PLANTS FOR HUMAN MEDICINE
IDS 2935, 3 credits

Quest 2

Primary General Education Designation: Biological Sciences
Secondary General Education Designation: International (N)
Writing Requirement (WR) 2000 words

Summer A: 5/12/2025 – 6/20/2025

Meeting Day/Time/Location:

18513, 18514, 18515, 18516
M, W| 11am – 12:15 pm (Period 3) | CSE A101
F| Online lecture/activity planned

Instructor:
Satya Swathi Nadakuduti, Ph.D. | Assistant Professor,
Plant Molecular and Cellular Biology
Environmental Horticulture Department
Email: s.nadakuduti@ufl.edu
Phone: 352-273-4575
nadakudutilab
Office location: 310 Cancer Genetics and Research Center
Office hours: T, R| 8-10 am (and by appointment)

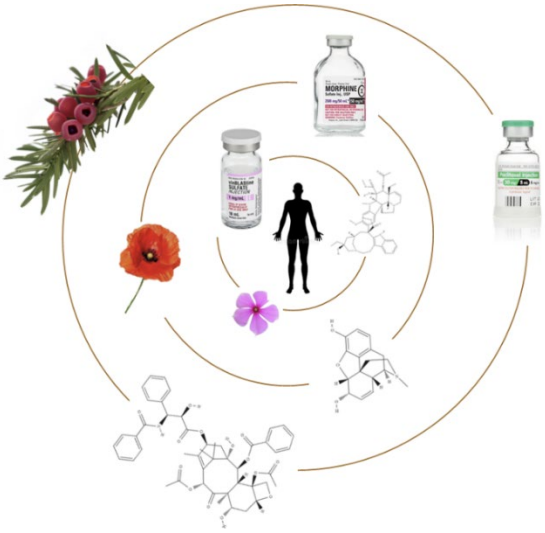
TA #1: Larissa Laforest, PhD student - llafirest@ufl.edu
18513: T, R| Period 3 (11am – 12:15 pm) | MAT 0102
18515: T, R| Period 4 (12:30 pm – 1:45 pm) | MAT 0108
Office location: 330G Cancer Genetics and Research Center
Office hours: T | 2-5 pm

TA #2: Katherine Ransden, PhD student - katherineransden@ufl.edu
18514: T, R| Period 3 (11am – 12:15 pm) | MAT 0108
18516: T, R| Period 4 (12:30 pm – 1:45 pm) | MAT 0011
Office location: 330G Cancer Genetics and Research Center
Office hours: M| 1:30-3pm
W| 3-4:30 pm

Course Description

***Pressing question(s)**:* Can plants cure human diseases? Can plants provide solutions to societal human health problems? Human beings and plants have had an intricate relationship since the beginning of their joint evolutionary history. We will learn about the ethnobotanical use of plants and examples of plants that provided modern medicines that help to fight some of humankind's deadliest medical conditions, including cancers, heart disease, and pain.

Additional course information



Besides being a food source, various cultures around the world used plants as natural health remedies for centuries, intertwining plant science and human medicine. We now know that plants have much sophisticated biochemistry. Several modern medicines are either still powered by plants, or their bioactive compounds were first discovered in plants, providing the stimulus and inspiration for synthetic drugs. Exploring plants to discover new molecules, new drug leads and nutraceuticals is a fascinating area of research. In this class, we will discover that plants are nature's powerhouse of chemical diversity. We will learn about plants that provided drugs and essential modern medicines that help to fight some of humankind's deadliest medical conditions, including cancers, heart disease, and pain. For example, childhood leukemia is treated with vincristine and vinblastine drugs derived from the Madagascar periwinkle plant, the anti-chemotherapeutic drug Taxol was first isolated from bark of pacific yew trees, opioids such as morphine and codeine are derived from opium poppy plants, etc. Several such discoveries have led to Nobel Prizes in Physiology or Medicine because they have impacted millions of lives across the globe. As the quest for new medicines for various human diseases continues, it's never been more urgent to understand the origins of life's chemical diversity on planet earth. We will also discuss various pressing societal problems such as the opioid crisis, mental health, major scientific developments in these areas, and their impacts on society, in an interdisciplinary way involving plant science, pharmacology, chemistry, and medicine.

Quest and General Education Credit

- Quest 2
- Biological Sciences

This course accomplishes the Quest and General Education objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Required Readings and Works

There are no required texts. Selected weekly readings and journal publications will be provided on the course Canvas site in digital format.

I recommend the Chicago manual of style (https://www.chicagomanualofstyle.org/home.html) as a guide for writing format and style. However, you may use a different style guide, if you check with me first and make sure to use the same format consistently.

Recommended Readings:
Textbooks:

1) Dauncey, E.A. & M.R. Howes. 2020. *Plants That Cure: Plants as a Source for Medicines, from Pharmaceuticals to Herbal Remedies.* Princeton University Press. [Students may choose to purchase this book]
2) Dewick, P.M. *Medicinal Natural Products, A Biosynthetic Approach.* Online ISBN: 9780470742761; Print ISBN: 9780470741689. [This textbook will be provided in Canvas]

Journal publications:

Atanasov, A.T. 2021. Natural products in drug discovery: advances and opportunities. *Nat Rev Drug Discov* 20: 200-216.

Atanasov, A.G. et al. 2018. Natural Products for Drug Discovery in the 21st Century: Innovations for Novel Drug Discovery. *Int J Mol Sci* 19(6): 1578. doi:10.3390/ijms19061578.

Humphreys, K. et al. 2022. Responding to the opioid crisis in North America and beyond: recommendations of the Stanford–Lancet Commission. *Lancet* 399: 555–604.

Su, X. & L.H. Miller. 2015. The discovery of artemisinin and Nobel Prize in Physiology or Medicine. *Sci China Life Sci* 58(11): 1175–1179.

Wurtzel, E.T. & T.M. Kutchan. 2016. Plant metabolism, the diverse chemistry set of the future. *Science* 353(6305): 1232-1236.

Materials and Supplies Fees: none

II. Graded Work

Description of Graded Work

Weekly quizzes	A 10-question quiz will be given as an online poll in the first 10min of the class. Quizzes will consist mostly of multiple-choice and true/false questions. Each quiz will be worth 2 points, and there will be five quizzes during the semester. The objective of this assignment is to understand the concepts of plants and their chemical diversity, success stories of plant based therapeutic drug development for various human diseases.	Each quiz question will be given 1 min to answer via online poll	10 points
Introductory Biography	Students submit a 300-word personal introductory biography to introduce themselves.	Required content includes self-introduction, background, interests, major, goals upon graduation, and what may help them succeed in this class	5 points

Think pair share	Give students time to think about One important reason why plants make diverse chemicals, turn to their neighbor for a short discussion and then share the results with the rest of the class.	Participation as a group	5 points
Class discussions	Comments always insightful & constructive; uses appropriate terminology. Comments balanced between general impressions, opinions & specific, thoughtful criticisms, or contributions.	Additional guidelines and grading rubrics will be provided via Canvas. Students should ask two or more questions per week to receive the credits. 1 point per week	10 points
Self-reflection paper I	As a part of experiential learning, students will utilize what they learnt in class along with literature review on opioid crisis in various regions of the world and submit a 1000-word self-reflection report designed to promote critical thinking on this topic of societal interest. *Commonly prescribed opioid medication and dosage *How does it work *What are the characteristics of these compounds that have addiction potential? *How topics are relevant to their intellectual, personal, and professional development.	The report should have double spaced, 12pt. Times Roman, 1" margins. The references must be presented towards the end. The documents must be uploaded in canvas for grading and will be evaluated using a rubric provided in canvas.	10 points
Video recording-Therapeutic horticulture	Plants help variety of vulnerable population with special needs to promote intellectual and sensory stimulation, stress reduction etc., Students visit UF's Wilmot Botanical Gardens, tour, identify at least three elements of the gardens that help with mind relaxation and therapy, and record a short video describing these elements while in the garden.	The video must be 3 min long and recorded by the student in the location mentioned	10 points
Self-reflection paper II - Semester group project	Global societal health issues - Role of plants. In modern societies across the globe, some of the most common human health issues revolve around plants. Plants could have been the reason for them to exist in some cases and plants are also the solution in some others. For a second self-reflection paper, students will work as a team. Each group will use one of the following societal health related topics to form an empirical argument or hypothesis for the report.	A group of 4-5 students will be assigned a topic to prepare an 800-word term paper (12pt. Times Roman, 1" margins, double-spaced with title and names of group members). Although students in the group may collaborate on a common topic, each student will write an independent 800-word review. The report will consist of 1) Abstract - 2.5 points, 100 words 2) Introduction and hypothesis 2.5 points, 100 words 3) Literature review of 3 scientific articles, 500 words to earn 7.5 points 4) Conclusion 2.5 points, 100 words. Written assignments and group	10 points

		participation will be evaluated using a rubric provided in Canvas.	
Survey of plant-based pharmaceuticals in your nearby pharmacy.	Go to a nearby pharmacy (CVS, Walgreens, Rite Aid etc.,) and prepare a list of 10 drugs/ pharmaceuticals or supplements in which plants/ plant products have been used. Identify the plants, respective bioactive ingredients and the purpose of medication. You could select pharmaceuticals for various conditions, examples include digestion, pain relief, heart burn, cold, coughs etc.,. Prepare for In-class discussion on the categories of plant products used for specific ailments (2.5 points) and prepare a report with all the above details along with pictures of each product reported (2.5 points).	Participation as a group	5 points
PowerPoint presentation	1) Tobacco dependence disease 2) Obesity, a global epidemic - Can plants help? 3) Nutraceuticals and herbal medicines - social and economic impacts 4) Environmental quality impact on human health - role of plants 5) Access to health care - plant-based medicine	20-min PowerPoint presentation	10 points
MIDTERM EXAM	The midterm exam, consisting of 20 multiple-choice questions, will be given on the Canvas website. Students must bring a laptop for the exam.	Students must bring a web- enabled device (laptop computer, tablet computer, phone) to take the exam. If there is an issue with attending the exam at this time, it should be discussed with the Dr. Nadakuduti at least one week before the exam.	10 points
FINAL EXAM	The final exam, consisting of 20 multiple-choice questions, will be given on the Canvas website. Students must bring a laptop for the exam.	Students must bring a web- enabled device (laptop computer, tablet computer, phone) to take the exam. If there is an issue with attending the exam at this time, it should be discussed with the Dr. Nadakuduti at least one week before the exam.	10 points
Attendance	Two free absences, others lose 2 points per absence.	Max 5 points will be awarded for attendance	5 points

Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	94.00 – 100%	C	74.00 – 76.99%
A-	90.00 – 93.99%	C-	70.00 – 73.99%
B+	87.00 – 89.99%	D+	67.00 – 69.99%
B	84.00 – 86.99%	D	64.00 – 66.99%
B-	80.00 – 83.99%	D-	60.00 – 63.99%
C+	77.00 – 79.99%	E	0.00 – 59.99%

Grading Rubric(s)

Writing Assessment Rubric and Statements

	SATISFACTORY (Y)	UNSATISFACTORY (N)
CONTENT	Papers exhibit at least some evidence of ideas that respond to the topic with complexity, critically evaluating and synthesizing sources, and provide at least an adequate discussion with basic understanding of sources (50% score)	Papers either include a central idea(s) that is unclear or off-topic or provide only minimal or inadequate discussion of ideas. Papers may also lack sufficient or appropriate sources.
ORGANIZATION AND COHERENCE	Documents and paragraphs exhibit at least some identifiable structure for topics, including a clear thesis statement but may require readers to work to follow progression of ideas (15% score)	Documents and paragraphs lack clearly identifiable organization, may lack any coherent sense of logic in associating and organizing ideas, and may also lack transitions and coherence to guide the reader.
ARGUMENT AND SUPPORT	Documents use persuasive and confident presentation of ideas, strongly supported with evidence. At the weak end of the Satisfactory range, documents may provide only generalized discussion of ideas or may provide adequate discussion but rely on weak support for arguments (15% score)	Documents make only weak generalizations, providing little or no support, as in summaries or narratives that fail to provide critical analysis.
STYLE	Documents use a writing style with word choice appropriate to the context, genre, and discipline. Sentences should display complexity and logical sentence structure. At a minimum, documents will display a less precise use of vocabulary and an uneven use of sentence structure or a writing style that occasionally veers away from word choice or tone appropriate to the context, genre, and discipline (10% score)	Documents rely on word usage that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short with awkward construction. Documents may also use words incorrectly.

MECHANICS	Papers will feature correct or error-free presentation of ideas. At the weak end of the Satisfactory range, papers may contain some spelling, punctuation, or grammatical errors that remain unobtrusive, so they do not muddy the paper's argument or points (10% score)	Papers contain so many mechanical or grammatical errors that they impede the reader's understanding or severely undermine the writer's credibility.

- The Writing Requirement (WR) ensures students both maintain their fluency in writing and use writing as a tool to facilitate learning.
- The instructor will evaluate and provide feedback before the end of the course on all of the student's written assignments with respect to grammar, punctuation, clarity, coherence, and organization. The point value to the writing assessment is provided in the rubric.
- WR course grades have two components. To receive writing requirement credit, a student must receive a grade of C or higher and a satisfactory completion of the writing component of the course.

Participation Rubric

	Excellent (5 points)	Good (4 points)	Average (3 points)	Insufficient (2 points)	Unsatisfactory (1-0 points)
Knowledgeable: Shows evidence of having done the assigned work.					
Thoughtful: Evaluates carefully issues raised in assigned work.					
Considerate: Takes the perspective of others into account and listens attentively.					

III. Annotated Weekly Schedule

Week	Activity	Topic/ Assignment
1. Importance of plants and their chemical diversity		
5/12 Mon	Topic	**Introductions and course overview; Why Study plants? Plants that transformed the world**

	Summary	First week we will introduce ourselves and familiarize with course structure, organization, and student learning objectives. Introduction to plants and human relationship; Recognize the importance of plants for food, fiber, fuel, and medicine
	Reading/works	Raven, P.H. Plants make our existence possible. *New Phytol Plants People Planet* 2021. 3: 2–6. doi: 10.1002/ppp3.10173
5/13 Tue	Topic	**Introductions and discussion overview; What do you know about plants**
	Summary	You will introduce yourselves to your TA and each other, go over the discussion grading scheme, and TA office hours. Poll– what do you know about plants?
	Activity	Discuss **- Introductory Biography assignment (Due 05/20)**
5/14 Wed	Topic	**Plant chemical diversity: new ways to use nature sustainably in healthcare**
	Summary	We will learn about plant chemical diversity, why plants make diverse chemicals? How do they make them? What is plant primary and secondary/specialized metabolism
	Reading/works	Royal Botanical Gardens Kew, *State of the World's Plants and Fungi 2020*, pp. 40-49.
		Royal Botanical Gardens Kew, *State of the World's Plants and Fungi 2017*, pp. pp. 24-31
5/15 Thu	Topic	**Plants in Medicine; Quiz #1**
	Summary	Complete quiz #1. Discuss through comments balanced between general impressions, opinions, thoughtful criticisms, or contributions. Focus on Think-pair-share questions 1 & 2. Go over Medicinal Plants of the World activity
	Activity	**Think-pair-share questions 1 & 2**
5/16 Fri	Topic	**Harnessing chemical diversity of plants (Online lecture)**
	Summary	Students will learn about several examples of plants that transformed the world and human life. Recording will be posted on canvas
	Reading/works	Veiga, M. Impact of plant extracts upon human health. *Crit Rev Food Sci Nutr*, 60(5): 873-886. doi: 10.1080/10408398.2018.1540969

2. Ethnobotany and human drugs		
5/19 Mon	Topic	**Is it worth investigating medicinal plants used by world cultures and focus on Ethnobotany?**
	Summary	Students will learn about the importance of ethnobotany and history of medicinal plants in various cultures across the world. Case study of Artemisinin discovery from traditional Chinese medicine pharmacopoeia and Youyou Tu's landmark work leading to artemisinin-based therapies against acute and severe malaria, saving millions of lives will be discussed.
	Reading/works	*Plants That Cure: Plants as a source for Medicines, from Pharmaceuticals to herbal remedies.* pp. 11-19
5/20 Tue	Topic	**Plants and the environment**
	Summary	Discuss through comments balanced between general impressions, opinions, thoughtful criticisms, or contributions. Focus on Think-pair-share questions 3-7. Discuss – Plants of the world activity (Slides due at end of day 05/21) Discuss – Self-reflection paper I (Due 06/03) Introductory Biography assignment due today.
	Activity	**Think-pair-share questions 3-7**
5/21 Wed	Topic	Special guest from UF McKnight Brain Institute - Dr. Rajesh Khanna, Prof. and Director of Center for Advanced Pain Therapeutics and Research (CAPToR), College of Medicine
	Summary	Students will learn about CAPToR and research pertaining to pain and non-opioid pain relievers.
5/22 Thu	Topic	**Medicinal Plants of the World; Quiz #2**
	Summary	Each student will do a 2-min presentation of a PowerPoint slide describing the background and uses of their plant, which will be researched in class.
	Activity	Medicinal Plants of the World PowerPoint Slide; **Quiz #2** Discuss - Survey of plant-based pharmaceuticals Report (Due 05/27)
5/23 Fri	Topic	**Survey of plant-based pharmaceuticals in your nearby pharmacy**

	Summary	Go to a nearby pharmacy (CVS, Walgreens, Rite Aid etc.,) and prepare a list of 10 drugs/ pharmaceuticals or supplements in which plants/ plant products have been used. Identify the plants, respective bioactive ingredients and the purpose of medication. You could select pharmaceuticals for various conditions, examples include digestion, pain relief, heart burn, cold, coughs etc.,
	Assignment	Prepare for In-class discussion on the categories of plant products used for specific ailments (2.5 points) and prepare a report with all the above details along with pictures of each product reported (2.5 points).
5/26 Mon - MEMORIAL DAY HOLIDAY		
3. Opium and pain – plant origins and opioid crisis		
5/27 Tue	Topic	**In-class discussion on the categories of plant products used for specific ailments (5 points)**
	Summary	**Discuss the plant products found during Friday's pharmacy survey.**
	Activity	In-class discussion on the categories of plant products used for specific ailments.
5/28 Wed	Topic	**Opium: A dark classic in chemical neuroscience**
	Summary	Students will learn about the opium poppy plant, which produces dozens of opioids, including morphine, codeine etc., responsible for medicinal properties, including analgesic and antitussive effects. Students will learn about the current opioid crisis in the United States, one of the most devastating public health catastrophes of our time.
	Reading/works	Presley, C.C. & Lindsley, C.W. DARK Classics in Chemical Neuroscience: Opium, a Historical Perspective. *ACS Chem Neurosci*. 2018, 9: 2503−2518
5/29 Thu	Topic	**Opioid jeopardy**; **Quiz #3**
	Summary	Students will be separated into teams and compete in jeopardy covering opioids themed topics.
	Reading/works	https://youtu.be/V0CdS128-q4?si=91oySctoGzKyiP68 Key Facts of the Opium Wars | Britannica https://museum.dea.gov/exhibits/online-exhibits/cannabis-coca-and-poppy-natures-addictive-plants/opium-poppy#:~:text=Opium%20is%20grown%20mainly%20by,Turkey%20through%20Pakistan%20and%20Burma.

	Activity	Opioid jeopardy; **Quiz #3**; Reminder – Midterm 06/03
5/30 Fri		**Opioid crisis in the United States - what led to this crisis? Are there alternatives?**
		1) TED talk: Seeing Pain: New approach to diagnosing and treating nerve damage by Dr. Christopher McCurdy https://youtu.be/Aetg4kJie0o 2) What led to the opioid crisis-and how to fix it? interview of Howard Koh, Professor of the practice of public health leadership, Harvard T.H. Chan school of public health https://www.hsph.harvard.edu/news/features/what-led-to-the-opioid-crisis-and-how-to-fix-it/ 3) Humphreys, K. Responding to the opioid crisis in North America and beyond: recommendations of the Stanford–Lancet Commission. *Lancet* 2022; 399: 555–604
4. Understanding pain and role of plants in brain and mental health		
6/2 Mon	Topic	**Special guest from College of Pharmacy, Dr. Christopher R McCurdy,** Prof and Director of the UF Translational Drug Development Core.
	Summary	The science underlying pain, role of plant natural products in managing pain, the chemical compounds and mechanism of action for pain management will be discussed.
	Reading/works	Congressional briefing: Dr. Chris McCurdy
6/3 Tue	Topic	**MIDTERM EXAM**
	Summary	The midterm exam, consisting of 20 multiple-choice questions, will be given on the Canvas website. **Students must bring a laptop for the exam**. Discuss ways to properly identify and cite scientific literature (Pubmed/citation managers).
	Activity	Self-reflection paper I Due Discuss: Wilmot gardens video (Due 06/6) Discuss: Self Reflection paper II (Due 06/12)
6/4 Wed	Topic	**Brain and Mental Health - Can plants help in calming the nerves and alleviate depression?**

	Summary	Students will learn about chronic conditions such as mental illness, addiction, and regarding plant compounds that are being investigated for their therapeutic value in nervous system related disorders, including Dementia and depression TBD
	Reading/works	National Institute of Health – Turning discovery into health, A Healthy Mind- series of brain diseases and disorders https://www.nih.gov/about-nih/what-we-do/nihe280a6turning-discovery-into-healthc2ae/healthy-mind
6/5 Thu	Topic	**ICBR Tour; Quiz #4**
	Summary	Come up with an idea for a medicinal plant, create a scientific and common name, and draw it. Provide details about your plant pertinent to its medicinal use. Students should understand each moving part of studying a medicinal plant and their implications. Quiz #4 will be completed at home.
	Activity	**ICBR Visit; Take Home Quiz #4**.
6/6 Fri	Topic	**Students visit and tour the Wilmot gardens at UF**
	Summary	Plants help variety of vulnerable population with special needs to promote intellectual and sensory stimulation, stress reduction etc., Students visit UF's Wilmot Botanical Gardens, tour, identify at least three elements of the gardens that help with mind relaxation and therapy, and record a short video describing these elements while in the garden. While you are there, identify the Hippocratic tree https://wilmotgardens.med.ufl.edu/2022/06/15/from-greece-to-gainesville-the-hippocratic-tree-at-shands-uf-caroline-h-crist-sustainability-intern-wilmot-botanical-gardens/ https://www.nih.gov/about-nih/tree-hippocrates
	Assignment	The video must be 3 min long and recorded by the student in the location mentioned
5. Chemotherapeutic and cardiac drugs with plant origins, and herbal medicines		
6/9 Mon	Topic	**Plants with anti-cancer properties**

	Summary	Students will learn about chemotherapeutic drugs discovered from plants focusing on the story of vincristine and vinblastine discovery from periwinkle and paclitaxel from pacific yew tree, along with other plants under investigation leading to life saving drugs.
	Reading/works	National Cancer Institute, Cancer prevention overview https://www.cancer.gov/about-cancer/causes-prevention/patient-prevention-overview-pdq
		Choudari, A.S. et al. Phytochemicals in cancer treatment; from preclinical studies to clinical practice. *Front Pharmacol.* 2019, 10. doi: 10.3389/fphar.2019.01614
6/10 Tue	Topic	**Create a Medicinal Plant**
	Summary	Come up with an idea for a medicinal plant, create a scientific and common name, and draw it. Provide details about your plant pertinent to its medicinal use. Students should understand each moving part of studying a medicinal plant and their implications.
	Assignment	Create your own medicinal plant
6/11 Wed	Topic	**Heart health - discovery of cardiac glycosides from plants**
	Summary	Students will learn about plants which are researched for chemicals to treat heart disease and focus on success story of foxglove plant that makes compounds present in prescription cardiac drug Digoxin. **Special guest invitation from UF Health Heart and Vascular care** TBD
	Reading/works	Whayne Jr, T.F. Clinical use of Digitalis: A state of the art review. *Am J Cardiovasc Drug* 2018, 18: 427–440 AAAS blog by Steven A. Edwards, Ph.D. on Digitalis: The flower, the drug, the poison https://www.aaas.org/digitalis-flower-drug-poison
6/12 Thu	Topic	**Society and Industry in Plant Science; Quiz #5**
	Summary	Discuss through comments balanced between general impressions, opinions, thoughtful criticisms, or contributions. Focus on Think-pair-share questions 8 & 9
	Activity	Think-pair-share questions 8 & 9; Self-reflection paper II due
6/13 Fri	Topic	**Commercial botanicals and herbal products - challenges in monitoring safety, quality, and regulation (Online lecture)**
	Summary	Students will learn about global use of herbal products and ways to authenticate commercial products that are available, some major

		challenges in monitoring safety and quality of over-the-counter botanicals. We will also discuss about the regulatory aspects in the US for herbal products and how their regulatory pipeline differs from other drugs.
	Reading/works	Leong, F. et al. *Chin Med.* 2020, 15:76. doi: 10.1186/s13020-020-00357-3
6. Modern approaches of making medicine and ethics surrounding medicinal plants		
6/16 Mon	Topic	**Biopharming' how can plants aid in manufacturing drugs? Making medicine in alternative hosts**
	Summary	Students will learn about several pharmaceuticals that are being produced in plants by advanced genetic engineering and synthetic biology techniques. Students will learn the meaning of biopharming, introduction to genetic engineering and synthetic biology approaches, some advantages and concerns with biopharming.
	Reading/works	Brady, J.R. & Love, J.C. Alternative hosts as the missing link for equitable therapeutic protein production. *Nat Biotechnol.* 2021, 39: 404–407. NPR report by Joe Palca on how tobacco plants are used for making COVID-19 vaccine https://www.npr.org/sections/health-shots/2020/10/15/923210562/tobacco-plants-contribute-key-ingredient-for-covid-19-vaccine PBS news report by Mary Jo Brooks on how biopharming is helping to ramp up the vaccine production for Ebola https://www.pbs.org/newshour/show/how-to-grow-an-ebola-vaccine-with-a-tobacco-plant
6/17 Tue	Topic	**Case Studies in Biopharming**
	Summary	In groups, students give oral presentations on case studies on some of the Biopharming companies in the US and across the world and what therapeutics are commercially produced in these firms.
	Activity	Biopharming case study presentations.
6/18 Wed	Topic	**Ethics surrounding medicinal plants from traditional medicinal pharmacopoeias across the world**

	Summary	Students will learn about The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is a supplementary agreement to the Convention on Biological Diversity.
	Reading/works	The Nagoya protocol on access and benefit-sharing https://www.cbd.int/abs/about/default.shtml/
6/19 Thu - HOLIDAY		
6/20 Fri		**FINAL EXAM**

IV. Student Learning Outcomes (SLOs)

General Education, International: International courses promote the development of students' global and intercultural awareness. Students examine the cultural, economic, geographic, historical, political, and/or social experiences and processes that characterize the contemporary world, and thereby comprehend the trends, challenges, and opportunities that affect communities around the world. Students analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate their own and other people's understanding of an increasingly connected world.

1. The general education objects will be accomplished through the identification and discussion of global health crisis scenarios including opioid crisis, heart diseases, mental health issues etc., to discuss role of plants and potential solutions from medicinal plants research to substantially improve human health.

2. Students will understand that traditional medicines used by various cultures across the globe involve variety of plants or plant extracts as remedies for various health issues. Traditional Chinese Medicine, Ayurvedic medicine and other world pharmacopoeias have valuable information to explore plants to search to cure human diseases.

3. Weekly lectures, TED talks and assignments including discussions, self-reflection papers will help with critical thinking and analyses of global health and societal problems and how plants may play a role in solving some of these.

Student Learning Outcomes Assessment:
Reflecting the curricular structures of Quest 2 and these Gen Ed designations, at the end of this course, students will be able to:
1. Define metabolism in plants, explain the basics of chemical diversity in plants and describe how humans have harnessed it (**Content SLOs for Q2, Gen Ed Bio, and International**).
2. Identify some modern drugs and their plant origins to reflect on the importance of global plant exploration for discovery of novel molecules (**Content SLOs for Q2, Gen Ed Bio, and International**).
3. Evaluate the importance of traditional medicines across the world and ethnobotany (study of how native people used plants) in developing modern medicine (**Connection SLOs for Q2, Gen Ed Bio, and International**).

4. Analyze certain critical global societal problems related to human health and explain the role of plants in solving them (**Critical thinking SLOs for Q2, Gen Ed Bio, and International**).
5. Recognize plants as alternative sources for making medicine and therapeutic proteins (**Content SLOs for Q2, Gen Ed Bio, and International**).
6. Evaluate modern analytical chemistry and genetic tools that aid in medicinal plants research using science and experiential learning (**Content SLOs for Q2, Gen Ed Bio, and International**).
7. Discuss ethics and policy in studying and utilizing plants affecting global society (**Critical thinking SLOs for Q2, Gen Ed Bio, and International**).
8. Evaluate participation in diverse interdisciplinary groups by means of both oral and written communication (**Communication SLOs for Q2, Gen Ed Bio, and International**).
9. Summarize plants for human medicine through class lectures, self-reflection papers and discussions, looking to the future of medicines from plants (**Critical thinking SLOs for Q2, Gen Ed Bio, and International**).

At the end of this course, students will be expected to have achieved the Quest and General Education learning outcomes as follows:

Content*:* Students demonstrate competence in the terminology, concepts, theories, and methodologies used within medicinal plants research, plant metabolites, especially medicinal compounds, and their classification. Discuss about important analytical chemistry and genetic tools used to analyze the botanical material and evaluate how rapid advancements in the field of medicinal plants research affects global social policies on plant utilization. Further, students will identify the significance of plants and contributions to modern human medicine and discuss critical societal health problems, their origins and current status. Student competencies will be assessed through quizzes, exams, group discussions.

Critical Thinking: Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems. Students critically analyze why plants make diverse chemicals that can be used by humans and share with the class. As a part of self-reflection papers, I and II students will analyze certain current societal health problems in collaboration to form an empirical argument or hypothesis for the reports. Assessments including think pair share, self-reflection papers are used to assess critical thinking.

Communication: Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms. Students use reflective writing assignments, collaborate in group discussions, and do oral presentations.

Connection: Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond. Students will make useful connections between natural product discovery from plants and human medicine. They will evaluate the importance of global plant exploration to identify novel compounds and drug leads.

V. Quest Learning Experiences

1. Details of Experiential Learning Component

Video recording-Therapeutic horticulture: Students visit and tour the Wilmot gardens at UF to identify at least three elements of the gardens that help with mind relaxation and therapy and record a short video describing these elements while in the garden. Students will experience the garden features and realize that plants and nature in general can help with calming the nerves.

Field visit to UF ICBR Proteomics & Mass Spectrometry Facility: The students will have a guided tour of the analytical equipment that is used to identify plant metabolites and medicinal compounds that they will be exposed to in the class.

The in-class experiential learning will be in-class discussions on societal health problems.

2. Details of Self-Reflection Component

Students will complete a questionnaire at the beginning of the course that will gauge their knowledge and opinion on several issues in plants and relationships with human medicine. This will be later assessed towards the end of the course as a self-reflection exercise. Self-reflection writings and oral presentation are included. For example, students write self-reflection paper I on opioid crisis epidemic and self-reflection II semester project where students form groups to choose one of the given global societal health related topics to write a report as well as do an oral presentation in class.

VI. Required Policies

Attendance Policy

Students are expected to attend every lecture and complete all assignments before the deadlines. Late assignments will be accepted after the due date with a 25% deduction per day and graded without penalty for documented emergencies as per UF`s attendance policy. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Accommodations for Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students

will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." Student Honor Code and Student Conduct Code https://policy.ufl.edu/regulation/4-040/) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: (New Link: https://policy.ufl.edu/regulation/4-040/)

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

Whole Gator App and website connects UF students with resources dedicated to supporting overall health and well-being. In addition to many of the resources below it also has strategies to practice self-care. https://one.uf.edu/whole-gator/topics

Health and Wellness

- U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

- Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

- Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

- University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

- UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

- GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273-4450.

- Student Success Initiative, http://studentsuccess.ufl.edu.

Academic Resources

- E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

- Career Connections Center: Reitz Union Suite 1300, 352-392- 1601. Career assistance and counseling services.

- Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. Call 866-281-6309 or email ask@ufl.libanswers.com for more information.

- Teaching Center: 1317 Turlington Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

- Writing Studio: Daytime (9:30am-3:30pm): 2215 Turlington Hall, 352-846-1138 | Evening (5:00pm-7:00pm): 1545 W University Avenue (Library West, Rm. 339). Help brainstorming, formatting, and writing papers.

- Academic Complaints: Office of the Ombuds; Visit the Complaint Portal webpage for more information.

- Enrollment Management Complaints (Registrar, Financial Aid, Admissions): View the Student Complaint Procedure webpage for more information.

Student Complaints:

- Residential Course: https://www.ombuds.ufl.edu/complaint-portal/
- Online Course: https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.