DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Department of Biology
BIOL /ENVS / GEOG / MARI 3633.03
Spatial Information and GIS in Ecology: A Practical Introduction
Summer 2020
June 17-30

 Instructor: Peter Bush petergbush@yahoo.ca and Beau Ahrens beauahrens@dal.ca

Lectures: Online - mornings

Laboratories: Online - afternoons

Meetings and Discussion: Online (dates and times to be determined)
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Course Description
A hands-on approach to understanding and using spatial information, this course introduces students to Geographic Information Systems (GIS) as a tool to answer ecological questions. Students will carry out a number of directed spatial analysis exercises such as inputting data, data preparation and analysis, map creation, interpreting spatial patterns related to problems in ecology. Students will conduct field data collection that will be used in their major project

Course Prerequisites
BIOL 2060 (Intro to Ecology)

Overview
This class offers a hands-on introduction to many basic spatial topics including GIS, GPS and Cartography, and uses Geographic Information Systems (GIS) to teach most of these topics. It introduces students to GIS – What is it? What types of problems can it solve? Throughout the class, students are shown the basics of spatial data and some of the most commonly used tools in GIS. Following one week in the lectures and labs, students will conduct an independent project ecology project using GIS. A number of projects will be offered for students to choose. The variety of projects will illustrate how GIS can be utilized as a tool for problem solving within a project rather than as the project itself. This course will show how GIS can be used as a tool in ecology. Students will be expected to bring together their newly acquired GIS skills with their own prior knowledge in ecology.

This class will introduce students to a wide variety of spatial topics, but with a limited depth. It is expected that students will gain enough knowledge and understanding to apply many basic GIS skills, as well as be comfortable with the general technology, layout and organization of data in GIS. The goal is for students to see how GIS can work for them, which may substantially different in the way another person may be using it. After taking this class, the student will have a basic foundation to be able to explore and understand more advanced topics through self-study or additional course

Course Objectives/Learning Outcomes
- Students will understand how GIS data and projects are organized
- Students understand the basics of GIS formats, particularly the ones that are native to ArcGIS
- Students will learn basics of map projections
- Students will learn how GPSs work and how they can be used for spatial ecological research.
- Students will learn how to create their own geographic data
- Students will learn many basic tools of GIS while gaining the confidence to explore new tools on their own
- Students will learn how to apply the practical ecology and GIS skills in other courses and apply it to an independent project
- Learn cartographic skills to help make useful maps

Course Materials
There is no textbook for the class. All digital material will be supplied through the course *Brightspace* as powerpoints, PDF files, spatial data files, etc.

Student Material Requirements
Due to the online nature of this course, student taking this course will require the following:
1) A strong and consistent internet connection
2) Access to ArcGIS 10.5 via*:*
   a) Installing and running the Dalhousie VPN software and ArcMap directly onto the student's computer. These can be downloaded through Dalhousie Software Services. (This approach requires a Windows Machine)
   <center>*AND/OR*</center>
   b) Utilizing dal.apporto.com virtual desktop (Works on Windows or Mac). Please contact instructors prior to the start of the course if you will use this route.
3) A mobile GPS capable device (dedicated GPS, mobile phone with GPS capabilities)
4) Computers to be used must have must have a minimum of:
   a) 4 gb of RAM
   b) 20 gb of FREE hard drive space
   c) Have reasonable computing power
5) A microphone (on computer, phone, or other device) to speak in on-line meetings.

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Course Assessment

Component	Weight (% of final grade)	Date
Quizzes		
Quiz 1 – Theory (lecture material)	20%	June 24th, Morning
Quiz 2 – Hands on techniques	20%	June 27th, Afternoon
Assignments		
Lab Assignments	30%	
Assignment 1		June 20th, Morning
Assignment 2		June 23rd, Morning
Assignment 3		June29th, Morning
Final Project (Report and Poster)	30%	June 30th, Morning

Course Policies

Class culture: We aim to cultivate a culture of mutual respect and collective curiosity. This course will be offered via remote learning, students will need to exhibit a desire to learn and world autonomously. Support will be provided via online tools (virtual meetings, discussion boards, brightspace chat function, etc). Students *must* take the initiative to engage with these platforms to ensure learning success. While there will some limited flexibility in the time of day that students access course learning materials (such as lectures), it is vital that students maintain **daily** access to the course shell on brightspace to engage with course materials, notifications and announcements, updates, and modifications. During virtual meetings students are expected to maintain professionalism as they would in a classroom setting. Students are encouraged to discuss lecture, lab, and assignment components. A discussion board will be created for student communication. All students must hand in individual work. Quizzes/tests must be completed alone.

Missed components: All of the information related to the logistical and administrative components of this course will be communicated via brightspace and/or virtual meetings (zoom/MS Teams, etc). If you miss any part of a lecture, it is your responsibility to make contact with a fellow student and catch up on what you missed, regardless of whether the absence was justified or not.

Late penalties: ** Late assignments will be docked at 5%/hr late

Documentation: Documentation is required to substantiate illness and emergency. A Declaration of Absence form must be submitted. In the case of other emergencies please speak with your department academic advisor about appropriate documentation (for example, a funeral program in the case of a death in the family). All documentation MUST be shared with the course instructor.

Course Content
tentative) (Please refer to brightspace announcements and schedule page for updates and amendments.

Day 0 – Software and Hardware
- Getting required software installed and configured
- Navigating the course page
- *To be completed before you begin the first day's lecture component*

Day 1 – Wednesday, June 17
Morning
Course Expectations
Intro to GIS

Afternoon
Introduction to basic map making
Introduction to projects options

Day 2 – Thursday, June 18
Morning
File management and spatial data formats
Projections and Datums

Afternoon
Commonly used Vector tools
Attribute Selection
Introduce Assignment #1

Day 3 – Friday June 19
Morning
Cartography

Afternoon
  (cartography lab, or open time, or something else?)

Day 4 –Saturday, June 20
Morning
Assignment #1 Due 8am
GPS
Defining projection/datum
Saving points and lines
Adding GPS data into a GIS

Afternoon
Creating and editing data
Modifying attribute tables
Introduce Assignment # 2

Day 5 Sunday, June 21–
No Class (work on project, assignment and study)

Day 6 – Monday, June 22
Morning
Introduce more vector tools
Review

Afternoon
GIS data models
Metadata
Hyerlinking
Other useful software

Day 7 – Tuesday, June 23
Morning
Assignment # 2 Due Tuesday June 23, 8am
Introducing Raster Data
Commonly Used Tools for Raster

Afternoon
More commonly used Tools for Raster
Georeferencing

Day 8 – Wednesday, June 24
Morning
Lecture Test

Afternoon
Introduce Assignment # 3

Days 9 - Thursday June 25
Morning
More raster tools

Afternoon
Work on final project and assignment

Day 10 - Friday June 26
Work on final project and assignment

Day 11 – Saturday, June 27
Morning
Assignment #3 due Monday June 29th 8am

Afternoon
Quiz 2 – Hands on techniques

Days 12-13 –Sunday, June 28 and Monday, June 29
Work on Final Project

Day 14 – Tuesday, June 30
Afternoon
Presentation/Submission of Final Projects
(Students will each present their final project through a Powerpoint Poster and zoom lightening presentation)