

**Faculty of Science Course Syllabus**  
**Department of Biology**  
Principles of Indigenous Medicine 4004  
Principles of Indigenous Medicine  
*Winter 2022*

***Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.***

**Instructor:** Dr. Jonathan Ferrier, [jferrier@dal.ca](mailto:jferrier@dal.ca), Dalhousie University, Department of Biology, Life Sciences Centre, Native Science and Medicine Laboratory, PO BOX 15000, Room 6087, 1355 Oxford St., Kijipuktuk, Mi'kma'ki, B3H 4R2

**Lectures:** 9:35 to 12:25 Friday (Last class is 9:35 to 12:25 Wednesday)

**Laboratories:** NA

**Tutorials:** NA

**Course delivery:** Online synchronous (not recorded) or in-person (when covid protocols permit)

**Course Description**

A holistic, two-eyed seeing course highlighting indigenous medicine's principles in ceremony, concepts of health and wellness, biochemistry, ethnopharmacology, practice and discovery. This course introduces indigenous ways of knowing medicine, important natural products, their biosynthesis, the drug discovery process, synthetic biology, indigenous style formulations and decolonized medicine practices.

**Course Prerequisites**

*There are no prerequisites required; however, students should be ready to embrace content experienced after year two of a Bachelor of Science program in Biology. Students must be ready to engage new world-views and ways of learning, knowing, and doing.*

**Course Objectives/Learning Outcomes**

1. Recognize the importance of indigenous ceremonies, protocols, research and work ethics
2. Appreciate the tenets of Science including Indigenous and Western approaches
3. Recognize concepts of health, wellness, disease with descriptive ethnobiologies of the world, zooethnopharmacology and human ethnopharmacology
4. Appreciate indigenous perspectives of medicine, work on the land and sea, field methods in quantitative ethnobiology, chemical ecology, with Indigenous cultural survival, conservation, sacred use and commercialization of natural products in medicine in mind
5. Appreciate Indigenous pharmacology in medicine, strategies in medicine formulation and drug discovery, biopiracy and racketeering, the NCI program, ICBG projects, the biodiversity convention and ethical conduct of research, bioassay guided phytochemical isolation,

- structure elucidation, advancement to clinical trials, major new natural products and drugs, analoging and QSAR of new drugs, rational natural product formulation and drug design
6. Learn major biosynthetic pathways and natural product diversity with respect to enzymology, molecular biology, and pharmacology of selected natural products including alkaloids, terpenes, phenolics, natural products derived from acetate, unique natural products, selected biosynthetic pathways, their pharmacology and biological activity with advances in characterizing the enzymes and genes, natural products and drugs
  7. Appreciate the world natural health product (NHP) industry and NHPs in and from First Nations and Canada.
  8. Appreciate Indigenous ecological knowledge and it's relation to medicine
  9. Understand the pharmacology of phytomedicines in respect to immunomodulatory and anti-infective phytomedicines, psychopharmacological plant products, phytomedicines for management of degenerative conditions, toxicology etc.
  10. Evaluate manufacturing, standardization, quality control, and regulation in the natural products industry
  11. Understand how to assess the safety of NHPs with respect to Indigenous Medicine, the Natural Health Product Directorate and international regulations
  12. Write reports according to peer reviewed publication standards
  13. Evaluate oneself after stories and lessons in Indigenous medicine and natural product biochemistry
  14. Appreciate specific laboratory techniques in biology and chemistry for experimentation and hypothesis testing in biochemistry.
  15. Recognize Traditional Ecological Knowledge (TEK) and TEK implications for conserving life
  16. Understand the importance of experimental design

### **Course Materials**

- *Peer reviewed literature will be referenced during learning objective presentations for further reading*
- *E-mail, the course Brightspace Page will deliver the majority of content and responses. A microphone and camera will be required to participate in online classes.*
- *The course Marker can be contacted at: Susanna Zhang <ss928833@dal.ca>*
- *Online interruptions in synchronous sessions will bump the class to the next day, and a recording or alternate date will be provided to make up for any material not covered at the end of the semester.*
- *Technology may be used to track participation*
- *students connecting to online resources from outside Canada are responsible for ensuring awareness and compliance with any applicable laws in the country from which they are connecting.*

### **Course Assessment**

<b>Component</b>	<b>Date</b>	<b>Weight (% of final grade)</b>
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<b>Assignment 1:</b> Self-knowledge reflection essay		
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*Based on self-knowledge and awareness of your starting point(s) as observer or learner of medicine. Students can reflect on their teachings and perceptions of medicine from their community, treaty territory with stories from classes to develop a growth path towards Assignment Two and Three. Assignment one follows a standard Introduction, Methods, Expected Results & Discussion format with References. Oral delivery is acceptable but must be scheduled with instructor.*

**Written assignment due mid February—20%**

**Assignment 2:** Report on a selected topic

*Based on a medicine topic that was discussed as a way forward from Assignment 1. Students can conduct a literature review (or meta analysis), analyze results or trends, and compare findings to literature, records or archives for the Discussion. Follows a standard Introduction, Methods, Results and Discussion format with References. Oral delivery is acceptable but must be scheduled with instructor.*

**Written assignment on a focussed topic due mid March—50%**

**Assignment 3:** Self-growth assessment reflection essay

*Based on Assignment 1 and 2, this brief essay will highlight the major findings from your course learning experiences from Assignment 1 to the end of the course and moving forward. Oral delivery is acceptable but must be scheduled with instructor.*

**Written assignment due last day of class—20%**

**Other course requirements**

**Participation**

*Participation requires attendance and presence in post lecture discussions—10%*

**Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale**

<b>A+</b> (90-100)	<b>B+</b> (77-79)	<b>C+</b> (65-69)	<b>D</b>	(50-54)
<b>A</b> (85-89)	<b>B</b> (73-76)	<b>C</b> (60-64)	<b>F</b>	(<50)
<b>A-</b> (80-84)	<b>B-</b> (70-72)	<b>C-</b> (55-59)		

**Course Policies**

- More than two absences, missed, or late assignments, exams, etc. must be excused by a medical or community leader, in a note, signed. Extension time shall begin after the leave time outlined in the excuse note, and begin from the leave end, through the allocated class time. Otherwise, component value is nil.
- Late slips can be found here (two max): [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html)
- Plagiarism detection software may be used in the course
- Lectures may not be recorded

**Other policies include:**

- Submissions shall be made on the date at 11:59pm Atlantic Time (Kjipuktuk/Halifax)
- Submissions shall be returned with time for feedback, review, and reflection prior to next task deadline

- Professionalism and respect around elders, teachers is expected
- Emails will be responded to within 24 hours (48 during break)
- No audio or video recording permitted
- Information to be completed by student and submitted to instructor will be kept in a locked office, in a locked filing cabinet, will remain confidential, not copied, prior to being returned to the student
- Trigger warnings and content warnings will be issued prior to sensitive topics

## **Course Content**

Lecture Material to be covered:

### 1. Indigenous protocols in medicine, ethnopharmacology, and discovery

#### 1.1 Indigenous medicine studies, descriptive ethnobotanies of the world:

Introduction to the instructor's personal ethnobotany, historical studies, and descriptive ethnobotanies of the world. Zooethnopharmacology vs human ethnobotany, regional ethnobotanies, Native Science and Western Scientific knowledge, world views, concepts of health, wellness, diseases and their treatment categories.

#### 1.2 Modern methods and concepts in ethnobotany

Field methods, quantitative ethnobotanical methods, human chemical ecology, native traditions in medicine and commercialization of natural products, cultural survival, conservation and ways forward.

#### 1.3 Ethnopharmacology and drug discovery

Indigenous ways of making medicine, implications and methods of drug discovery, the NCI program, ICBG projects, biopiracy, the biodiversity convention and the ethical conduct of research, phytochemical isolation, structure elucidation and instrumental methods, bioassay guided isolation, advancement to clinical trials, major new drugs, analoging and QSAR of new drugs, rational design

### 2. Biosynthesis, molecular biology and pharmacology of natural products.

#### 2.1 Natural product diversity and biosynthesis:

Overview of major biosynthetic pathways and natural product diversity

## 2.2 Enzymology, molecular biology, and pharmacology of selected natural products:

Diversity of alkaloids, terpenes, phenolics, natural products derived from acetate and other natural products, their pharmacology and biological activity, selected biosynthetic pathways, recent advances in characterizing the enzymes and genes, drugs with consideration of “-omics”.

## 3. Phytomedicines

### 3.1 Introduction to the world herbal industry and Natural Health Products in Canada

### 3.2 Pharmacology of phytomedicines:

Immunomodulatory and anti-infective phytomedicines, psychopharmacological plant products, phytomedicines for management of degenerative conditions, toxicology etc.

### 3.3 Manufacturing, standardization, quality control and regulation:

Safety of herbal products, NHPD and international regulation

## **University Policies and Statements**

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

### **Academic Integrity**

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### **Accessibility**

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)

### **Student Code of Conduct**

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

### **Diversity and Inclusion – Culture of Respect**

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

### **Recognition of Mi'kmaq Territory**

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) ([elders@dal.ca](mailto:elders@dal.ca)).

Information: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

### **Important Dates in the Academic Year (including add/drop dates)**

[https://www.dal.ca/academics/important\\_dates.html](https://www.dal.ca/academics/important_dates.html)

### **University Grading Practices**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

## **Student Resources and Support**

### **Advising**

**General Advising** [https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

**Indigenous Student Centre:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

**Black Students Advising Centre:** [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

**International Centre:** [https://www.dal.ca/campus\\_life/international-centre/current-students.html](https://www.dal.ca/campus_life/international-centre/current-students.html)

### **Academic supports**

**Library:** <https://libraries.dal.ca/>

**Writing Centre:** [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

**Studying for Success:** [https://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

**Copyright Office:** <https://libraries.dal.ca/services/copyright-office.html>

**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

### **Other supports and services**

**Student Health & Wellness Centre:** [https://www.dal.ca/campus\\_life/health-and-wellness/services-support/student-health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html)

**Student Advocacy:** <https://dsu.ca/dsas>

**Ombudsperson:** [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

**Safety**

**Biosafety:** <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

**Chemical Safety:** <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

**Radiation Safety:** <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

**Scent-Free Program:** <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

**Dalhousie COVID-19 information and updates:** <https://www.dal.ca/covid-19-information-and-updates.html>