

## Medicinal and Aromatic Plants Laboratory

11:776:313 (1 credit)

Fall (yearly)

### CONTACT INFORMATION

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### COURSE DESCRIPTION

As a companion course to 11:776:312 *Medicinal Plants*, 11:776:313 *Medicinal and Aromatic Plants Laboratory* is a hands-on class that introduces students to the anatomical, physical, chemical, and biological characteristics of medicinal and aromatic plants and plant parts. The class also focuses on the safety, quality, and chemistry of plant products, highlighting characteristics related to human health and nutrition. Laboratory activities include the extraction and chemical analysis of specific plant products (e.g., essential oils, fatty acids) and provides a primer on protocols used to analyze the quality and chemistry of raw botanical ingredients (e.g., herbs, spices, medicinal plants, extracts), which are the type of analyses conducted by industry to assess quality. Students work in groups on specific products to assess quality and will prepare a report and a product specification sheet.

### COURSE WEBSITE, RESOURCES AND MATERIALS

- Course website: Canvas. Lectures and other course materials will be posted to the course website.
- There is no required text for this course.
- Primary reference: Upton, Roy et al (eds.). 2011. *American Herbal Pharmacopoeia: Botanical Pharmacognosy – Microscopic Characterization of Botanical Medicines*. American Herbal Pharmacopoeia, Boca Raton, FL. ISBN-13: 978-1-4200-7326-3
- Additional resources: all readings, including scientific papers, books and book chapters, news and media stories, online video, podcasts, etc., will be posted to Canvas or placed on reserve at Chang Library.

## PRE- or CO-REQUISITE

Pre- or co-requisite: 11:776:312 Medicinal Plants

## 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. Recognize anatomical, physical, chemical, and biological characteristics of plants and plant parts (leaves, stems, flowers, seeds) (addresses program goal 1, technical proficiency)
2. Assess the chemistry and quality of plant products (e.g., herbs, spices) by analyzing their sensory, physical, and chemical properties (addresses program goal 1, technical proficiency)
3. Place the importance of medicinal plants and plant products within an economic context (addresses program goal 2, context)
4. Interpret and analyze laboratory results, reporting these to the class (addresses program goals 3, communication, and 4, critical thinking)

## ASSIGNMENTS/RESPONSIBILITIES AND ASSESSMENT

### Grading (100 points):

- |   |           |
|---|-----------|
| • Quizzes (3 at 25 points each)                           | 75 points |
| • Project 1: Quality assessment of a botanical product    | 15 points |
| • Project 2: Development of a product specification sheet | 10 points |

Quizzes will include lecture material and assigned readings. Quizzes will also include practical components such as identification of common fruits, spices, herbs, and vegetables.

**Independent projects (two):** These represent independent work and Turnitin will be used to assess text for plagiarism. Points will be taken off for misspellings, wrongly formatted text, sloppiness, and similar mistakes, and all plagiarism will be reported to the Dean.

Grades are A ( $\geq 91\%$ ); B+ (85-90%); B (80-84%); C (70-70%); D (60-69%). Grades will be posted online so that students can monitor their progress in the class. *Significant and constructive participation in class discussions may enhance grades.*

**Learning goals assessment:** Specific questions on exams and review of independent projects will be used to assess student knowledge of all course learning goals, from technical proficiency (course learning goal 1), context (course learning goal 2), and communication of current issues and demonstration of critical thinking (course learning goals 3 and 4). The percentage score on these assessments will determine the level of mastery:  $>90\%$  outstanding; 80-89% good; 70-70% satisfactory;  $<69\%$  unsatisfactory.

## ABSENCE POLICY

Attendance is mandatory. Laptops are welcome for note-taking, but internet surfing is not permitted. Students unable to attend may contact the instructor via e-mail prior to the missed class or may 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.

## COURSE SCHEDULE

Week	Topic	Activity
1	Introduction	Introduction to the course and expectations
2		Botanical pharmacognosy and major plant groups
3	Diversity of plants and products	Preparation of botanical specimens; nomenclature of botanical materials
4		Touch, smell, and characterization of a plethora of plant products (herbal teas, spices, fats, and essential oils): choose your product
5		Botanical adulteration; microscopy for identification of botanical raw materials; learn to use a microscope and prepare slides
6		Organization of tissues in medicinal and aromatic plants
7	Assessing quality of raw botanical ingredients	Sensory analysis
8		<b>Quiz 1</b> Assessing quality of raw botanical ingredients: foreign matter analysis; color determination; use of the analytical scale
9		Proximate analysis: moisture, ashes, total phenolics, proteins, crude fats, etc.; introduction to analytical procedures (e.g., ultraviolet-visible spectroscopy, thin-layer chromatography)
10		Microbial contamination and toxins
11		<b>Quiz 2</b> Essential oil extraction and quality assessment of essential oils; introduction to analytical procedures (e.g., gas chromatography)
12	Quality standards	Meeting quality standards: safety, effectiveness
13	Reporting	Technical reports, specification sheets, and other communications
14	Closing	<b>Thanksgiving recess</b> <b>Presentations and projects due</b> <b>Quiz 3</b>

## FINAL EXAM/PAPER DATE AND TIME

There is no final exam for this course.

## 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.