



## **BOT 205 ETHNOBOTANICAL PHARMACOGNOSY**

4 Credits (CRN 61386)  
WWW and Virtual Course  
DB, DY

**INSTRUCTOR:** Teena Michael PhD  
**OFFICE:** Hale Palanakila 142  
**OFFICE HOURS** Contact me for in-person meeting via email (response within 24 hrs)  
*Zoom contact for office hours and discussion times to be determined*  
Teena Michael is inviting you to a scheduled Zoom meeting:  
Topic: Ethnobotanical Pharmacognosy  
Time: This is a recurring meeting Meet anytime  
Join Zoom Meeting  

- <https://hawaii.zoom.us/j/92454752623>
- Meeting ID: 924 5475 2623
- Passcode: molecules

**DB** Diversification—Biological Science **DY** Diversification—Laboratory (Science)

**TELEPHONE:** (808) 236-9114  
**EMAIL:** (best contact): [teena@hawaii.edu](mailto:teena@hawaii.edu)  
**EFFECTIVE DATE:** Fall 2023

### **WINDWARD COMMUNITY COLLEGE MISSION STATEMENT**

*'O keia ka wā kūpono e ho'onui ai ka 'ike me ka ho'omaopopo i kō Hawai'i mau ho'oilina waiwai. Aia nō ho'i ma ke Kulanui Kaiāulu o ke Ko'olau nā papahana hou o nā 'ike 'akeakamai a me nā hana no'eau. Me ke kuleana ko'iko'i e ho'ohiki ke Kulanui e kāko'o a e ho'okumu i ala e hiki kē kōkua i ka ho'onui 'ike a nā kānaka maoli. Na mākou nō e ho'olako, kāko'o a paipai i nā Ko'olau a kō O'ahu a'e me nā hana no'eau ākea, ka ho'ona'auao 'oihana a me ka ho'onui 'ike ma ke kaiāulu — hō'a'ano a e ho'oulu i nā haumāna i ka po'okela.*

*Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai'i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide the Ko'olau region of O'ahu and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.*

### **CATALOG DESCRIPTION**

A study of medicinal plants of Hawai'i, their characteristics, plant extraction, isolation and identification of their chemical constituents for possible uses in pharmaceuticals or in their natural state, and bioproduct manufacturing. This course is designed to train students for careers in plant and medicinal biotechnology. Lecture and laboratory/field trip course.

### ***Requirement course satisfies:***

#### **At WCC:**

- Certificate of Achievement in Agripharmatech: Ethnopharmacognosy
- AA Liberal Arts and AS Natural Sciences (DB, DY)

#### **At UHM:**

- Bachelor of Science Degree Program in Plant and Environmental Biotechnology. Accepted as an elective for the following specializations: Plant Biotechnology, General Biotechnology, and Environmental – Microbial Biotechnology.
- [Ethnobotany studies at UH Manoa](https://www.ethnobiology.net/study-ethnobotany-at-the-university-of-hawaii/) <https://www.ethnobiology.net/study-ethnobotany-at-the-university-of-hawaii/>

### ***Activities Required at Times Other than Class Times***

*Read our Laulima weekly information and resources including PDFs in readings. Read/watch presentations and prepare for lab—write your procedures and finding for each lab as we proceed. Study plants in your neighborhood and life.*

- 1) [B205 Readings](#) and B205 Resources for Lecture are in *Laulima Resources*
- 2) PDFs for 2 resources, [Abbott and Krauss](#), are in *Laulima Resources*. These books are central to our sister class B105 and resources for us—perhaps beyond our course! Each are rich in cultural knowledge and botany.
- 3) Complete assignments (*solo and collective*) outside of class and grow seeds/cuttings and other out-of-class activities at home with *the intention of understanding the processes!*
- 4) An optional class zoom discussion will be offered support learning and be guided by questions for those that can attend and/or questions sent to me ([teena@hawaii.edu](mailto:teena@hawaii.edu))! Recordings of zoom discussions that focus on content will be posted for all.

### **THE STUDENT LEARNING OUTCOMES:**

- 1) Discuss theories and principles in the study of medicinal and nutritious plants
- 2) Discuss ethics, intellectual property rights and conservation of traditional knowledge
- 3) Perform laboratory exercises including: plant study, plant extraction, drying or distillation, bioassay tests, and vitamin analysis for use in nutraceutical product manufacturing
- 4) Produce lab reports using the standard scientific format or as described in class

### **COURSE CONTENT**

**COURSE GOALS:** Upon completion of this course, you should have a basic understanding and technical competency in identifying medicinal and nutritious plants, analyzing their pharmaceutical and nutritional properties, and manufacturing nutraceutical plant-based products.

**COURSE OBJECTIVES:** You will demonstrate knowledge and understanding of theories and concepts of diet-health care and diseases, ethics and researcher behavior, intellectual property rights and conservation of traditional knowledge; laboratory/field methods in identifying and collecting medicinal plants, and perform extraction, bioassay, nutritional analysis and visualization of potentially significant biological molecules in plant tissues and cells via microscopy.

## **COURSE TASKS and ASSESSMENT**

The evaluation of the student's achievement of course objectives will be based upon lecture, laboratory and field participations, laboratory research & reports, project research and presentations, short assignments and final exam. Details and feedback will be provided!

### **LECTURE AND LABORATORY/FIELD PARTICIPATION AND ASSIGNMENTS (50 points)**

You will actively participate in all lectures and lab/field activities at the Bioprocessing Medicinal Garden Complex (BMGC).

Assignments will be posted in our Lulima ASSIGNMENTS with directions!

### **LABORATORY (Cumulative) REPORT (100 points)**

You will submit a final report on our research with *Piper sarmentosum* from our BMGC garden. There will be distinct aspects/components to this research and you will write the background, objective, question, protocol, results and conclusions for each component. Think of each component as a chapter with its own background, objective, question, protocol, results and discussion. Each component has a distinct technique that you will learn and practice in our labs. Each skill supports addressing distinct questions. As you gather skills you gather the ability to address diverse questions...and to think of more!

*Work together* on each aspect of this learning and apply what you learn to follow your own curiosity with regard to another plant...

Using one or more of our research techniques with another plant/plants *CAN be your second of two projects (Project CHOICE below)*. We will discuss this in class.

### **PROJECTS (all can be individual or group)**

*Project MOLECULES \*All DO! (50 points)*

- Choose one class of molecules from Natural Product Chemistry—research and present your findings. Choices include: Complex Polysaccharides, Glycosides, Lipids, Terpenoids, Steroids, Phenylpropanoids, Alkaloids, Proteins and Peptides, Antibiotics, Biologics and Immunomodulators...
  - Note—*traditional* plant uses are filled with discoveries and stories. Bring traditional knowledge into all projects. It is important to couple “Natural Products Chemistry” with traditional uses. What do/could you learn from each?
  - Describe your molecules—where are they found (?)—how are they used? What are plant examples that relate to your life/our lives? Include traditional and scientific knowledge.

*Project CHOICE! (50 points)*

*You can select from diverse topics in Food OR Medicinal Ethnobotany OR Healing including (but not limited to) the following topics:*

- Food preparation (Hawaiian, Asian/Pacific Islander styles)
- Food and healing/health
- Indigenous medicine preparation (Hawaiian, Asian/Pacific Islander styles)
- Healing in Hawaii versus Healing in Samoa or other Polynesian and/or Asian area
- Hula and plants or Hula and healing
- Plant bioproducts (fermented drinks, teas, ways to use kalo and/or ‘ūala...)
- Agriculture and medicine
- Agriculture and global climate change at local and/or global levels.
- Limu and Hawaiian culture...
- *GROW*/plant and tell us what you did—what you found—what is next?
- *DO* research based on class findings and techniques from our class
- *DO* microscopy to visualize alkaloids or polyphenolic molecules (for example) with images and presentation to class.
- *COOK!* Share food and explain the food in terms of cultural as well as nutrition/healing aspects!

## QUIZZES (25 points)

Short, low-point-value quizzes will address information from class to punctuate your recall—remembering facts and gaining vocabulary—supports our conversation(s) and learning.

Worksheet/study guides will be given throughout our class to support learning and confidence...recall, analytical thinking, understanding and applications—and doing well on quizzes and the final.

## ETHNOBOTANICAL INTERVIEW (15 points)

How have ‘we’ learned information? We will follow a clear protocol to learn from a person of your choice—family member or vender at an open market (for example) and communicate what you learn in an one page reflection or a recording or video.

## EXAM (100 points)

*Our final* will be in three parts: 1) take home, 2) in-lab *group problem solving* and 3) a solo part. The final will be based on a *final study guide* that includes information learned from our literature, presentations, assignments and common research. The process of preparing for and taking the final exam is to support recall, analytical thinking, understanding and application of what you have learned.

## EXTRA CURRICULAR ACTIVITY (10 points)

*Prepare food pharmacy* for special Agripharmatech program event(s). Event date(s) will be announced in the class.

**\*Service Learning--**Please contact me individually if you are involved or would like to be involved in service learning on or off campus.

## GRADING

The grades are assigned as follow:

Participation and Assignments.....	50 points
Laboratory Report (cumulative).....	100
Project Molecules.....	50
Project CHOICE.....	50
Ethnobotanical Interview.....	15
Quizzes.....	25
Final Exam.....	100
Extra Curricular Activity.....	10

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**Total            400 points**

Grade scales:

A = 90 – 100% of total points

B = 80 – 89% of total points

C = 70 – 79% of total points

D = 60 – 69% of total points

F = less than 60% of total points

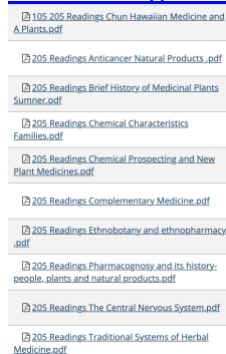
I (incomplete), given at the INSTRUCTOR’S DISCRETION when you are unable to complete a small part of the course because of circumstances beyond your control. It is YOUR responsibility to make up incomplete work with a minimum level (or better) of achievement. Failure to satisfactorily make up incomplete work within the appropriate time period will result in a grade change from “I” to the contingency grade identified by the instructor (see catalog).

CR (credit), 60% or above in total points. You must indicate an intent to take the course as CR/NC and audit options in writing (see catalog). NC (no credit), below 60% or total points (see catalog). The last day to withdrawal with “W” grade is 10/30/2023 (see catalog).\* See catalog for specifics and calendar for dates in general and for I grades and NC grades. Taking this class as Credit/No credit is an option.

## LEARNING RESOURCES

See **Laulima Resource for Readings**. The following screen shot shows you important PDFs that are referred to in our course schedule.

**205 Readings as PDFs:** (*start here* to see scope of our coverage vis this screenshot of readings *in Laulima*)



**Provided as PDFs: These books** are central to our Bot 105 class and provided as resources for you in Bot 205

- Abbott, Isabella A. La'au Hawaii: Traditional Hawaiian Uses of Plants. Bishop Museum Press.
- Kraus, Beatrice H. Ethnobotany of Hawaii. University of Hawaii, Department of Botany, Manoa.

*Note! Below are important books and if screen shots are provided the the books are available from Amazon (for example) for purchase—as used copies.*

### Book References:

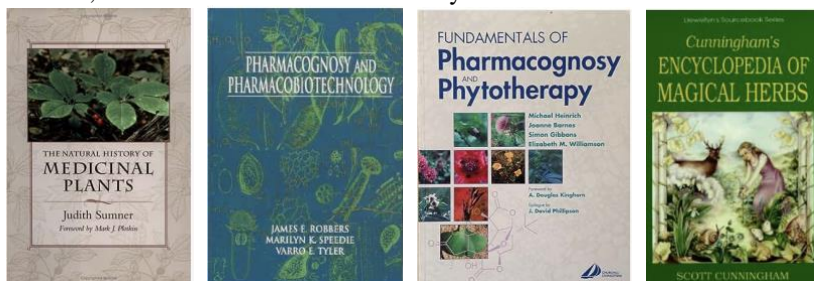
Chun, M. N. translator. Native Hawaiian Medicine v1 (1994), 2 (1998) and 3 (2003). (Original publication 1922) First People's Productions. \*In both Hawaiian and English languages. These books are *NOT* available for purchase but *ARE IN OUR Hawaiian Room of WCC Library*.

Cunningham, S. 1991. Cunningham's Encyclopedia of Magical Herbs. Llewellyn Publications.

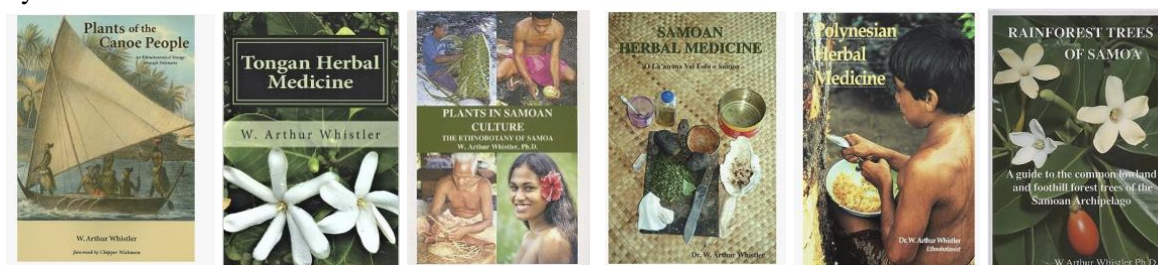
Heinrich, M, et al. 2004. Fundamentals of Pharmacognosy and Phytotherapy. Elsevier

Robbers, J. E. et al. 1996. Pharmacognosy and Pharmacobiotechnology. Williams & Wilkins.

Sumner, Judith. 2000. The Natural History of Medicinal Plants. Timber Press

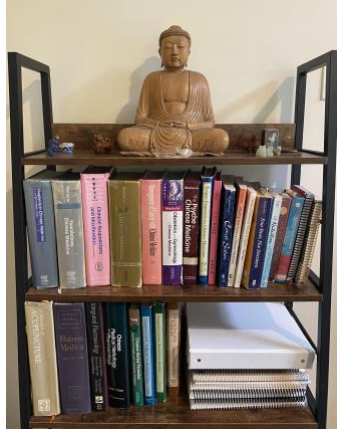


Whistler, A. W. Plants of the Canoe People; An Ethnobotanical Voyage through Polynesia. \*and other Resources by this author!





*And from the book shelf of one of us—shared with permission: (thank you Kathy)*



**Optional:**

White, Ingelia. Ethnopharmacognosy Series (ALL!) and Series 1V: Pharmaceutical & Neutraceutical Values of Spanish Needle. Windward Community College.

White, I., Li, H., Michael, T. Ethnopharmacognosy Series VI: Bioprocessing Medicinal Garden Complex; International Vegetarian Recipes. Windward Community College.

White

- Websites (Inge White PhD)  
[http://windward.hawaii.edu/people/Ingelia\\_White/](http://windward.hawaii.edu/people/Ingelia_White/)  
[http://windward.hawaii.edu/Academics/Agripharmatech\\_CA/](http://windward.hawaii.edu/Academics/Agripharmatech_CA/)

**Online sites!** So many! Please familiarize yourself with the Bishop Museum Ethnobotany website below.

Bishop Museum Ethnobotany Online Database

<http://data.bishopmuseum.org/ethnobotanydb/ethnobotany.php?b=list&o=1>

**LEARNING ACTIVITIES**

- Join our zoom discussion group whenever possible
- *Work with each other* on worksheets (for example) and Projects
- Take time to apply what we are learning to your lives and to understanding the news in general—explore TED talks that deal with Ethnobotany
- Utilize WCC learning/student support services including **TRIO** for tutoring and Ka Piko below:

[Ka Piko Services](#) provides FREE academic and technical support to all WCC students. Our services are available both in-person and virtually (via Zoom). Our goals are to help students succeed academically and to become independent lifelong learners. We are staffed by friendly and knowledgeable peers who are ready to assist you!

- **Ka Piko Math Lab** provides assistance for all math courses offered at WCC, helping to improve students' understanding of important concepts and problem-solving processes.
- **Ka Piko Writing Lab** provides assistance with any and all aspects of the writing process, including: brainstorming, research, MLA formatting and citations, drafting, and revising.
- **Ka Piko Student Tech. Support** can assist students with Google@UH, Lailima, MyUH, UH accounts, and can provide best-effort support for problems or questions with personal computers and other smart devices.

- **Success Connection Workshops**, weekly student success workshops, are also available.

Visit the Ka Piko webpage at [go.hawaii.edu/A42](http://go.hawaii.edu/A42) for more information about our services, to learn how to connect with our tutors and tech assistants, or to RSVP for a Success Connection Workshop. Contact the Ka Piko Coordinator, Scott Sutherland, at [scottjks@hawaii.edu](mailto:scottjks@hawaii.edu) if you have any questions.

## DISABILITIES ACCOMMODATIONS

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Accessibility Counselor to discuss reasonable accommodations that will help you succeed in this class. Roy Inouye can be reached at (808) 235-7448, [royinouy@hawaii.edu](mailto:royinouy@hawaii.edu), or you may stop by Hale Kāko‘o 106 for more information.

## SEX DISCRIMINATION AND GENDER-BASED VIOLENCE RESOURCES (TITLE IX)

Windward Community College is committed to providing a learning, working, and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, WCC has staff and resources to support and assist you. To report an incident of sex discrimination or gender-based violence, as well as receive information and support, please contact one of the following:

UH Confidential Advocate

Phone: (808) 348-0663 Email: [Advocate@hawaii.edu](mailto:Advocate@hawaii.edu)

Karla K. Silva-Park, Title IX Coordinator  
Phone: (808) 235-7468

Email: [karlas@hawaii.edu](mailto:karlas@hawaii.edu) Office: Hale Kāko‘o 128

As a member of the University faculty, I am required to immediately report any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and I cannot guarantee confidentiality, you will still have options about how your case will be handled. My goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need. For more information regarding sex discrimination and gender-based violence, the University’s Title IX resources and the University’s Policy, Interim EP 1.204, go to [manoa.hawaii.edu/titleix/](http://manoa.hawaii.edu/titleix/)

## Nondiscrimination and Affirmative Action

*The University of Hawaii is committed to a policy of non-discrimination on the basis of race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status in all of its programs, policies, procedures, or practices. This policy covers admission and access to, participation, treatment and employment in university program and activities.*

## ALTERNATE CONTACT INFORMATION

If you are unable to contact the instructor, have questions that your instructor cannot answer, or for any other issues, please contact the Academic Affairs Office: Location: Alaka‘i 121. Phone: (808) 235-742

## Fall 2023 SCHEDULE

Date	Lecture Topic	READINGS
<b>WEEK 1</b> 8/21-8/28	<p>Introduction to our Ethnobotanical Pharmacognosy and our class!</p> <p>Tools for addressing questions, indigenous knowledge and scientific inquiry, plants as sources for healing, medicine and food. Cultural knowledge as experienced by watching VOYAGERS with medicine and food and healing in mind...and discovery.</p> <p><i>It is really very simple, neither animals nor people have consciousness. It is plants that have consciousness. Animals get consciousness by eating plants. -- Dale Pendell</i></p>	
8-23-23	<p>Lab BOTANY and the BMGC! Basics of plants, plant organs and tissues, cells and molecules introduced.</p> <p>What are the levels of botany and how do they relate to cells and molecules?</p> <p>How do we extract chemistry? Bring spice from home to extract Week 2</p> <p><i>Bring notebook, closed toe shoes, gardening gloves (if possible) and phone/camera to labs!</i></p>	
<b>WEEK 2</b> 8/28-9/3	<p>History of medical ethnobotany.</p> <p><a href="#">205 Readings Brief History of Medicinal Plants Sumner.pdf</a></p> <p>*Chun p vii at least! Keep this resource in mind.</p> <p><a href="#">105 205 Readings Chun Hawaiian Medicine and A Plants.pdf</a></p>	Sumner Ch 1
8-30-23	<p>Lab BMGC, Pattern Recognition and Plant Identification. Study <i>Piper sarmentosum</i> and 'Ūala.</p> <p>Extract! With what? Why?</p> <p>Biosafety lab practice</p> <p>Discuss Tea</p>	
<b>WEEK 3</b> 9/4 Holiday- 9/5-9/11	<p>History of Pharmacy &amp; Herbal Products</p> <p><a href="#">205 Readings Pharmacognosy and its history- people, plants and natural products.pdf</a></p>	Heinrich Ch 2
9-6-23	<p>Healers and healing <i>discussion</i> Chinese (Traditional Chinese Medicine TCM) and Ayurvedic Medicine</p> <p><i>Discuss Health and Disease</i></p> <p>Harvest and dry plant organs for extraction including <i>Piper sarmentosum</i></p> <p>Bioassay techniques 1 <i>Biosafety lab practice with microbes</i></p> <p>Discuss Tea</p>	
<b>WEEK 4</b> 9/11-9/17	<p>Ethnobotany and Ethnopharmacy</p> <p><a href="#">205 Readings Ethnobotany and ethnopharmacy .pdf</a></p>	Heinrich Ch 5
9-13-23	<p>BMGC</p> <p>Continue discussion Chinese (Traditional Chinese Medicine TCM) and Ayurvedic Medicine .</p> <p>Extract 1 powders including <i>Piper sarmentosum</i></p> <p>Bioassay techniques 2 <i>Biosafety lab practice with microbes</i></p> <p>Gather seeds and cuttings for home! Grow plants at home from seeds and cuttings start!</p> <p>Understand what is happening and why!</p> <p>Discuss Tea</p>	
<b>WEEK 5</b> 9/18-9/24	<p>Complementary Medicine</p> <p><a href="#">205 Readings Complementary Medicine.pdf</a></p>	Heinrich Ch 12
9-20-23	<p>Harvest and dry plant organs for extraction 2</p> <p>Bioassay techniques 3 <i>Biosafety lab practice with microbes</i></p> <p><i>PREPARE MEDIA for Bioassay</i></p> <p>Discuss Tea</p>	
<b>WEEK 6</b> 9/25-10/1	<p>Traditional Systems of Herbal Medicine</p> <p><a href="#">205 Readings Traditional Systems of Herbal Medicine.pdf</a></p>	Heinrich Ch 11
9-27-23	<p>BMGC</p> <p>Informed Consent and Human Research</p> <p>Extract 2 plant organs from powders</p> <p>Bioassay techniques 4 <i>Biosafety lab practice with microbes</i></p> <p><i>Kirby Bauer Disk Diffusion Method</i></p> <p>Discuss Tea</p>	Sumner Ch 4
<b>WEEK 7</b>	Ethnobotany of Polynesian Medicinal Plants	Whistler recorded presentation



<b>10/2-10/8</b> <b>10-4-23</b>	Open lab and CHOICE Projects presentations Discuss Tea and Food Pharmacy <i>Bring food and lets eat while we talk about food!</i>	
<b>WEEK 8</b> <b>10/9-10/15</b> <b>10-11-23</b>	Outline of Hawaiian Physical Therapeutics  Bioassay techniques 5 <i>Biosafety lab practice with microbes</i> <i>Kirby Bauer Disk Diffusion Method</i> CHOICE Projects presentations Discuss Tea	Abbott PDF and Handout
<b>WEEK 9</b> <b>10/16-10/22</b> <b>10-18-23</b>	Natural Products Chemistry 1  Making Bioproducts 1 Visualizing Biological Molecules and Cells Microscopy Begin	Heinrich Ch 4 (Chapter 6) Robbers et al. Chs 1-6, 8-12  Sumner Chs 2, 5
<b>WEEK 10</b> <b>10/23-10/29</b> <b>10-25-23</b>	Natural Products Chemistry 2 The Central Nervous System <a href="#">205 Readings The Central Nervous System.pdf</a> Making Pizza and Starting Fermentation! Visualizing Biological Molecules and Cells Microscopy	Heinrich Ch 16
<b>WEEK 11</b> <b>10/30-11/5</b> <b>11-1-23</b>	Natural Products Chemistry 3 Anticancer Natural Products <a href="#">205 Readings Anticancer Natural Products .pdf</a>  Making Bioproducts 2 CHOICE Projects presentations Molecules Projects presentations Visualizing Biological Molecules and Cells Microscopy	Heinrich Ch 8
<b>WEEK 12</b> <b>11/6-11/12</b> <b>11-8-23</b>	Chemical Prospecting and New Plant Medicines <a href="#">205 Readings Chemical Prospecting and New Plant Medicines.pdf</a>  Making Bioproducts 3 CHOICE Projects presentations Molecules Projects presentations Visualizing Biological Molecules and Cells Microscopy	
<b>WEEK 13</b> <b>11/13-19</b> <b>11-15-23</b>	Characteristics of Phytomedicines  Making Bioproducts 4 CHOICE Projects presentations Molecules Projects presentations Visualizing Biological Molecules and Cells Microscopy	Heinrich Ch 10 pp. 73-131 (K)
<b>WEEK 14</b> <b>11/20-26</b> <b>11-22-23</b>	Conservation and Intellectual Property Rights  OPEN lab TBD	Sumner Ch 9
<b>WEEK 15</b> <b>11/27-12/3</b> <b>11-29-23</b>	OPEN lecture/discussion TBD  Research Completion and Discussion	
<b>Week 16</b> <b>12/4-12/7</b> <b>12-6-23</b>	Final Preparation <i>12-7-23 Last day of instruction</i> Research PRESENTATIONS and Completion for Report	
<b>12/13/23</b>	<b>FINAL EXAM</b>	

*Note: TWO events will alter our Wednesday Lab topics. One—we will devote one Wednesday to Literature Searching to specifically support our research and projects and TWO we will go to UH Manoa and DO Scanning Electron Microscopy! I will announce any changes ahead of time. Have a great semester!*