medicinal and aromatic plants (MAPs) and to ongoing research that focuses on understanding the biology of MAPs, the genetic improvement of selected MAPs, and the discovery of new bioactive compounds in plants. A greenhouse tour will also provide the opportunity to see many MAPs.

### COURSE WEBSITE, RESOURCES AND MATERIALS

- Course website: Canvas
- Recommended (not required) texts:
  - Awang, DVC. 2009. Tyler's Herbs of Choice: The Therapeutic Use of Phytomedicinals, 3<sup>rd</sup>. CRC Press. ISBN 9780789028099
  - Blumenthal, M, JA Brinckmann, B Wollschlaeger. 2003. The ABC Clinical Guide to Herbs. American Botanical Council. ISBN 1-58890-157-2
- Lectures and supplemental readings will be posted to Canvas

## PREREQUISITE

01:119:115 General Biology OR equivalent OR 11:776:242 Plant Science

## COURSE LEARNING GOALS (link to Plant Biology Undergraduate Program Goals:

<http://plantbiology.rutgers.edu/undergrad/plantbiology/>)

By the end of this course, the student will be able to:

1. Comprehend and describe the basics of medicinal product biochemistry (addresses program goal 1)
2. Describe the applications of plants in a historical, cultural, medicinal, legislative, and global context (addresses program goal 2).
3. Discuss current issues and research associated with medicinal plants (addresses program goals 3 and 4).

## ASSIGNMENTS/RESPONSIBILITIES & ASSESSMENT

### Grading:

- Exams (two, 30% each) 60%
- Research reports (two, 20% each) 40%

Grades will be classified based on Rutgers approved system: A, B+, B, C+, C, D, and F.

There will be two exams that will cover the materials presented in the lectures, and from any supplemental readings and handouts.

**Research reports.** Reports are 10 to 15 typed pages, including illustrations and references. Each report is based on a specific MAP or a topic related to medicinal plants from their botany, horticulture, biology, or relationship to human health and disease state. Each paper must include an in-depth scientific literature review of the topic; and/or support/argue popular articles on herbs and plant-derived medicines; critical analysis of literature, and provide a conclusion that relates directly to your stated objectives for each paper. Research papers will be graded on completeness and overall depth and quality of the paper. Students are expected to work independently to complete reports.

Alternatively, for those seeking additional experience, in place of one research papers, some hands-on learning experience that includes a report may be provided. Speak with Profs. Simon or Wu prior to September 30.

**Learning goals assessment:** Specific questions on exams and review of research reports will be used to assess student knowledge of all course learning goals, from technical proficiency (course learning goal 1) to context (course learning goal 2) and communication of current issues and demonstration of critical thinking (course learning goal 3). The percentage score on these assessments will determine the level of mastery: >90% outstanding; 80-89% good; 70-79% satisfactory; <69% unsatisfactory.

## PARTICIPATION GRADE AND ABSENCE POLICY

Arrive to class on time. Attendance is mandatory. Lack of attendance will lower your grade. Active class participation and contribution to class discussion may, in special circumstances, increase your grade. Laptops are welcome for note taking, but Internet surfing is not permitted. Cell phones must be turned off. If you cannot attend class for medical or other reasons, notify the instructors prior to the missed class indicating the reason or use the

University absence reporting website (<https://sims.rutgers.edu/ssra/>) to indicate the date and reason for the absence. An e-mail is automatically sent to the instructor.

The class is on an honor system – no doctor or parental notes will be requested.

## COURSE SCHEDULE

Lecture	Topic
1	Class overview and expectations
2	Tabloid herbals – supermarket medicines Botany of medicinal and aromatic plants
3	Chemistry of essential oils and biochemistry of terpenes and phenylpropanoids and other aromatic compounds (part 1)
4	Chemistry of essential oils and biochemistry of terpenes and phenylpropanoids and other aromatic compounds (part 2)
5	From ancient to modern methods of distillation
6	Chemistry of alkaloids and pharmaceutical applications
7	Chemistry of polyphenols; their health properties including antioxidant activity
8	Chemistry of terpenes, diterpenes, triterpenes and their glycosides: biosynthesis, distribution, and bioactivities
9	Plants as ancient and modern medicines – malaria and quinine, digitalis steroids and the drug plants: cannabis, tobacco, cocoa, opium poppy, and others
10	Lab practicum and demonstration on EO distillation aroma sensing in NUANPP Lab
11	<b>Exam I</b>
12	African medicinals (part 1)
13	African medicinals (part 2)
14	African medicinals (part 3)
15	South American MAPs
16	Medicinal and aromatic plants of North America
17	Greenhouse tour: appreciating the genetic diversity of MAPs and growing medicinals and herbs
18	Asian medicinal and aromatic plants
19	Traditional Chinese medicine
20	Lecture and practice on aromas and flavors of traditional and herbal teas
21	Extraction and processing technologies for natural products
22	The legislative environment for medicinals and botanicals in the USA
23	The value chain and sustainability and ethical sourcing of natural products: from science to politics
24	<b>Thanksgiving break (no class)</b>
25	Medicinal and pharmaceutical fungi
26	Genetic diversity, biodiversity, and endangered medicinal and aromatic plants
27	Nutraceuticals, dietary supplements, and botanical standardization
28	Bioprospecting: searching for plants that cure disease and improve human health
<b>Exam 2 (cumulative, lectures and labs, date to be determined)</b>	

## FINAL EXAM/PAPER DATE AND TIME

Project due dates will be announced at the start of term. The Online Final exam Schedule: <http://finalexams.rutgers.edu/>

## ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

## ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/>

The principles of academic integrity require that a student:

- Properly acknowledge and cite all use of the ideas, results, or words of others.
- Properly acknowledge all contributors to a given piece of work.
- Make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- Obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- Treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that:

- Everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.
- The reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

## STUDENT WELLNESS SERVICES

**Just In Case Web App** <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

**Counseling, ADAP & Psychiatric Services (CAPS)**

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ [www.rhscaps.rutgers.edu/](http://www.rhscaps.rutgers.edu/)

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

**Violence Prevention & Victim Assistance (VPVA)**

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

**Disability Services**

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

**Scarlet Listeners**

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.