GEOG 2215 – INTRODUCTION TO EARTH OBSERVATION AND ANALYSIS (F19)

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Course Description:

Introduction to Earth Observation and Analysis course will introduce fundamentals of aerial photogrammetry including vertical and oblique photography, photo scale, mission planning, photo interpretation and stereo vision. Students become familiar with the basic image interpretation principles and aerial photography applications. The state-of-the-art remote sensing techniques such as stereo image acquisition, drone mapping and LiDAR remote sensing will also be explored within this course.

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- understand the basic principles of photogrammetry/remote sensing;
- describe the general procedure of aerial photography/UAV mission planning;
- identify photo interpretation techniques including stereo viewing and their applications; and
- successfully apply different image processing techniques for data extraction using aerial images and LiDAR point clouds.

Learning Resources:

Recommended (Chapter 2 and 3): Lillesand, T.M., Kiefer, R.W., and Chipman, J.W., 2015. *Remote Sensing and Image Interpretation*, 6th Edition (New Jersey: Wiley), ISBN 978-1-118-34328-9

ebook for renting: https://www.wiley.com/en-ca/Remote+Sensing+and+Image+Interpretation%2C+7th+Edition-p-9781118919477

Reading materials from the course website

Grading:

Lab exercises	50%	
Midterm exam	25%	(Oct 24th)
Final exam	25%	(Dec 5th)

Course Expectations/Student Responsibilities:

1. **Attendance** is expected for each lecture and lab unless communicated with the instructor ahead of time.
2. **Late Assignments** receive a deduction of 10% per day unless an extension is agreed to with the instructor prior to the due date. After class assignments are graded and returned, late assignments receive a zero grade **but must be satisfactorily completed to receive credit in the course.**
3. **Participation** is expected in all class discussions, group work and collaborative efforts.
4. **Exams** (a) absences from illness, compassionate reasons or representing the university off-campus, supported by written documentation will be accepted as sufficient evidence to allow a rewrite of a missed test.

   (b) If you miss an exam for any reason other than those deemed acceptable in Lakehead University calendar, then you will be given the opportunity of an essay-based makeup exam that is significantly longer and more difficult.

Course Schedule:

Week starting from	Topic	Lab exercise
Sept. 2	No classes	
9	Introduction to Photogrammetry History of Photography Electromagnetic spectrum	Accessing historical and other photo products (hard copies and online)
16	Elements of image interpretation, Image interpretation keys (classification keys, elimination keys etc), applications of image interpretation (natural/rural phenomena)	Image interpretation (natural), ecological land classification, landforms, drainage/channel patterns
23	Principles of chemical photography, film development, photo exposure and color theory Photo acquisition systems (analogue and digital), charged couple devices, different types of digital cameras	Prairie landscape, four types of photography films, Search and compare different types of aerial cameras
30	Principles of Photogrammetry – geometry of vertical/oblique aerial photo, photo scale, ortho photo	Calculating scales, units of measurements, difference between an aerial photo and ortho photo
Oct 7	Single photo measurements, coordinate systems, relief displacement, shadow length and height of objects	Single photo measurements
14	***Reading break no classes***	
21	***Review and Midterm test***	

28	Stereo vision and stereo photo measurements (photo base, parallax, height), surface modelling using overlap photos	Stereo photo interpretation and measurements
Nov 4	Introduction to UAV photography, spatial resolution, mission planning	Developing a flight plan including ground coverage, no. flight lines, photos, overlap etc.
11	3D products and 3D visualization from UAV imagery	Create Digital Surface Models, Digital Elevation Models, ortho mosaic and point clouds using UAV images
18	Introduction to LiDAR Remote Sensing	Explore a LiDAR point cloud for creating different 3D products
25	Introduction to LiDAR – different applications	Explore a LiDAR point cloud for creating different 3D products
Dec 2	***Review and Final exam***	

Note that this document is subjected to change pending unforeseen circumstances.