

# Plants and Society

BIOC<sub>38</sub>



# Course Manual, 2014

## 1. *Course syllabus*

### **Course description and objectives**

BIOC38H provides an introduction to the scientific foundation and practice of food production. How do plants directly and indirectly feed the human population? Students will learn about the origin of agriculture and what traits people have been altering in domesticated plants over the course of the last 10,000 years. Emphasis will be put on an understanding of the changes in how crops are grown since the 20th century, i.e. the Green Revolution and its legacy. A good portion of the lectures will be dedicated to a discussion of the most important plants that feed the world ('the top 20'). Since ancient times, people have used herbs and spices to add interest to their meals and the course will discuss the (historical) importance of these plants. Often, it is a fine line between healing plants and plants of addiction and we will learn about plant secondary compounds involved in both these purposes. Plants are also used to produce alcoholic beverages and the course will showcase how beer is brewed and from what plants. Lastly, plants are also very important for the fibers that keep us warm and also for the production of paper, which triggered the development of our culture and complex societies.

### **Instructors**

Ivana Stehlik

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Office hours: TBA, SW563C

TA: Jessie Wong [jessierachel.wong@mail.utoronto.ca](mailto:jessierachel.wong@mail.utoronto.ca)

### **Website**

Class information will be provided on the course website on the U of T Portal: [portal.utoronto.ca](http://portal.utoronto.ca). You will need your UTORid and your password to access the site. Please refer to instructions on how to access the course website on blackboard using the information in <http://www.portalinfo.utoronto.ca>.

### **Marks breakdown**

Midterm exam	25%
Final exam (cumulative)	33%
Essay	27%
Presentation	15%

### **Times and location**

Course lecture time and place: Wed, 11 AM – 1 PM

Tutorial time and place: Thu, 2 – 5 PM

## Course schedule/Important dates

Date	Lectures	Lecture topic/presentations
1/8	1/2	Origin of agriculture
1/9	Tutorial	Instructions for the essay and the presentations
1/12 by 11:59 PM	Mail your 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> presentation choice to Ivana Stehlik Mail your essay choice to Ivana Stehlik	
1/15	3/4	Plant domestication
1/22	5/6	Methods of domestication
1/29	7/8	Green Revolution I
2/5	9/10	Green Revolution II
2/12	11/12	Plants that feed the world I
2/13	Presentations	Plants that feed the world, spice plants
2/17-21	Reading week	
2/23 by midnight, essay due at Turnitin.com		
2/26	13/14	Plants that feed the world II
2/27	Presentations	Plants that feed the world, spice plants
3/5	15/16	Plants that please the palate
3/6 during tutorial time: Midterm exam (lectures 1-12)		
3/12	17/18	Plants that heal the sick
3/13	Presentations	Medicinal plants
3/19	19/20	Plants that hook the mind and body
3/20	Presentations	Drug plants
3/26	21/22	Plants the world thirsts after
3/27	Presentations	Oil and alcohol plants
4/2	23/24	Plants of warmth and strength
4/3	Presentations	Non-food plants
Apr. TBA (exam period)	Final exam (cumulative; lectures 1-24)	

## Lectures and other course material

Lectures will be posted in a dedicated BIOC63H class folder on dropbox, typically 24 hours before class, so you will either need to create a new (and free) dropbox account or you can use your pre-existing dropbox. In order to create your personal 2 GB dropbox account, please follow instructions online found under

<https://www.dropbox.com/pricing>

by choosing the FREE option. Once you own a dropbox account, you will be able to follow the invitation sent to you by the instructor through email to join the dropbox class folder in the first week of classes. This invitation will be sent to your official university email account, so it is vital that you check your email inbox as soon as the course starts (no lecture material will be posted on Blackboard or intranet, so it is in your own interest to get access to all course materials through dropbox ASAP). Lectures will be posted typically the evening before class.

## Communication policy

Students are required to regularly and often check their UTOR email to receive announcements or updates relating to the course. To inquire about course-related issues, students are strongly encouraged

to solely use their UTOR email, as hotmail or other email providers are spam-filtered on a regular basis. It is the responsibility of you as the student to make sure your email reaches the instructor.

The instructor will not answer any questions related to material discussed in class or during the tutorials by email (unless it is a clear yes-no answer), but the student is encouraged to ask these questions before or after class or the tutorial, during official office hours or to schedule a meeting outside office hours by email.

## **Accessibility**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach the course instructor and/or the AccessAbility Services Office as soon as possible. Enquiries are confidential. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca).

## **Readings**

There is no required reading, but most topics introduced in the lectures are covered in the book [Levetin and McMahon. 2007. *Plants and Society*. McGraw-Hill], which is the recommended course book. The book is available at UTSC's book store (hopefully both new and used books). The course's approach in regard to exam questions is as follows: questions will only cover material introduced in class or labs. If you do not understand certain concepts, the recommended sections of Levetin and McMahon's book should be consulted, but anything present in the book yet not covered in the lectures will not be on the exam.

In case a certain topic is not covered in Levetin and McMahon's book, the lecture material originated most probably from primary scientific literature. In each such case, there is a reference provided on the slide along with e.g. a table or figure. This reference will help you to find the article using either ISI web of science (with your UTOR ID and password, on the website of the Gerstein library; <http://www.library.utoronto.ca/gerstein/>) or through Google scholar (does not work in all cases).

## **Penalty for late submission of your essay**

There will be a penalty of 5% per day for assignments received late. Weekend days count as individual days. Unless there are extenuating circumstances (e.g. medical reasons with a medical certificate), a mark of zero will be applied to assignments submitted one week late or more. Heavy workloads or malfunctioning computer equipment are not legitimate reasons for late submission. If you know ahead of time that you have a legitimate reason why you cannot hand in the assignment, let the course instructor know before the due date.

## **Missed exams**

Students who miss an exam for reasons entirely beyond their control may, within one week of the missed test, submit a written request for special consideration to the instructor explaining the reason for missing the test, and attaching appropriate documentation, such as the official University of Toronto medical certificate ([www.utoronto.ca/health/form/medcert.pdf](http://www.utoronto.ca/health/form/medcert.pdf)).

## Academic integrity policy

According to Section B of the University of Toronto's *Code of Behaviour on Academic Matters*, it is an offence for students to:

- use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- include false, misleading or concocted citations in their work.
- obtain unauthorized assistance on any assignment.
- provide unauthorized assistance to another student. This includes showing another student completed work.
- submit their own work for credit in more than one course without the permission of the instructor
- falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- use or possess an unauthorized aid in any test or exam.

Violation of the Code of Behaviour on Academic Matters will force the instructor to provide a written report of the matter to the Chair/Dean/Provost's and a penalty according to the U of T's guidelines on sanctions will be put into place.

## Submission of essays to Turnitin

Students will be asked to submit their essays to **Turnitin.com** for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site:

<http://www.utoronto.ca/ota/turnitin/ConditionsofUse.html>

Turnitin.com is most effective when it is used by all students; however, if and when students object to its use on principle, the course offers a reasonable offline alternative. The student will then be asked to meet with the course instructor to outline and discuss the report before its final submission to demonstrate the process of creating the report according to the academic integrity policy.

## 2. Essay

You have several questions to choose from for writing an essay in this course:

- The rise of urban farming – feasibility, reality, implications?
- Vertical farming – feasibility, reality, implications?
- How to feed 10 billion people by the mid 21st century
- Agriculture and virtual water trade - a solution to the looming water shortage?
- Influence of agribusiness giants like Monsanto on food production in developing countries
- Effects of a shift of a vegetarian to meat-based diet in India or China
- Golden rice - a great tool to combat vitamin A deficiency in developing countries or evil?
- Cacao production and slavery (or sugar cane or cotton and slavery)

Alternatively, you are welcome to come up with your own essay idea relevant to the course (a food-related topic), but your topic needs to be approved by Ivana Stehlik. You also need to show six papers (half of the required number) related to your topic to demonstrate that there is enough science done your question. This procedure is not meant to deter you from searching your own topic but rather to ensure that your own topic is 'meaty' enough and worth your hours spent to investigate, think and write about it.

### **Basic steps for writing an essay**

The scientific essay must be written following the '5-paragraph-essay' format, ie. by dividing the essay into an introduction (one paragraph), body (three paragraphs) and conclusion (one paragraph; see detailed instructions below). Format your essay according to the formatting style of essays in the journal 'Science' (look up the online instructions to authors, on how to write an essay).

#### **1. Familiarize yourself with your chosen topic**

Read up on your topic and keep in mind that you will need to read more journal articles than you will end up using (i.e. citing) in your essay. This preparatory phase will provide you with the necessary familiarity and overview of the scientific field to recognize important concepts and questions where the science is moving in this discipline. Base your research on either primary research papers or reviews, both published in peer-reviewed journals. Access these journals either through ISI Web of Science (accessible from the U of T library web page and your UTORid) or using Google Scholar.

#### **2. Write an essay outline**

Write an outline, as this will make the actual essay writing process much easier! Write down all the points that are relevant to your essay and upon which you want to expand and elaborate. An outline will prevent you from forgetting to include important information.

#### **3. Write the essay**

The structure of a five-paragraph essay is quite simple, as it consists of these five elements: 1. introductory paragraph; 2. body, consisting of i. a first supporting paragraph, ii. a second supporting paragraph, iii. a third supporting paragraph; and 3. a closing or summary paragraph.

1. In your essay introduction, explain to the reader what your essay is about. This section sets the tone of the essay. The introduction must contain background information, interesting facts and should explain the importance of your selected topic. An effective introduction captivates the reader and makes him want to read more. Writing in an active voice makes an introduction more captivating. Read up on your topic until you come up with interesting supporting ideas, about which you are well-informed.

2. The body provides the supporting evidence for your line of argumentation outlined in the introduction. Thus the body of your essay contains the best examples or support for your argumentation. Each of the three paragraphs should flow logically from one to the next one. Start out each paragraph with one or two topic sentences exposing what this paragraph is about. The first supporting paragraph should contain the strongest support, the most intriguing example or best illustration of the point you are trying to make. The second paragraph of the body should contain the second best, while the third one should contain the third best example for your line of argumentation.

3. The concluding paragraph is the final section of your essay and is very important and thus should receive a lot of attention. In this paragraph you need to effectively conclude your essay by returning what you mentioned in your introduction paragraph. Do this however not by simply restating

verbatim what you wrote in your introduction, as your concluding paragraph must have original content and summarize your argumentation in an authoritative tone.

**References.** Provide at least 12 references (primary research or review papers from peer-reviewed journals) and cite them in the correct format (look up the online instructions to authors of the journal 'Science', on how to write an essay).

**Miscellaneous.** Avoid quotations - paraphrase your sources instead while making sure you are not plagiarizing.

### **General grading scheme for your essay**

When writing the essay, you should also consider the criteria and grading scheme that will be used to evaluate your report. The maximum number of points you can reach in your paper is 24.

#### **1. Research (4 points max)**

**4 pts (A):** A significant amount of independent, scholarly research was undertaken. The majority of sources are from peer-reviewed publications. Research is solid.

**3 pts (B) :** A reasonable amount of independent, scholarly research was undertaken. Sources are mainly from peer-reviewed publications. Research is sound but predictable

**2 pts (C):** The minimum amount of independent, scholarly research was undertaken. Sources also rely on non-scholarly publications. Research is weak and unoriginal.

**1 pt (D):** Less than the minimum amount of independent, scholarly research was undertaken. Sources depend heavily on non-scholarly publications. Research is weak and unoriginal, but also fails to adequately support the argument.

**0 pts (F):** Little to no research undertaken, scholarly or not. Little evidence of scholarly research in the paper

#### **2. Argument in the introduction and conclusion (7 points max)**

**7 pts (A):** An original and provocative thesis is clearly stated at the beginning of the paper. The thesis provides the backbone of analysis and reaches a satisfying conclusion based on what was proposed at the beginning.

**5.5 pts (B):** An interesting but predictable thesis is clearly stated at the beginning of the paper. The thesis tends toward more description than argument, leading to a weak conclusion.

**3.5 pts (C):** The thesis is fundamentally descriptive or dependent on a value judgment (good/bad, right/wrong). The argument fails to reach a satisfying conclusion, with the paper simply petering out.

**1.5 pts (D):** There is no easily identifiable thesis. There is no conclusion because no argument was established early on.

**0 pts (F):** There is no thesis. The conclusion is deeply flawed or outright non-existent.

### **3. Analysis (body of essay; 7 points max)**

**7 pts (A):** Based on excellent research and an original thesis, the analysis is strong, and clearly follows established research questions. The research is artfully woven throughout the analysis, shoring up and thoughtfully supporting the argument. New information is well contextualized and serves to propel the argument towards a satisfying conclusion.

**5.5 pts (B):** The analysis is good but there are some significant weaknesses or lapses. The paper occasionally drifts off-topic or into territory that isn't adequately supported by the research. The research questions are interesting but potentially unrealistic in terms of the type and/or level of research undertaken.

**3.5 pts (C):** Analysis is uninteresting or uninspired, tending toward description. Research questions are poorly laid out and inadequately explored. The research does not adequately support the analysis.

**1.5 pts (E):** Research questions are not identified at the outset. There is little interaction between research and analysis. What is supposed to pass as analysis is little more than description.

**0 pts (F):** Analysis is nearly non-existent, weak, minimal and unsupported by research.

### **4. Clarity (3 points max)**

**3 pts (A):** The paper is easy to read, analysis flows expertly. Language is sophisticated without being jargonistic. Terms of analysis and argumentation are clearly laid out and well-defined.

**2.25 pts (B):** The paper is well written but suffers from some significant grammatical inconsistencies or spelling errors. Language is clear but lacks scholarly depth. There are some lapses in definition and explication of terms. Segue between points in the analysis are weak.

**1.5 pts (C):** There are significant but not quite major problems in grammar and spelling. Language is unclear and/or shallow. Terms are not well defined and analysis leaps erratically from point to point.

**0.75 pts (D):** Major problems with grammar and spelling. Language is murky, confused and difficult to follow. There is a paucity of definitions or context for analysis.

**0 pts (F):** Language is sub-par for university, riddled with grammatical and spelling errors. Analysis is difficult to follow and lacks any sense of flow.

### **5. Format (3 points max)**

**3 pts (A):** A cover page provides pertinent information. The bibliography follows a recognized scholarly style. Citations are thorough and well documented throughout the paper.

**2.25 pts (B):** Citations and bibliography are solid but not thorough, with some noticeable omissions.

**1.5 pts (C):** Citations are weak and/or the bibliography is incomplete.

**0.75 pts (D):** There are next to no citations and/or no bibliography or it does not follow a scholarly style.

**0 pts (F):** The paper does not follow a scholarly format.

### 3. Oral presentation

You will be required to present a talk to the class about one plant which is important to humans (except those plants already covered in class). The plants can belong to the following categories:

- |                                    |                          |
|------------------------------------|--------------------------|
| i. Top 20 plants feeding the world | ii. Spice plants         |
| iii. Medicinal plants              | iv. Drug plants          |
| v. Plants used to make alcohol of  | vi. Food additive plants |
| vii. Non-food plants               |                          |

Please find a list of suggested plants below. You may choose your own plant compatible with topics covered in class, i.e. plants other than those listed below if you prefer, but these must be approved by Ivana Stehlik. Please note that we need a similar number of students per plant category, thus you need to send in to Ivana Stehlik a 1st, 2nd and 3rd choice of plant from three different categories and I will to my best to accommodate your wishes on a first-come-first-serve basis. If you fail to do that by the deadline (see table with dates on page 3), I will assign a plant to you. On the PPT presentation day, please send in your file to the TA by 9 AM. If you are a mac user, convert your ppt presentation into a pdf to avoid file incompatibility.

#### **Presentation goals**

Presentations should be 12 min long, and should fulfill the following goals:

(1) With most plants, there will be much more material than you can cover in 12 min. Thus decide on the most relevant and interesting topic best fitting the course (remember, it is Plants and **SOCIETY**) and create a logical, interesting and captivating narrative. Thus: pick and choose, less is more! Do not bore the class with just secondary chemical structures and lethal doses... *Also: we will be able to tell whether you did solid research for your topic or whether you got your narrative just from Wikipedia...*

(2) Bring the whole class 'up to speed' on the history of the plant, ie location and time of cultivation (this can be brief)

(3) Introduce the class to the plant's interesting biology or history pertaining to its human use.

If you require anything other than powerpoint, please contact the TA beforehand. If your plant is consumable (in a safe way), feel free to bring samples for the class to try. The more personal the sampling is (for example: your family recipe to tea or a recipe using a specific spice), the more fun! If you need utensils (dishes, cups, spoons, knives, water cooker etc), please contact Ivana Stehlik and I am happy to help you provide these things (they are sitting in my office).

#### **Your duty as a member of an active audience**

As an active audience member during a presentation, you cannot just take a nap... The role of the audience is to provide an attentive, receptive, but critical response to the material presented. Each student will be allocated a specific role to provide feedback, e.g. on the construction of the presentation or logical flow, slide quality and layout, on oral presentation skills, or on non-verbal communication.

## Potential presentation topics

### i. Top 20 plants feeding the world, not covered in class

- Tomato (*Solanum lycopersicum*)
- Banana (*Musa* sp.)
- Orange (*Citrus x sinensis*)
- Apple (*Malus domestica*)
- Onion (*Allium cepa*)

### iii. Medicinal plants

- American ginseng (*Panax quinquefolius*)
- St. Johnswort (*Hypericum perforatum*)
- Pacific yew (*Taxus brevifolia*; taxol)
- Periwinkle (*Catharanthus roseus*)
- Quinine (*Cinchona officinalis*)
- Willow (*Salix* sp.; aspirine)

### v. Alcoholic beverages and their source plants

- Pulque, tequila: Agave
- Cider, brandy: apple (pear, plum, berries, etc)
- Chicha: corn
- Pombe: millet
- Vodka, aquavit: potato
- Sake, oke: rice
- Rum, oke: sugarcane

### vii. Non-food plants

- Bamboo (for textile fiber)
- Cork oak (*Quercus suber*; cork)
- Para rubber tree (*Hevea brasiliensis*)
- True indigo (*Indigofera tinctoria*; blue pigment)
- Choose you own: talk to IS

### ii. Spice plants

- Allspice (*Pimenta dioica*)
- Cardamom (*Elettaria cardamomum*)
- Cinnamon (*Cinnamomum* sp.)
- Saffron (*Crocus sativus*)
- Turmeric (*Curcuma longa*)
- Choose you own (except cloves): talk to IS

### iv. Drug plants

- Guarana (*Paullinia cupana*)
- Khat (*Catha edulis*)
- Peyote (*Lophophora williamsii*)
- Tea (*Camellia sinensis*; tea)
- Choose your own (except marijuana, opium, heroin): talk to IS

### vi. Food additive plants

- Agar (*Gelidium*, *Gracillaria*)
- Corn: high-fructose corn sirup
- Guar bean (*Cyamopsis tetragonoloba*; guar gum)
- Stevia (*Stevia rebaudiana*; sugar substitute)
- Choose you own: talk to IS