

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY
SAULT STE. MARIE, ONTARIO**



**SAULT
COLLEGE**

COURSE OUTLINE

COURSE TITLE: Remote Sensing

CODE NO. : NET204

SEMESTER: 4

PROGRAM: Natural Environment Technician/Technologist

AUTHOR: Gerard Lavoie

DATE: January, 2016

PREVIOUS OUTLINE DATED: Jan., 2015

APPROVED: "Colin Kirkwood"

Jan., 2016

Dean

Date

TOTAL CREDITS: 3

PREREQUISITE(S): N/A

HOURS/WEEK: 3

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**For additional information, please contact Colin Kirkwood,
Dean, Environment Technology & Business
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I. COURSE DESCRIPTION:

This course deals with both the quantitative uses of aerial photographs as well as the qualitative uses. Photogrammetric calculations will be studied. Distances, areas, & directions of target objects will be measured on hardcopy aerial photos and also using digital imagery. Tree species identification in both the Great Lakes-St. Lawrence forest region and the boreal forest region will be viewed stereoscopically on-screen. Remote sensing theory, platforms and applications will be discussed in detail.

II. LEARNING OUTCOMES AND ELEMENTS OF PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. **Account for topographic displacement when determining distances and directions on hardcopy aerial photographs.**

Potential Elements of the Performance:

- Identify the different components that make up an aerial photograph.
 - Identify different types of hardcopy aerial photographs.
 - Identify the equation inputs for topographic displacement and solve vertical displacement problems.
 - Understand the differences between a map, a vertical photograph and a vertical ortho rectified image.
2. **Accurately determine the scale of hardcopy aerial photographs for usage in distance measurements.**

Potential Elements of the Performance:

- Understand and identify reasons for why scale is not constant within one hardcopy photo, and between sets of photos along a flight line.
- Understand and calculate hardcopy photo scale using two differing methods.
- Calculate the distance between two points on an aerial photograph

3. **Accurately determine directions on standard OMNR aerial photographs**

Potential Elements of the Performance:

- Utilize a navigational protractor with aerial photographs and topographical maps
- Establish directions and locations for field usage
- Successfully identify “tie in points” used for access in the field.
- Understand and minimize topographic displacement for use in plot location and field access.

4. Explain the foundations of optical remote sensing

Potential Elements of the Performance:

- Identify and compare satellite sensors and their utility.
- Describe the electromagnetic spectrum
- Describe energy interactions with earth surface features
- Locate different earth surface features on different band combinations using different satellite sensors.
- Describe & Discuss four (4) types of image resolution

5. Demonstrate knowledge and understanding of digital aerial imagery types.

Potential Elements of the Performance:

- Describe the associated characteristics of both frame and scan- line sensors.
- Identify and gain exposure to: Panchromatic, RGB, and NRG band combinations of ortho-imagery.
- Understand and identify relationships between different image band combinations as they interact with features (vegetation, urban, water, barren...).

6. Identify boundaries for non-forested features using OMNR eFRI and ELC specifications.

Potential Elements of the Performance:

- Gain some introductory exposure to Ecosite Land classification parameters
- Understand the automated water classification concept and methods used for quality control.
- Differentiate between non-forested wetland features. Classify non-forested urban features
- Identify & discuss natural vs. purposed disturbances.

7. Identify delineation boundaries of forested stands

Potential Elements of the Performance:

- Differentiate conifer, hardwood and mixed wood stand types.
- Recognize single and multi tiered stands.
- Identify plantations and natural regeneration
- Identify wetland species (conifer and deciduous).
- Identify upland species (conifer and deciduous).

III. TOPICS:

1. Topographic displacement
2. Aerial photo scale
3. Measuring distances and directions
4. Remote sensing fundamentals
5. Digital aerial imagery
6. Earth feature recognition

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Pocket stereoscope
2. Calculator
3. Metric scale (1:500 to 1:2500)
4. Masking tape
5. 1:50 000 NTS topographic map sheet #41 K/9
6. Navigational Protractor
7. Polarized 3d glasses (provided).

V. EVALUATION PROCESS/GRADING SYSTEM:

There are 5 assignments making up 35% of the final grade; 2 written tests, worth 25% each, make up 50% of the final grade. A written report worth the remaining 15% will be assigned at or near the beginning of the semester, due near the end of the course. There will be opportunities during the semester to assess the progress of the written report. Regular attendance is absolutely necessary in order to succeed in this course as there is an abundant amount of learning material to cover.

One of the following semester grades will be assigned to each student:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	4.00
B	70 – 79%	3.00
C	60 – 69%	2.00
D	50 – 59%	1.00
F	<50%	0.00 (Fail)

CR (Credit)	Credit for diploma requirements has been awarded.
S:	Satisfactory achievement in field /clinical placement or non-graded subject area.
U:	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X:	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR:	Grade not reported to Registrar's office.
W:	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

Substitute course information is available in the Registrar's office.

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Plagiarism:

Students should refer to the definition of "academic dishonesty" in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade "C", (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, and records of achievement, unofficial transcript, and outstanding obligations. Announcements, news, the academic calendar of events, class cancellations, your learning management system (LMS), and much more are also accessible through the student portal. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session. *<Optional: It is the departmental policy that once the classroom door has been enclosed, the learning process has begun. Late arrivers may not be granted admission to the room.>*

Tuition Default:

Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not honoured) as of the first week of *<choose November, March, or June>* will be removed from placement and clinical activities. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default. Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum are located on the portal form part of this course outline.