

SC 220
Environmental Mapping Technology

Instructor: Kaylie Krys

Outline

The Implementation Date for this Outline is 21/02/2023

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Calendar Description

This course is an introduction to map reading, coordinate systems, Geographic Information Systems (GIS), and remote sensing. In the first unit, students learn map interpretation, measurement, and scale calculations. Global Positioning System (GPS) instruments are introduced. Then the course focuses on the fundamentals of GIS, including coordinate systems and map projections, data models, spatial analysis, and environmental applications of GIS. The final portion of the course focuses on the principles of remote sensing, working with manned-aerial, Unmanned Aerial Vehicle (UAV), and satellite imagery, and introduces various applications of remote sensing in the environmental sciences. Students gain practical experience and introductory proficiency in GIS using the QGIS platform, as well as an understanding of the knowledge expectations for a Basic UAV Operators Certificate.

Rationale

This course is required for students in the Environmental Sciences diploma program. An understanding of maps and aerial photography is essential to workers in all sectors of the environmental industry. GPS is a fundamental measurement technology and is also an important data collection tool for environmental workers. GIS is a primary data management tool for environmental practitioners. UAVs are an evolving tool and remote sensing source in the environmental field. This course provides an overview of the theory and application of GIS and remote sensing, coupled with practical experience in the use of GIS to manage imagery and spatial data for environmental applications.

Prerequisites

None

Co-Requisites

None

Course Learning Outcomes

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

1. Distinguish different kinds of maps.
2. Work confidently with geographic, UTM and DLS coordinate systems.
3. Describe the essential elements of a map.
4. Use DLS coordinates and addressing for navigation.
5. Explain coordinate systems and map projections

6. Describe environmental applications of remote sensing and GIS technologies.
7. Recognize important wavelength bands.
8. Distinguish applications of raster and vector interpret remote sensing images.
9. Use a GIS for operations such as overlay, buffering, route planning and basic modeling.
10. Incorporate GIS and GPS data into map presentations.
11. Describe the benefits and challenges of different remote sensing sources (manned-aerial, UAV, and satellite)
12. Understand the rules, regulations, and operations involved to operate with a Basic UAV Operators Certificate.

Resource Materials

Required Text:

No textbook is required. The course notes are downloaded from D2L and contain most of the necessary information. Each learning activity identifies any supplemental on-line resources required.

Reference Texts:

The Internet is referenced with suggested search topics.

Conduct of Course

The course consists of 42 hours of lecture and 28 hours of lab. The course is delivered over a set 14-week period. The lecture is in an asynchronously presented pre-recorded video format, with course content modules and links to assigned readings available on-line. The lab component is composed of demonstrations, tutorial work and projects where students are required to demonstrate competency with assigned tasks. A course facilitator/instructor is available to guide the students through the course, answer any questions, and grade assignments and exams. Student questions are encouraged to clarify subject areas, the instructor can be reached through email or scheduled virtual meetings. Assignments are submitted electronically through D2L. Quizzes, labs, and assignments are marked by the instructor and returned to the student with a grade and comments in D2L. Students can monitor their progress through the course using utilities available in D2L. In order to complete the course on time, deadlines for assignments, exam, and projects are enforced.

Evaluation Procedures

There is no final exam or midterm. Unit assignments will take place after the completion of each lecture unit to evaluate the students' understanding of course material. Lecture quizzes will take place throughout the length of the course to allow students an opportunity to review lecture information. Lab exercises will give students the opportunity to demonstrate their understanding of the material. The final grade for the course is weighted according to the following schedule:

Unit assignments (3)	30%
Lecture Quizzes	10%
Lab exercises (6)	60%
Total	100%

To obtain credit for this course all lab exercises must be completed and handed in. A minimum grade of D in the combined lecture/lab portions of the course must be achieved.

Late exercises are not graded, and a grade of zero is assigned.

All exercises, quizzes, and exams are graded on a percentage (%) basis. Then, a total course percentage is calculated using the above weighting values. Finally, the total course percentage is converted to a grade basis using the grade scale that is after the Knowledge/skills matrix section.

Grade Equivalents and Course Pass Requirements

A minimum grade of D (50%) (1.00) is required to pass this course.

Letter	F	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Percent Range	0-49	50-52	53-56	57-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	1.00	1.30	1.70	2.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

Students must maintain a cumulative grade of C (GPA - Grade Point Average of 2.00) in order to qualify to graduate.

Attendance

Active participation is required in all courses within the Environmental Sciences certificate and diploma programs. Each facilitator designates these requirements through the use of tools within the management system and personal contact with students.

For SC220, students will be asked to demonstrate their participation/attendance through submitting assignments, communicating with colleagues and the facilitator, and participating in asynchronous activities such as lectures and labs.

Students can request for an excused absence. An excused absence is one that is verified with your facilitator.

NOTE: Any exceptions to the above attendance policy (e.g. family or work-related issues) **must** be approved in writing by the Department Chair **prior** to the beginning of the course.

It is the student's responsibility to know their own absentee record.

Course Units/Topics

0. Introduction, Expectations, Course Outline

Cartography

1. Mapping Overview
2. Direction Determination
3. Coordinate Systems (geographic, UTM, DLS, NTS)
4. Datums

GIS

5. GIS Overview
6. Imagine
7. Attribute Information
8. Electromagnetic spectrums (EMS)
9. Applications of GIS

Remote Sensing

10. GPS
11. Air Photos
12. Satellite and UAV Imagery

Laboratory Contents: (number and order may vary.)

1. QGIS – installation and familiarization
2. QGIS – GPS data upload
3. QGIS – Map-making
4. QGIS – Aerial Photo Application
5. UAV Basic Operator – Part 1
6. UAV Basic Operator – Part 2