GTECH 32100/GTECH71200
Remote Sensing of the Environment
Spring 2018

I. Class Time & Location Information:

Room:	**North Building 1090B-1**
Class Time:	**Tuesday, 5:35 PM – 9:25 PM**
Note:	**There will be a break half way through the session**

II. Instructor Contact Information:

Instructor:	**Paradorn Wongchanapai**
Email:	**pwongcha@hunter.cuny.edu**

Email Policy: When you send me an e-mail, **you MUST do the following**:
1) **Include "GTECH321/712"** in the subject line.
2) **Sign your full name (i.e. your first and last name)** as it appears in CUNYfirst at the end of the message.

- I do not answer an e-mail that fails to meet the requirements listed above.

- Students' email will be responded to within 48 hours. Please note there will be a delay for messages sent over the weekend or during non-business hours (i.e. after 5:00 PM EST.)

- Please use your Hunter College email (@myhunter) when you email me. My Hunter college email has a strong spam filter and I may not receive your email if you use non-Hunter email, such as yahoo or Gmail. In this case, it is **YOUR RESPONSIBITY** to follow up with the issue.

Office:	HN1032
Office Phone:	212-772-4351
Office hours:	**Tuesday, 4:00 PM – 5:00 PM and by appointment**.

Department Information: Department of Geography, room HN1006, Phone: 212-772-5265

III. Course Materials:

Required Textbook:
- *Introduction to Remote Sensing, Fifth Edition 5th Edition*, James B. Campbell and Randolph H. Wynne, The Guilford Press, ISBN-13: 978-1609181765 and ISBN-10: 160918176X

IV. Course Description:

Prerequisites: GTECH 20300 or GTECH 71000 or permission of instructor.
Course Credits: *3 credits.*
Course structure: *The first half of each class is lecture and the second half is lab.*
Course Description: This course provides an introduction to remote sensing science and technology. The course is divided into three components: **(1)** physical processes and properties of electromagnetic radiation and its interactions with physical environment (i.e. atmosphere and land surface); **(2)** basic airborne and space-borne image interpretation skills; and **(3)** digital remote sensing imageries; basic concepts of passive and active satellite sensors, multi spectral and optical satellite imageries, and how to analyze and extract information from remote sensing data. We will also explore remote sensing applications. Lab exercises will be assigned to enhance understanding of remote sensing concepts and skills.

Course Objectives and Learning Outcomes: By the end of the semester, students will be able to:

- Explain key concepts of remote sensing and concepts of techniques use in analyzing remote sensing data.
- Compare and contrast remote sensing data collected from different types of platform and sensors.
- Interpret remote sensing imageries acquired from various platforms.
- Analyze multi spectral remote sensing data to map and monitor natural environment and resources.
- Display skills of using ENVI remote sensed imagery software.

Class Communications-Blackboard

- Blackboard will be used for posting course announcements, lab assignments, your scores, and etc. Therefore, you should check Blackboard frequently.

V. Course Evaluation:

Grading:
- ❖ **Attendance & Participation:**   **5%**
- ❖ **Quizzes:**   **25%**
- ❖ **Lab exercise:**   **40%**
- ❖ **Final Project:**   **30%**
Total: **100%**

<u>**Brief Descriptions of Course Evaluation:**</u>

❖ <u>**Attendance & Participation**</u> (**5%**) is graded based on attendance and in-class discussion.
   - I take attendance every class and it is computed as part of your final grade.
   - I expect you to come to class on time. Therefore, three latenesses equal one absence.
   - If you miss more than two classes without providing documented reason(s), your course grade will be drop one grade for each additional class you miss. For instance, three unexcused absences will result in deducting your course grade from 'A' to 'B'.

❖ <u>**Quizzes:**</u> (**25%**) Instead of the midterm exam, quizzes will be given throughout the semester. Quizzes will be a mixed format of short-answer, multiple choice, and true or false questions based on the material covered from previous lectures.
   - You are allowed to **make up a quiz only if you contact me within 48 hours of the missed quiz and provide me with VALID REASON(s) and proper DOCUMENTATION supporting your absence.**

❖ <u>**Lab Exercises**</u> (**40%**) will be assigned after we finish discussing each remote sensing topic. The goal of lab exercises is to enhance your understandings of each topic.
   - The main software used in most lab exercise is ENVI image processing software (although we will also explore other software such as QGIS.)
      - You are not required to purchase ENVI software. However, if you are interested in ENVI 1 year student's license, please check the link: http://www.harrisgeospatial.com/IndustrySolutions/Academic.aspx#students
   - Lab exercises will be available on Blackboard unless I specify other methods.
   - Submit your completed work through Blackboard unless I specify other methods.
   - **I do not accept late assignments.**
      - After the due dates, assignment submission links will disappear from Blackboard.
      - You will receive a 0 for any assignment you fail to submit by the due date.
   - <u>**For written assignments:**</u> If you take information from other sources, such as newspapers, online websites, magazines, academic journals, etc., **YOU MUST CITE YOUR SOURCES**. You may use any citation style as long as the style is consistent throughout the paper.

❖ <u>**Final Project:**</u> (**30%**) Every student is required to conduct a course final project. The final project will allow you to demonstrate the remote sensing knowledge and skills you have acquired over the course of the semester.
   - The requirements for the final project are: (**1**) give a final project presentation and submit (**2**) a final paper describing your final project and (**3**) presentation material (i.e. PowerPoint presentation.)

Grading Policy

Graduate students are expected to do much more comprehensive final projects than undergraduate students. A different grading system will be used for undergraduate and graduate students.

- Grading will following Hunter College policy as explained at:
  - ➢ http://catalog.hunter.cuny.edu/content.php?catoid=22&navoid=2774 for graduate students
  - ➢ http://catalog.hunter.cuny.edu/content.php?catoid=23&navoid=3507 for undergraduate students.

- **I do not give extra credit assignments.**

- **I do not give incompletes (IN)** except under the most extraordinary, and documented, circumstances. You must contact me within 24 hours of the final exam and request IN as a grade. At that time you will schedule a date to meet with me at the college and complete a Contract to Resolve Incomplete Grades. Otherwise, I will average the grades I have for you and record you the grade you have earned.

- If you miss an exam, you must **(1)** contact me within 24 hours of the missed exam, **(2)** present acceptable documentary evidence for your absence, and **(3)** be available for the make-up exam. (Note: there will be one make-up exam day at the end of the semester held outside of class for those eligible) A make-up exam covers the same material as the regular exam but will not be the same exam given as scheduled. (Therefore, **DON'T MISS AN EXAM**).

- The last day to hand-in Credit/No Credit (CR/NC) form is **5:00 PM - on Tuesday, May 15, 2017**. **Only undergraduate students who have completed ALL of the course requirements are eligible for consideration of CR/NC as a grade**. CR/NC is not available to graduate students.

VI. Essential Polices:

Hunter College Statement on Academic Integrity

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. Plagiarism, dishonesty, or cheating in any portion of the work required for this course will be punished to the full extent allowed according to Hunter College regulations.

ADA Policy

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY, located in Room E1214B, to secure necessary academic accommodations. For further information and assistance, please call: (212) 772- 4857 or (212) 650-3230.

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationship. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, on contacting the College's Public Safety Office (212-772-4444)

b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) of Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct
Link: http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf

Syllabus Change Policy

- Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change **with advance notice.**
- An updated course syllabus will be posted on Blackboard.

VII. (Tentative) Course Schedule:

Date	Class	Lecture Topics	Labs & Assignments	Readings
Jan 30	1	**Overview of the Course & Fundamental of Remote Sensing**	Lab 1: Basic Windows' file organization and Introduction to ENVI	Ch 1
Feb 6	2	**Electromagnetic Radiation (EM)** – Interaction with atmosphere & surface	Lab 2: ENVI Basic Function	Ch 2
Feb 13	3	**Image Interpretation** – visual and environmental contexts and color theories	Lab 3: Image Interpretation and measurement and color theories	Ch 5
Feb 20		**No class, Classes to follow Monday's schedule**		
Feb 27	4	**Multispectral Data:** Digital Imagery, characteristics and acquisition	Lab 4: Basic Image Format and color composite image.	Ch 4
Mar 6	5	**Land Observation Satellites:** Landsat Satellite Imageries, overview of final project.	Lab 5: Satellite Imagery Online – Download Satellite data	Ch 6
Mar 13	6	**Preprocessing I-Image restoration:** Geometric, Radiometric, and atmospheric correction	Lab 6: Radiometric correction and atmospheric correction	Ch 11
Mar 20	7	**Preprocessing II- Image Enhancement:** contrast stretch, Spatial Filtering, Image transformation	Lab 7: Image Enhancement and transformation **final project proposal due**	Ch 11
Mar 27	8	**Feature Extraction: Image Classification I** – supervised classification	Lab 8: Supervised classification	Ch 12
Apr 3		**Spring Recess**		
Apr 10	9	**Feature Extraction: Image Classification II** – unsupervised classification ***AAG Conference**	Lab 9: Unsupervised classification	Ch 12
Apr 17	10	**Accuracy Assessment & Change Detection**	Lab 10: Change Detection	Ch 14 & 16
Apr 24	11	**Thermal Sensors and Application**	Lab 11: Urban Heat	Ch 9
May 1	12	**Integration of RS & GIS** **RS applications**	QGIS Exercise	Ch 17, 20
May 8	13	**Active sensors:** Lidar & Microwave Sensors	Work on Final Project	Ch 7 & 8
May 15	14	**Course Review**	Work on Final Project	
May 22	15	**Final Project Presentation**	**Final Paper Due**	