Syllabus
Medical *Cannabis*
Pharm 3000
Spring 2025

3 Credit hours
T,R Time: 10:05-11:20
Location: Dewey Hall 314

Directors:
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Technical Help
Students, please read this technology check list to make sure you are ready for classes.
https://www.uvm.edu/it/kb/student-technology-resources/

Students should contact the Helpline (802-656-2604) for support with technical issues.

Course Description
Pharmacology 3000, Medical *Cannabis* will be offered by the Department of Pharmacology in the Spring Semester. This course will use *Cannabis* as a springboard to introduce fundamental concepts in Pharmacology. The *Cannabis* plant has an interesting history, and recent policy changes have led to an explosion in *Cannabis* science. Presentations intersperse historical, political, and social background information with more advanced scientific concepts in plant biology, pharmacology, and medicine.

The course will be divided into three areas of content: 1) plant biology, 2) chemistry, and 3) biological effects on humans and clinical research. 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 plant biology, 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* and assess the impacts of our expanding scientific knowledge on how medicines and toxins provided by natural products are used today

2. Gain an understanding of how plants are classified and the implications this has on writing *Cannabis* policies
3. Understand current issues in *Cannabis* business, law, and policy
4. Explore the chemical compounds found within *Cannabis* and different methods used to extract its chemicals
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. Utilize methods of scientific inquiry to develop new knowledge about 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:
   Ahmad, S., K.P. Hill. 2021. *Medical Marijuana: A clinical handbook*. NY: Wolters Kluwer.

   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.
   http://ezproxy.uvm.edu/login?url=https://ebookcentral.proquest.com/lib/vermontdana-ebooks/detail.action?docID=5663106

   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. https://www.nap.edu/read/24625/chapter/1

   Pertwee, Roger, Ed. 2014. *Handbook of Cannabis.* Oxford University Press.
   http://ezproxy.uvm.edu/login?url=https://oxford.universitypressscholarship.com/view/10.1093/acprof:oso/9780199662685.001.0001/acprof-9780199662685

Performance Goals
1. Participation: students will be expected to view presentations, participate in discussions, and complete quizzes, assignments, and exams.
2. Written Assignment: All students will be required to submit written assignments that will require outside research and scientific writing.
3. Exam format: Exams will consist of primarily multiple-choice questions with the possibility of additional formats (i.e. True/False, Matching, short essay).

Grading
We will use the following tentative grading scheme:

Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Exam	20%
Assignments	15%
Participation	5%

Exams: All students will be required to complete 4 exams related to the course material on Brightspace. Exams will be available on Brightspace for a select amount of time on the scheduled exam day. You will have 75 minutes and one attempt to complete the exam. Exams cover material since the last exam (not cumulative).

Written Assignments: All students will be required to submit written assignments related to the course materials. The assignments should be 2 pages in length, 12-point font, double-spaced. Please use MLA format to cite reverences. MLA stands for Modern Language Association. Perdue's library gives a <u>great explanation</u>. "MLA format follows the author-page method of in-text citation. This means that the author's last name and the page number(s) from which the quotation or paraphrase is taken must appear in the text, and a complete reference should appear on your Works Cited page." More information on MLA style citations can be found <u>here </u>at UVM's Howe Library site. Students will use the lecture material and primary literature sources to review and discuss course topics.

Modality: PHRM 3000 for Spring semester is an in-person class. As part of your enrollment in the course, we will provide you login information to our online learning management system, Brightspace. Brightspace will house the curriculum materials, presentations, readings, exams, and resources for the Program. Brightspace will also be used for communication from instructors.

Attendance Policy:
If a student will not be able to attend in-person classes for qualifying health reasons, Student Health Services (SHS) will send a notification to the appropriate student services office or designated staff member informing them of this along with the dates the student is unable to attend. The SHS

notification will specify whether the request for flexibility is only around in-person class attendance or includes additional flexibility for assignments and tests because the student is too ill to participate. Students are responsible for working with their faculty to make up class content and work they miss due to a documented illness.

Recording Class sessions: Our class sessions *may* be audio-visually recorded for students in the class to refer back to, and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the chat feature, which allows students to type questions and comments live.

Lived Name and Pronoun Information: The UVM Directory includes fields for indicating your lived name and your pronouns. Lived names (preferred names, names in use) are names that an individual wants to be known by in the University community. Entering your pronouns is strongly encouraged to help create a more inclusive and respectful campus community. To update your information, login to the UVM Directory. A preview box will allow you to see how this information will appear in other systems used on campus such as Microsoft Teams and Brightspace.

More information about how to make changes to your lived name and pronouns is available in the [Knowledge Base](#).

Research and Citation Help: For help selecting research topics, finding information, citing sources, and more, ask a librarian. The UVM Libraries are eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.

Howe Library: https://library.uvm.edu/askhowe
Dana Medical Library: https://dana.uvm.edu/help/ask
Silver Special Collections Library: https://specialcollections.uvm.edu/help/ask

Course Evaluation: All students are expected to complete an evaluation of the course at its conclusion. The evaluations will be anonymous and confidential. The information gained from evaluations will be used to improve the course.

Potential changes during the semester: http://catalogue.uvm.edu/
The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

Intellectual Property and Academic honesty: Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a

take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

Academic integrity policy: The Academic Integrity policy addresses plagiarism, fabrication, collusion, and cheating.

Code of Student Conduct: http://www.uvm.edu/policies/student/studentcode.pdf

Student Learning Accommodations:
In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course.

Contact SAS:
A170 Living/Learning Center;
802-656-7753
access@uvm.edu
www.uvm.edu/access

Grade Appeals: If you would like to contest a grade, please follow the procedures outlined in this policy.

Grading: This link offers information on grading and GPA calculation.

Religious holidays: Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time. The complete policy is here.

Promoting Health and Safety: The University of Vermont's number one priority is to support a healthy and safe community:
Center for Health and Wellbeing
Counseling & Psychiatry Services (CAPS) Direct Phone Line: (802) 656-3340
C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380).   If you would like to remain anonymous, you can report your concerns online by visiting the C.A.R.E. Team website.

FERPA Rights Disclosure: The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.
http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/

Final Exam Policy: The University <u>final exam policy</u> outlines expectations during final exams and explains timing and process of examination period.

Alcohol and Cannabis Statement: As faculty members, we want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

It is our expectation that you will do everything you can to optimize your learning and to fully participate in this course.

Tentative Course Schedule

Date	Topic	Instructor
1/14	Introduction & Cannabis history	McHenry
1/16	Cannabis law & policy	McHenry

Section 1. Plant Biology

Date	Topic	Instructor
1/21	Plant taxonomy	McHenry
1/23	Plant omics	McHenry
1/28	Plant ecology and evolution	McHenry
1/30	Plant Chemical Production	McHenry
2/4	Cannabis Chemotypes	McHenry
2/6	**EXAM 1 (Brightspace)**	

Section 2. Cannabis Chemistry

Date	Topic	Instructor
2/11	The non-cannabinoid constituents of Cannabis	Dostmann
2/13	The cannabinoid constituents of Cannabis	Dostmann
2/18	The Medicinal Chemistry of Cannabinoids	Lounsbury
2/20	Cannabis Extraction	McHenry
2/25	Metabolism and Methods of Field Testing	Lounsbury
2/27	Cannabinoid Receptors and the Endo-cannabinoid System	Lounsbury
3/4	Town Meeting Day, no class	
3/6	**EXAM 2 (Brightspace)**	

Section 3. Biological Effects on Humans & Clinical Research

Date	Topic	Instructor
3/11	Spring Break	
3/13	Spring Break	
3/18	Cannabinoids for inflammation and pain	Freeman
3/20	Effects of Cannabis on Pain and Nausea pathways	Lounsbury
3/25	Cannabinoids for seizure disorders	Freeman
3/27	Cannabinoids for motor disorders	Lounsbury
4/1	Cannabis and the Endocrine System	Carr
4/3	Cannabinoids for cancer and associated symptoms	Lounsbury
4/8	**EXAM 3 (Brightspace)**	
4/10	Psychiatric responses to Cannabis	Lounsbury
4/15	Biological basis of Cannabis addiction	Lounsbury
4/17	Emerging Mental health therapies	Lounsbury
4/22	Cannabinoid effects in special populations	Lounsbury
4/24	Cannabis—Social deviance and early/late adapters	Lounsbury
4/29	Public Health and Safety impacts	Freeman
5/1	Industry Panel	McHenry

TBD 5/5-9, please refer to UVM final schedule once published for **FINAL EXAM (Brightspace)**

Sample assignments:
PHRM 3000 Medical Cannabis Written Assignment 1. *Cannabis* **Taxonomy**
Due: 1/30/2025
Format: Expected length—2 pages double-spaced, essay format with in-text citations.
Please list any references you use using with MLA format citation. You can use websites, as long as website is a government website that includes references to back up information. Please upload your assignment onto Brightspace as a word or pdf file and submit well in advance of the deadline. Contact monique.mchenry@uvm.edu if you have difficulties uploading or questions with the assignment well before the deadline.

> You will create and submit a Nomenclatural review. Please utilize the presentations, read at least one of the assigned readings (see Brightspace "taxonomic readings – McPartland, 2018 (DOI: 10.1089/can.2018.0039); Small, 2015 (DOI:10.1007/s12229-015-9157-3); or Pollio, 2016 (DOI: 10.1089/can.2016.0027)", write the two-page review and submit. Each review should clearly identify your chosen reading, include one additional reference, and clearly answer the following questions:

1. What nomenclature does the author recommend?
2. What evidence does the author provide in support of their recommendation?
3. Do you agree with the author's concept? Please remember to use an evidence-based approach (including citations) to state your rationale for your decision.

PHRM 3000 Medical Cannabis Assignment 2. *Cannabis* **chemistry**
Due Tuesday Feb **25th by midnight**
Expected length—2 pages double-spaced, essay format. Include references.
Literature Resource: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7324885/pdf/CN-18-87.pdf
Ferber SG, Namdar D, Hen-Shoval D, Eger G, Koltai H, Shoval G, Shbiro L, Weller A. The "Entourage Effect": Terpenes Coupled with Cannabinoids for the Treatment of Mood Disorders and Anxiety Disorders. Curr Neuropharmacol. 2020;18(2):87-96. doi: 10.2174/1570159X17666190903103923. PMID: 31481004; PMCID: PMC7324885.
Please **bold 4 key words** within your essay. Please list any references you use (including the resource above). Websites are ok but use sites that include references to back up information. Upload your assignment onto Brightspace as a word or pdf file. Contact karen.lounsbury@uvm.edu if you are having difficulties with uploading or have any other questions.
Read the above article then describe 2 non-cannabinoid terpene/terpenoid compounds that are found within cannabis and also have separate medicinal uses. Explain their contribution to the entourage effect in medical cannabis, and provide evidence for their medicinal effectiveness when obtained from sources independent of cannabis.

PHRM 3000 Medical Cannabis Assignment 3: Autoimmune or Endocrine Disorder Research Proposal
Due Thursday April 22th **by midnight**
Expected length—2-3 pages double-spaced, essay format. Include references.
The goal is for you to think about how to develop a research question on a topic relevant to Medical Cannabis as a possible therapeutic in autoimmune or endocrine disorders. The research project can be at the cellular, animal, or human level. You can be conservative or creative but use some references to back up your idea.

Resources to get you started:

Cannabinoids and Autoimmune Disease

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8313508/pdf/itt-10-261.pdf

Cannabinoids in Endocrine Signaling

https://link.springer.com/article/10.1007/s11154-021-09682-w (log into UVM Dana library for access)

Please **bold 4 key words** within your essay. Please list any references you use (including the resource above). Websites are ok but use sites that include references to back up information. Upload your assignment onto Blackboard as a word or pdf file. Contact Karen.lounsbury@uvm.edu if you are having difficulties with uploading or have any other questions.

Propose a research project to test the effectiveness of a cannabinoid in the treatment/care of autoimmune or endocrine disorder. Use at least 2 references to support your idea with the following format:

Section 1: Significance and Question

Section 2: Background and Hypothesis

Section 3: Aims of the Study including basic method and controls you would use

Section 4: Expected Results and Clinical Impact