

GGR414 Advanced Remote Sensing

University of Toronto, Fall 2020

Lecture: Thursday, 10–12 am, every week, online

Lab: Friday, 1–3 pm, selected weeks, online

Instructor

Prof. Jane Liu

E-Mail: janejj.liu@utoronto.ca

Office hours:

Monday, 1–2 pm, Thursday, 1–2 pm. to be offered online.

Teaching Assistants

Mr. Yihong Liu

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Office hours:

Tuesday, 3–4 pm, Friday, 3–4 pm, to be offered online.

Course Description

Building on GGR337H1 Environmental Remote Sensing, which covers the basic theories and techniques of optical and microwave remote sensing of the land surface, GGR414H introduces advanced theories and techniques for land cover mapping, retrieval of vegetation structural and physiological traits, and remote sensing of vegetation light use efficiency and photosynthetic capacity. Diagnostic ecosystem models will also be introduced for terrestrial water and carbon cycle estimation using remote sensing data. Optical instruments for measuring vegetation structural parameters in the field will be demonstrated, and high-resolution remote sensing images acquired from a drone system will be used as part of the teaching material and lab assignments.

Evaluation

	<u>Weight</u>	<u>Due Date</u>
Assignment 1	20%	Oct. 15, 2020
Midterm	20%	Oct. 22, 2020
Assignment 2	20%	Nov. 26, 2020
Final assessment	40%	Final assessment period

Tutorials/Practicals

Lab 1	Sep. 25, 2020	Mapping Biophysical Parameters
Lab 2	Nov 6, 2020	Mapping Vegetation Productivity

Submissions

All assignments should be submitted electronically on Quercus by 8 pm on the due days.

Delivery method

All lectures and labs will be offered online. Lectures will be offered every Thursday, 10–12 at noon. Labs will be offered on selected Fridays, 1–3 pm (see Course Schedule). Pre-recorded lectures and lab demonstrations will be posted on Quercus before the scheduled time. Students can watch these recordings at the scheduled or a later time.

Access to Course Materials & Readings

Course materials and readings will be posted on Quercus, accessible to students.

Access to Computer Software ArcGIS

The lab sessions of this course require usage of ArcGIS. If students are able to install ArcGIS on their own computers, that would be the best option. Otherwise, they will be able to remotely access to IIT computers via Remote Desktop at the Geography Department Lab at St. George campus. A detailed guide will be provided in Quercus.

Recording/electronics usage

Students can access the course materials in Quercus from a electronic device, e.g., a computer.

Communication

The instructor and teaching assistants are available in online lectures, labs, office hours. Students are encouraged to ask questions during these times, also through emails (see Instructor and Teaching Assistants). Extra office hours can be arranged. One to one appointment can also be arranged. If you feel that you are having difficulty keeping up with assignments or understanding the material we are covering, please contact the instructor as soon as possible.

Course Policies

Assignments: Late assignments will be subject to a late penalty of 10% per day (including weekends) of the total marks for the assignment. Assignments submitted five calendar days beyond the due date will be assigned a grade of zero.

Missed Quiz/Test: There will be no re-writes or make-ups for term tests/quizzes missed for University-accepted reasons. Instead the final assessment will be re-weighted by the value of the missed term test/quiz.

Informing Your Instructor and Submitting Appropriate Documentation: Students must submit a self-declaration of illness within **one week** of a missed assignment due date or test date. Failure to submit appropriate documentation will result in a grade of zero.

Required Text

No textbook is suitable. Papers relevant to each lecture will be provided in Quercus

Reference Books

Liang, S. 2003, Quantitative Remote Sensing of the Land Surface. Wiley-Interscience, ISBN-13: 978-0471281665.

Additional Readings

To be provided in Quercus.

Course Schedule

Week	Lecture (Thursday)	Lecture Topic	Lab (Friday)
1	Sep 10	Introduction Review of radiation terms	No Lab
2	Sep 17	Radiative transfer theory Plant canopy radiation models	No Lab
3	Sep 24	Multispectral remote sensing of LAI	#1, 20%, due on Oct. 15
4	Oct 1	Multi-angle remote sensing of clumping index	No Lab
5	Oct 8	Simple remote sensing-based GPP and ET models	No Lab
6	Oct 15	Remote sensing of leaf pigments	No Lab
7	Oct 22	Mid-term exam	20%.
8	Oct 29	Sun-induced chlorophyll fluorescence (SIF) and GPP	No Lab
9	Nov 5	Remote sensing of plant function PRI and LUE	#2, 20%, due on Nov. 26
10	Nov 12	Reading week, no class	No Lab
11	Nov 19	Global land cover mapping	No Lab

12	Nov 26	Lidar techniques Lidar applications	No Lab
13	Dec 3	Radar applications	No Lab

Accessibility Services

The University of Toronto is committed to accessibility. If you require accommodations or have any accessibility concerns, please visit Accessibility Services at <http://www.accessibility.utoronto.ca/> as soon as possible.

For more information please contact Accessibility Services at

Robarts Library

1st Floor (ground entrance off St. George St.)
130 St. George Street, Toronto, ON M5S 3H1
Voice: 416-978-8060

Fax: 416-978-8246

TTY: 416-978-1902

Email: accessibility.services@utoronto.ca

Web: www.accessibility.utoronto.ca

Academic Integrity

It is your responsibility as a student at the University of Toronto to familiarize yourself with, and adhere to, both the Code of Student Conduct and the Code of Behaviour on Academic Matters.

This means, first and foremost, that you should read them carefully.

- The [Code of Student Conduct](#) is available from the U of T website:
- The [Code of Behaviour on Academic Matters](#) is available from the U of T website:

See also the [University's website on Academic integrity](#).

Services

Geography Math Help Centre

A resource for this course is the department's Math Help Centre. Geography TAs will be available to help refresh and explain math concepts and techniques that may come up in your Geography courses. This includes working with formulas, graphing data, completing calculations, and so forth. It does not matter how basic your questions are! No appointment is required, just drop by. There will also be table space available in the room, allowing students to get math help as they work through assignments. Details on location and TA times will be posted here:

<http://geography.utoronto.ca/undergraduate/math-help/>