Syllabus

Medical *Cannabis*
Pharm 200
Spring 2020
T,R Time: 4:25-5:40
Location: Votey 105

Directors:
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Course Description

Pharmacology 200, Medical *Cannabis* will be offered by the Department of Pharmacology in the Spring Semester 2020 as an introductory level Pharmacology course for undergraduate and graduate students. This course will use *Cannabis* as a springboard to introduce fundamental concepts in Pharmacology (the science of drug actions). The *Cannabis* plant has an interesting history, and recent policy changes have led to an explosion in *Cannabis* science. Lectures intersperse historical, political, and social background information with more advanced scientific concepts in pharmacology and medicine.

The course will divided into five areas of content: 1) plant biology, 2) biological effects on humans, 3) Cannabis analytic chemistry, 4) clinical research, and 5) business, law, and policy. We will also discuss current information about the Vermont experience with medical marijuana. This course will provide students with a foundation of up-to-date scientific knowledge in a complex and evolving area of medicine, while introducing key concepts in human physiology and pharmacology.

Course learning goals

This course is intended to be a unique experience for students to develop a broad understanding of *Cannabis* and its medicinal use, with more advanced concepts relevant to pharmacology and medicine in the context of the following specific objectives:

1. Discover the important milestones in the human use of *Cannabis*
2. Gain an understanding of how plants are classified and the implications this has on writing *Cannabis* policies.
3. Explore the chemical compounds found within Cannabis and different methods used to extract its specific psychoactive other neural effects
4. Examine the spectrum of medicines and toxins provided by natural products
5. Detail the basic pharmacological properties of cannabinoids including their absorption and metabolism as well as their mechanisms of action
6. Discuss the biology of addiction and compare *Cannabis* with other drugs of abuse
7. Develop knowledge of the physiology and pathology underlying neurological and inflammatory disorders including chronic pain, epilepsy, multiple sclerosis, and migraine
8. Catalog the evidence-based studies that detail the benefits of cannabis in the treatment of several neurological and inflammatory disorders
9. Understand current issues in *Cannabis* business, law and policy
10. Utilize a balanced academic approach to dispel myths surrounding the benefits and toxicities associated with *Cannabis* use

Readings

Required:

There is no required textbook, but readings will be regularly distributed to students.

Recommended Texts and Readings:

CDC. 2018. Marijuana and Public Health. Available online
https://www.cdc.gov/marijuana/index.htm

Hanson, Bryan Abbot. 2005. *Understanding Medicinal Plants: Their chemistry and therapeutic action*. MI: Haworth Herbal Press. Print.

Holland, Julie, Ed. 2010. *The pot book: A complete guide to Cannabis.* ME: Park Street Press.

Koehn FE, Carter GT. 2005. The evolving role of natural products in drug discovery. *Nature Reviews Drug Discovery*. 4:206-20.

National Academies of Science. 2017. *The Health Effects of Cannabis and Cannabinoids: The Current State of Evidence and Recommendations for Research*. Washington D.C.: National Academies Press.

Pertwee, Roger, Ed. 2014. *Handbook of Cannabis.* Oxford University Press.

Performance Goals
1. Participation: students will be expected to engage in lectures, readiness quizzes, assignments and exams.
2. Exam format: Exams will consist of primarily multiple choice questions with the possibility of additional formats (i.e. True/False, Matching, short essay).
3. *Written Assignments*: All students will be required to submit written assignments that will require outside research and scientific writing. Students taking the course for graduate credit will have expanded case study assignments as described below.

Grading
We will use the following tentative grading scheme:

Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Exam	20%
Assignments	20%

Academic honesty: You are expected to maintain a high standard of academic honesty. Please read about UVM's Academic Honesty Policy at http://www.uvm.edu/policies/student/acadintegrity.pdf Be particularly careful to avoid plagiarism when working on written assignments.
Religious holidays: You have the right to practice the religion of your choice. Each semester, you should submit in writing to your instructors by the end of the second full week of classes your documented religious holiday schedule for the semester. Faculty must permit students who miss work for the purpose of religious observances to make up this work.
Illness: For your own health and that of others around you, if you are sick with a fever or other severe illness, please do not attend class. We will arrange for you to make up the material and/or extend deadlines and exams as deemed necessary.

Tentative Course Schedule   *Assignment Due

1/14	Course Introduction & Cannabis history	McHenry

Section 1. Plant Biology

1/16	Plant taxonomy – Hemp or marijuana?	McHenry
1/21	Plant genomics – Developments and innovations	McHenry
1/23*	Plant chemicals – Defense or incentive?	McHenry

Section 2. Cannabis Chemistry

1/28	Chemical phenotypes of cannabinoids	Dostmann
1/3	Pharmacological actions of cannabinoids	Dostmann
2/4	Human Cannabinoid Pharmacokinetics	Dostmann
2/6	**EXAM 1 (Dostmann proctor)**	
2/11	Analytical chemistry of cannabinoids in plants and humans	Dostmann
2/13	Cannabinoids as drug targets	Dostmann
2/18	Metabolism of Cannabinoids	Dostmann
2/20	Field Testing of Cannabinoids	Dostmann

Section 3. Biological Effects on Humans

*2/25	Psychiatric responses to Cannabis	Lounsbury
2/27	Biological basis of Cannabis addiction	Lounsbury
3/3	Town Meeting Day Recess	
3/5	Effects of Cannabis on Pain and Nausea pathways	Lounsbury
3/10	BREAK - Spring Recess	
3/12	BREAK - Spring Recess	
3/17	**EXAM 2 (Dostmann proctor)**	

Section 4. Clinical Research

3/19	Cannabinoids for seizure disorders	Freeman
3/24	Cannabinoids for inflammation and pain	Freeman
3/26	Cannabinoids for motor disorders	Lounsbury
3/31	Cannabinoids for cancer and associated symptoms	Lounsbury
4/2	Cannabis and the Endocrine System	Carr
4/7	Cannabis and Mental health	Lounsbury
*4/9	Dispensary and Patient Testimonials (panel discussion)	Lounsbury
4/14	**EXAM 3 (Lounsbury proctor)**	

Section 5. Business, Law, and Policy

4/16	Cannabis—Social deviance and early/late adapters	Lounsbury
4/21	Public Health and Safety impacts	Freeman
4/23	Cannabinoid effects in special populations	Lounsbury
4/28	Cannabis business, law & policy	McHenry
4/30	Current & future challenges in Cannabis science	McHenry

5/7   **FINAL EXAM (McHenry proctor) 4:30-7:15 VOTEY 105**

*Written Assignments: All students will be required to submit 4 written assignments related to the course materials. The assignments will be assigned according to student level as described below.

Undergraduate

Students will use the lecture material and at least one outside source to review and discuss course topics. Students will be asked for form evidence-based opinions on topics related to medical uses.

Advanced Biology Credit

Students will use the lecture material and outside sources to review a topic and form a thesis for discussion. One of the assignments will include either an outline of a basic research proposal or clinical trial.

Graduate Student Credit

Students taking the course for graduate credit will be required to focus on primary literature and to present 4 scientific papers that integrate class area topics into an in-depth literature review. One of the assignments will include a hypothesis-based research plan and one will include basic design of a clinical trial. Students will be able to choose from several area topics presented prior to the due date.

Rubric:

1) Papers should be 2 pages in length, double-spaced.

2) Advance Biology and Grad Student papers must have at least 2 references from primary basic science literature. The remaining can be from textbooks, reviews or websites. Other levels should list references used being careful to choose reliable sources.

3) Papers will outline the background of the topic and then use specific examples from the literature that helped to develop the current understanding of the topic.

4) The final 2 Grad student papers will present a research proposal that includes a hypothesis and experimental design for a new study in medical cannabis (one basic research, one clinical trial).

A discussion section will also be used on blackboard for online discussion of recently published research or legislative news. All students will be expected to read the discussion, and graduate students will be expected to comment within the discussion thread.