

**COURSE INSTRUCTOR:** C.T. (Tat) Smith  
Professor and Dean Emeritus (Forestry)

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Office hours: 4:00-5:00 pm Wednesday or by appointment

**COURSE TIME AND LOCATION:** 3:10 – 5:00 p.m. Monday  
Room 215 BF, Bancroft Building, 4 Bancroft Ave

**COURSE DESCRIPTION:** This is a senior undergraduate science course that focuses on the scientific foundation for sustainable natural resource management, and the challenges and opportunities for developing management and production systems and governmental policies that enable sustainability goals to be achieved in the long term. Theoretical and case study evaluations will be drawn from a global array of renewable natural resource and energy development topics. The curriculum format will allow students to pursue self-directed inquiry through a mix of individual and team projects, and will develop oral and written communication skills.

**FIELD TRIPS:** As scheduled

**REQUIRED TEXT:** There is no required text.

**RESERVE READINGS:** Readings will be assigned from a variety of sources. Books and journal articles may alternatively be placed on 2-hour reserve in the Noranda Earth Sciences Library, or found on the web, as indicated in lecture notes.

**COURSE WEB SITE:** Course materials will be posted to a Blackboard-based site throughout the semester. Students in the class are encouraged to attend Blackboard training, and will be provided passwords for access to the site.

**COURSE EVALUATION:** The course grade will be based on the following.

Active participation	15%
-- incl. lectures, student-lead seminars	
Discussion leader	15%
Term paper	40% (incl. 10% for proposal)
Oral project presentation	10%
Take home essay exam	20%

Term papers will typically be a review paper on a topic of interest to individuals in the class. Topic and scope selection should be approved by the instructor. Each student will prepare a typed report, and present their paper to the class at the end of the semester.

Paper schedule:

- Paper topic and outline 16 October
- Paper submitted 20 November
- Paper seminars presented 13 November - 4 December

**GGR 405 H1 F**  
**Sustainable Natural Resource Management**  
**Fall 2017**

<b>DATE</b>	<b>TIME</b>	<b>TOPIC</b>
11 Sept	3-5 pm	Course overview
18 Sept	3-5 pm	Sustainability concepts
25 Sept	3-5 pm	Application of sustainability concepts to natural resources
2 Oct	3-5 pm	Governance of sustainability, incl. certification systems
9 Oct	<b>No class</b>	<b>Thanksgiving</b>
16 Oct	3-5 pm	Case study 1&2*
		<b>Term papers topic and outline due</b>
23 Oct	3-5 pm	Case study 3&4*
30 Oct	3-5 pm	Case study 5&6*
6 Nov	<b>No Class</b>	<b>Fall Break</b>
13 Nov	3-5 pm	Student term paper seminars
20 Nov	3-5 pm	Student term paper seminars
		<b>Term papers due</b>
27 Nov	3-5 pm	Student term paper seminars
4 Dec	3-5 pm	Student term paper seminars (last class)
7 Dec	5 pm	Take-home final available on Blackboard
8 Dec	5 pm	Take-home exams due

\* Student panel-led discussions will be based upon six case studies organized around environmental, economic and social sustainability values

**GGR405 H1**  
**Sustainable Natural Resource Management**  
**Fall 2017**

<b>DATE</b>	<b>TOPIC</b>	<b>REQUIRED READINGS</b>
11 Sept	Course overview	
18 Sept	Sustainability concepts	Floyd 2002 pp. vii-34; Brundtland 1987
25 Sept	Application of sustainability concepts to natural resources	Lattimore et al. 2009; FAO 2010 pp. 1-12 & 31-79; Nonhebel 2005
2 Oct	Governance of sustainability, incl. certification systems	FAO 2010 pp. 13-30; Kittler et al. 2012; Mansoor et al. (2016); Van Dam et al. 2010
9 Oct	<b>Thanksgiving</b>	
16 Oct	Case study 1&2	<i>*Student assigned readings</i>
	Term paper topic and outline due	
23 Oct	Case study 3&4	<i>*Student assigned readings</i>
30 Oct	Case study 5&6	<i>*Student assigned readings</i>
	<b>Fall break</b>	
13 Nov	Student term paper seminars	
20 Nov	<b>Term papers due</b> Student term paper seminars	
27 Nov	Student term paper seminars	
4 Dec	Student term paper seminars	
7 Dec	<b>Take home exam posted to B'board at 5 p.m.</b>	
8 Dec	<b>Take home exams due 5 p.m.</b>	

**Required readings:**

Brundtland 1987. Brundtland Report – Our Common Future. 1987. UN World Commission on Environment and Development.

Available at: <http://www.un-documents.net/wced-ocf.htm>.

FAO. Criteria and indicators for sustainable woodfuels. FAO Forestry Paper 160. Food and Agriculture Organization of the United Nations, Rome (2010).

- Available on course reserve at Noranda Earth Sciences Library.

Floyd, Donald W. 2002. Forest Sustainability – The History, the Challenge, the Promise. Forest History Society, Durham, North Carolina. 83 pp.

- Available on course reserve at Noranda Earth Sciences Library.

Kittler, Brian, Will Price, Will McDow and Ben Larson. 2012. Pathways to sustainability – an evaluation of forestry programs to meet European biomass supply chain requirements. Environmental Defense Fund.

Available at: <http://www.edf.org/sites/default/files/pathwaysToSustainability.pdf>

Lattimore, B., C.T. Smith, B.D. Titus, I. Stupak, G. Egnell. Environmental factors in woodfuel production: risks, and criteria and indicators for sustainable practices. *Biomass & Bioenergy* 33(10): 1321-1342 (2009).

- Access through U of T library website.

Mansoor, Maha, Inge Stupak and Tat Smith. 2016. Private regulation in the bioenergy sector. Chapter 17. pp. 406-438. In: Yves Le Bouthillier, Annette Cowie, Paul Martin and Heather McLeod-Kilmurray (Eds.). “The Law and Policy of Biofuels”. Publisher: Edward Elgar.

- Uploaded to Blackboard

Nonhebel S. 2005. Renewable energy and food supply: will there be enough land? *Renewable and Sustainable Energy Reviews* 9: 191-201.

- Access through U of T library website.

van Dam, J., M. Junginger, A.P.C. Faaij. From the global efforts on certification of bioenergy towards an integrated approach based on sustainable land use planning. *Renewable and Sustainable Energy Reviews* 14(9): 2445-2472 (December 2010).

- Access through U of T library website.

\* Plus student assigned readings related to six case studies.

**Student led discussions**

Student led discussions will take place on dates listed in the Topic Outline (16, 23 and 30 Oct). Each person will be expected to assume a specific role and responsibility for the topic they have selected. Please allocate those roles in any way that works for individuals and the whole group. No one should be standing silently in the background; and no one should do it all alone. We will allocate specific time for each person's portion and for the whole team (50 minutes all together).

Be prepared to:

1. present the theoretical framework underpinning the sustainability of the natural resource being discussed, the ways in which the case study serves as a good example of the science supporting our knowledge of the sustainability of the system, as well as the opportunities and challenges involved (40 minutes for this portion); and
2. serve as discussion leaders (approximately 10 minutes for this portion) for the ways in which your topic and assigned readings contribute to our understanding of the sustainability of the natural resources associated with the specific case, and the linkages between science-based and traditional cultural knowledge and policy and management.

Please distribute the following materials to the class **one week prior to your presentation** so that everyone can prepare for a lively discussion.

- |                      |   |
|----------------------|---|
| Topic outline:       | Please develop a brief outline of the material you will be presenting to the class. Your main focus should be on developing an overview including theoretical sustainability concepts, the opportunities and challenges underpinning a topic, and ways in which the case study helps us understand the relevant issues.   |
| Reading list:        | Please recommend 2-3 readings for the whole class to read prior to your topic being discussed. Readings might be drawn from peer-reviewed journals, trade magazines, government reports and policies, and reports from NGOs. Case studies should be selected on the basis of their ability to illustrate the salient points of the conceptual framework (context, issues, theory) and/or excellent examples of the challenges associated with implementing sustainable natural resource management. |
| Discussion Questions | Please develop a list of thought-provoking questions to stimulate active discussion of your topic.  |

**16, 23 and 30 October – Social, economic and environmental sustainability of cases**

Case study 1 to 6 (?)

**Topic:** tbd (e.g. sustainability of forest bioenergy production systems in a developing country -- example below)

**Suggested number of students:** 5

**Time:** 50 min.

**Structure:**

Students lecturing (with accompanying Powerpoint) – 40 min (4 x 10 min each)

- Economic sustainability of forest bioenergy production (~10 min)
- Environmental sustainability of forest bioenergy production (~10 min)
- Social sustainability of forest bioenergy production (~10 min)
- Case study selected from a developing region (i.e., Africa, Central/South America, Asia) (~10 min)

Class discussion – 10 min

- Student(s) in the group will have prepared a set of thought-provoking questions and will use these to actively lead the rest of the class in a discussion of their topic.

Evaluation – Students in the class will evaluate the presenting team using the evaluation matrix provided.

## **GUIDELINES FOR TERM PAPER WORK**

Term papers will provide an excellent opportunity for students to develop and strengthen library research skills, as well as the skills associated with critical analysis, synthesis and integration. Another major learning objective associated with this course is to develop student communication skills. Opportunities for developing oral and written communication skills include student lead discussions, term papers, and seminar presentations based on term projects. The following describes the assessment procedures to be used in this course so that students will have a clear understanding of the criteria for excellence.

**TERM PAPER TOPIC AND OUTLINE** (due 16 October 2017) (10% of semester grade, incl. in 40% for term paper):

There are four components I typically look for (all assumed to be in draft form/status):

1. Title
2. Concise paragraph stating the topic (conceptual background, justification and objectives)
3. Brief outline (depth to two or three levels of detail; demonstrating the main components of the paper and flow of concepts)
4. Current list of key references (demonstrating that you have made solid start on searching the literature on your topic and building confidence that the proposed topic and paper are well conceived)
5. Total length – One or two pages should be adequate.

It is assumed that, by week-5 in the semester, you will have made a solid start on conceiving the topic and approach to take; and also that you will probably revise the approach and maybe objectives as you learn more and begin writing the paper and work through the project. I am keen to see you demonstrate that you have given it a fair amount of thought; and certainly want to encourage you to revise the specifics of your project as you learn more and become more experienced in the topic.

**TERM PAPER** (due 20 November) (30% of semester grade; note an additional 10% allocated to proposal):

The Term Paper should be based on a critical, analytical review of published information that is related to the science and policies associated with sustainable natural resource management. Term paper topics should reflect the interests of each individual student. The rubric for evaluating papers is described in the attached that will also be made available on the course web site.

**TERM PAPER SEMINAR PRESENTATIONS** (13 November – 4 December) (10% of semester grade):

The purpose of the student term paper presentations is to develop oral presentation skills using a variety of media (e.g. Powerpoint, video, sound). Each student's presentation will be 10 minutes (maximum) in length, followed by a 4-minute question and answer period. The criteria for evaluating seminars is attached.

## **FAQs regarding term papers:**

The paper should be typed and double-spaced.

Length: 2500-3000 words, excluding graphics and citations

Citation format: See below

Line spacing and font size: Double-spaced, 12-point font

Use of sub-headings: Very much encouraged; improves structure

## **OUTLINES:**

For a simple discussion of outlines, visit: <http://www.trentu.ca/history/workbook/effectiveoutlines.php>.

The type of outline I suggest you write is the "Formal Outline", as described on the Trent University web site and below.

### **Formal Outlines**

A formal outline is hierarchical and linear. It shows the stages of development of the essay in relation to each other and the order in which they will be discussed. It also shows the evidence that you will use to support your ideas. Even when creating a formal outline, do not worry too much about which roman numerals or letters you are using. Just make sure that you are breaking your thesis down into smaller arguments, and then developing each argument through examples.

Below you will find the basic format for a formal outline.

- Introduction

- Major Point 1

- A. Evidence

- 1. detail

- B. Evidence

- Major Point 2

- A. Evidence

- B. Evidence

- 1. detail

- 2. detail

- a. even more detail

- i. even more detail

- Major Point 3, etc.

- Conclusion



## SUGGESTION FOR REFERENCE FORMATTING:

<http://www.frontiersinecology.org/fron/>

<http://www.frontiersinecology.org/fron/instructions-to-authors/research-communications/>  
Research Communications

### +References Section: Examples

#### Article in Journal

Mathews R and Richter BD. 2007. Application of the indicators of hydrologic alteration software in environmental flow setting. *Am Water Resour As* **43**: 1400–13.

Romme WH, Allen CD, Bailey JD, *et al.* 2009. Historical and modern disturbance regimes, stand structures, and landscape dynamics in pinyon–juniper vegetation of the western United States. *Rangeland Ecol Manag* **62**: 203–22.

#### Book

Ehrhart LM, Bagley DA, and Redfoot WE. 2003. Loggerhead turtles in the Atlantic Ocean: geographic distribution, abundance, and population status. In: Bolten AB and Witherington BE (Eds). *Loggerhead sea turtles*. Washington, DC: Smithsonian Books.

#### Chapter in Book

Lambers H, Chapin III FS, and Pons TL (Eds). 2008. Life cycles: environmental influences and adaptations. In: *Plant physiological ecology*. New York, NY: Springer.

#### Conference Proceedings

Schaefer M. 1975. Experimental studies on the importance of interspecies competition for the lycosid spiders in a salt marsh. *Proceedings of the 6th International Arachnological Congress*; 19–20 Mar 1974; Amsterdam. Amsterdam, The Netherlands: Nederlandse Entomologische Vereniging.

#### Scientific and Technical Reports and their Parts

IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate change 2007.: synthesis report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva, Switzerland: IPCC.

Grant GE, Lewis SL, Swanson F, *et al.* 2008. *Effects of forest practices on peakflows and consequent channel response: a state-of-science report for western Oregon and Washington*. Portland, OR: US Department of Agriculture. PNW-GTR-760.

### **Conference Presentations (Papers) and Abstracts**

Smith RD. 1992. Little brown birds are really interesting. In: Jones X (Ed). Interesting birds of North America. Proceedings of the symposium at the 112th meeting of the American Birding Society; 1992 Mar 2-4; Los Angeles, CA. Washington, DC: American Birding Society.

### **Dissertations, Theses, and Their Parts**

Feth JA. 1947. The geology of Northern Canelo Hills (PhD dissertation). Tucson, AZ: University of Arizona.

### **Websites**

Poole A (Ed). 2005. The birds of North America online. Ithaca, NY: Cornell Laboratory of Ornithology. <http://bna.birds.cornell.edu/BNA>. Viewed 16 Sep 2009.

GVU's 8th WWW user survey. (nd). [www.cc.gatech.edu/gvu/usersurveys/survey](http://www.cc.gatech.edu/gvu/usersurveys/survey) 1997–10. Viewed 8 Aug 2000.

### **Newspaper Articles**

Baker JK. 1999. Switch to dollar bodes ill for Ecuador. *Washington Post*. Sept 12: Sect B: 2.

### **Documents In Press**

Fulton RS. Predator–prey relationships in an estuarine littoral copepod community. *Ecology*. In press.

**Constructive Comments and Evaluation for Oral Presentations:**

Course: \_\_\_\_\_ Date: \_\_\_\_\_

Presenter: \_\_\_\_\_

Title: \_\_\_\_\_

<b>Objectives:</b> Were there clearly stated goals to presentation?	1	2	3	4	5	6	7	8	9	10
<b>Body of Presentation:</b> Was information well explained and relevant?	1	2	3	4	5	6	7	8	9	10
<b>Conclusions/Recommendations:</b> Did these relate to presentation objectives/content?	1	2	3	4	5	6	7	8	9	10
<b>Organization:</b> Was there a logical flow to material and information?	1	2	3	4	5	6	7	8	9	10
<b>Creativity:</b> Flair and originality of ideas	1	2	3	4	5	6	7	8	9	10
<b>Use of visual aids:</b> Good use of audiovisual equipment? Table/figures of high quality and explained to audience?	1	2	3	4	5	6	7	8	9	10
<b>Handling of questions and discussion period:</b> Were questions well answered? Did speaker develop ideas and stimulate debate?	1	2	3	4	5	6	7	8	9	10
<b>Targeted at Audience:</b> Was material at appropriate depth for audience?	1	2	3	4	5	6	7	8	9	10
<b>Rapport with Audience:</b> Good eye contact, voice projection, confident speech etc.?	1	2	3	4	5	6	7	8	9	10
<b>Time management:</b> Was talk delivered within allotted time? If yes, circle 10; if No, deduct 1 mark for each minute over time	1	2	3	4	5	6	7	8	9	10

General Comments:

What were the strengths of the presentation?

Are there any areas that need further improvement?

Evaluator: \_\_\_\_\_ Overall Grade: \_\_\_\_\_

## Term paper evaluation rubric

	Inadequate & Marginal	Adequate	Good	Excellent
<b>Mark range</b>	<b>0-49% &amp; &lt;59%</b>	<b>60-69%</b>	<b>70-79%</b>	<b>80-100%</b>
<b>Knowledge</b>	Little or no evidence of a familiarity with the information. Little evidence of use of information beyond that provided in lectures and assigned readings. Literature or other sources are outdated or primarily from grey literature. Inordinate use of non-refereed journals, web sites, etc. Fails to relate relevant information to the question, problem or task.	Some evidence of a familiarity with the information. Some evidence of use of information beyond that provided in lectures and assigned readings. Demonstrates an understanding of the question, problem or task. Literature (or other sources of information) is up-to-date and appropriate.	Strong evidence of a familiarity with and understanding of the information. Clearly relates the appropriate information to the question, problem or task. Literature (or other sources of information) reviewed is substantial, appropriate and up-to-date.	Demonstrates an exceptional understanding of the relevant information. Exceptional ability to identify the most critical information and relate it to the question, problem or task. Literature (or other sources of information) reviewed is extensive, appropriate and up-to-date.
<b>Analysis &amp; Synthesis</b>	Simply "reports" on or summarizes information with only limited evidence of analysis. Little or no evidence of an understanding of the question, problem or task. Little or no attempt to incorporate information or ideas from other sources, jurisdictions, schools of thought, etc. Little or no evidence of original ideas relevant to the question, problem or task.	Some evidence of an ability to analyze the information and relate this to the question, problem or task. Some attempt to incorporate information from related issues or sources, jurisdictions, schools of thought, etc. Some evidence of original ideas relevant to the question, problem or task.	Clearly demonstrates an understanding of the question, problem or task. Strong evidence of an ability to analyze the information and relate this to the question, problem or task. Many (but appropriate) examples of the incorporation of information from related issues or other sources, jurisdictions, schools of thought. Strong evidence of original ideas relevant to the question, problem or task.	Exceptional analysis of the information with a very strong linkage to the question, problem or task. Carefully selected examples of the incorporation of information from related issues or other sources, jurisdictions, schools of thought, significantly strengthen the response. Extremely well-developed approach to solving the problem, answering the question or accomplishing the task. Original ideas relevant to the question, problem or task form a significant part of the response and are well supported.
<b>Critical Thought</b>	Little evidence of evaluation of competing arguments. Approach is unclear or unsupported. No conclusions and/or recommendations provided OR those that are provided are superficial and/or poorly defended or explained.	Some evidence of evaluation of competing arguments. Conclusion and/or recommendations are reasonable but lack substantial depth, explanation or support. Assumptions that conclusion (of the author or those of other sources) rest on are identified and addressed to some degree.	Many examples of an ability to assesses and weigh competing arguments. Develops a logical and well-reasoned approach to solving the problem (answering the question, or accomplishing the task). Clearly defined conclusions and/or recommendations. Assumptions that the conclusion (the authors or those of other sources reviewed) rest on are clearly identified and justified and limitations are recognized.	Demonstrates an exceptional ability to assesses and weigh competing arguments. Very in-depth and clearly defended conclusions/recommendation are presented and clearly relate to the questions, problem or task. Assumptions that the conclusion rest on are clearly identified and justified, and limitations are recognized. Measures to improve the approach used to address the question, problem or task are identified and explained to an appropriate degree.
<b>Organization</b>	Very poor organization. Detracts significantly from the answer to the question or solution to the problem. Lacks a logical flow.	Generally well organized with coherent sentence and paragraph structure. Some extraneous material. Some integration of conclusions, solutions and/or recommendations is evident.	Good organization and logical flow. Objective(s) and/or hypothesis (where appropriate) are/is presented. The approach is defined and results of the analysis or problem solving effort are clearly presented. Clearly addresses the question, problem or task. Provides appropriate and integrated conclusions, solutions and/or recommendations.	Exceptional organization. Focus on the problem or question is evident throughout. Very clearly articulated objectives (or hypothesis where appropriate), approach (or methods where appropriate), and results. Conclusions, solutions and/or recommendations are clearly related to the question or objectives (or hypothesis where appropriate).
<b>Communication</b>	Very poorly written. Frequent spelling mistakes or typographical errors that could clearly have been corrected by proof reading or the use of a "spelling checker". Inadequately referenced and/or inappropriately formatted referencing	Generally well written with some minor spelling or grammatical errors or awkward style. Some minor referencing issues. Minor editing would make this appropriate (based on the communications only) for submission to an outside review or audience.	Clearly and very efficiently written with no spelling or grammatical errors. All necessary references are provided and appropriately formatted.	Clearly and exceptionally well written with no spelling or grammatical errors. No extraneous information that does not add to the value of the document. All necessary references are provided and appropriately formatted. The level of writing is well-suited to the "audience". Ready for submission to an outside review or audience.

## **HOUSE RULES**

### **Attendance**

While no mark is allotted specifically for attendance, it is assumed that all students will attend class regularly. This is important for students to gain maximum benefit from the course. If a student does not attend regularly, this will be reflected in their participation mark.

### **Field trip**

Depending on the selected case studies, we may want to schedule a field trip.

### **Academic integrity**

The University of Toronto has a strict policy on plagiarism, which can be found in the Code of Behaviour on Academic Matters (available at <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>).

The following excerpts from this document outline the university's policy:

*It shall be an offence for a student to knowingly:*

*(d) to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e. to commit plagiarism (for a more detailed account of plagiarism, see Appendix "A") ;*

*(e) to submit, without the knowledge and approval of the instructor to whom it is submitted, any academic work for which credit has previously been obtained or is being sought in another course or program of study in the University or elsewhere;*

*(f) to submit any academic work containing a purported statement of fact or reference to a source which has been concocted.*

Therefore, under no circumstances will plagiarism be accepted in this course, and students who engage in plagiarism will face strict penalties.

The following resource from the University of Toronto provides tips on how to avoid plagiarism:

<http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>

It is also expected that students will complete individual assignments (e.g., take home exam) on their own.

### **Course Policy for Late Submissions and Missed Assignments for Medical Reasons**

If you require accommodation for late submission of assignments or a missed midterm examination, you must inform your instructor by email within 24 hours of the due date of the assignment or missed test. In addition, you must also submit University accepted medical or other documentation, in person, to the Faculty of Forestry *within 5 calendar days* for missed assignments or midterm examination. Medical Certificates or Doctor's Notes *must* be an original U of T Student Medical Certificate (available from the Office of the Registrar's web site) and *must* include the statement "This Student was unable to write the test on date(s) for medical reasons". Documentation *must* show that the physician was consulted within *one* day of the test. A statement merely confirming a report of illness made by the student is *not* acceptable. Failure to comply with this policy will result in a grade of zero for the assignment or midterm in question. For students with a documented absence due to a medical condition or other serious event who are unable to submit an assignment within 6 days, the other assignments will be reweighted on a pro rata basis.

### **Late assignments**

It is expected that assignments will be handed in by the dates specified on the course syllabus. Late assignments will be penalized 5% per day of lateness, to a maximum of 6 days (30%). After six days, assignments will no longer be accepted and a grade of 0 will be given.

Late assignments can be slipped under the door of office 3038 ESC after regular business hours.

### **Participation and group dynamics**

The material in this course will represent many opportunities for interesting, lively and sometimes controversial discussions. Students are encouraged to participate actively in these discussions, and are expected to respect the opinions and ideas of other class members at all times.

### **Communication with instructor**

Students are encouraged to approach the instructor with any questions, concerns or ideas they may have throughout the course. If questions are detailed, it is recommended that students visit the instructor during office hours rather than via email (although I will

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make every effort to answer all emails promptly), as face-to-face may be a more efficient means of communication for some complex questions. If a student is unable to come to any of the specified office hours, please contact us to set up an appointment with the instructor, as available.