DALHOUSIE UNIVERSITY

ENVI 5507 / INFO 6681 & *MGMT 4507 / 4681*
Environmental Informatics/Geospatial Information Management
Fall 2021
Course meets **Mondays, in person, 11:35am-2:25pm**

Instructor:	Jennifer Grek Martin	*Teaching Assistant*:	Jessica Needham
email:	jgrekmartin@dal.ca	*email:*	Jessica.Needham@dal.ca
checks email:	9am to 4pm Sunday – Thursday	*checks email:*	TBA
Office:	Rowe 4028		
Office hours:	10am to 11:20am M, Th (mask required) Virtual appts available by request	*Course website*:	Brightspace

Course Description

This course introduces students to geospatial information management, including the nature of geospatial data, and access, representation, and communication of geospatial data and information. It also introduces students to relevant tools and materials such as census data, spreadsheets, and geographic information systems (GIS). Special topics may include privacy, health, citizen science, or the humanities.

Course Delivery

***NOTE: I will deliver this course in person**, including lectures and hands-on workshops in a computer lab setting with masking and physical distancing in accordance with Dalhousie and Provincial requirements. Even so, local spikes in Covid-19 cases may necessitate a move online. Fear not! This course was delivered successfully online in 2020 and can be again!*

***If you cannot attend class due to illness, quarantine, vaccinations, or other health-related issues**. Please let me know! I can make lectures available through Brightspace (Asynchronously) and I or the TA will establish a synchronous, live session to help with the hands-on workshops.*

***In the event we move the course online**, we will establish synchronous live discussion sessions, but all other course material will be delivered asynchronously through our Brightspace page. These materials would be for your educational use only. Do not distribute them outside this class.*

This class will involve a lab component using ArcGIS Pro. This software operates on PCs but needs additional software to work on a Mac. We are working with Dalhousie ITS to ensure all students have access to ArcGIS Pro before the Fall term begins.

I have taught several different lab-based courses at Dalhousie and I am no stranger to technological difficulties! My philosophy is that they offer chances to learn, to be creative, and understand the limitations of specific technologies.

Course Prerequisites:

ENVI 5507 is a core course for MREM students and INFO 6681 is an advanced technology elective course for MI students. MI students should have taken INFO 5515 or have consent of the instructor. Undergraduates need permission from the instructor or the BMGMT Undergraduate Advisor.

Learning Objectives:

This course will provide students with…

- knowledge of the unique characteristics of environmental and geospatial data
- an introduction to the tools and techniques used to access, manage, and communicate geospatial data and information, including Geographic Information Systems (GIS)
- an improved ability to manage both quantitative and qualitative data, to evaluate various methods, and to ethically and effectively communicate messages with data
- an understanding of potential legal and policy aspects of managing, distributing, and using geospatial data and information.

Learning Outcomes:

With successful completion of this course, students should be able to…

I. understand the unique characteristics of environmental and geospatial information;
II. develop skills in managing quantitative and qualitative data and to communicate information through the use of tools such as MS Excel and ArcGIS;
III. conceive of a question with environmental and/or geospatial implications and develop a project using appropriate data sources and techniques;
IV. explore the practical and theoretical implications of communicating environmental and geospatial information;
V. comprehend the possible ethical, legal, and policy aspects of managing, distributing, and using environmental and geospatial information in a variety of settings.

Integration of **MI Competencies**:

PROGRAM COMPETENCY	COURSE LEARNING OUTCOME	COURSE ASSESSMENT
1. Management of Information Technology	I, II, IV, V	Workshops, Lab Assignments, Final Portfolio
2. Information Management Leadership	I, III, IV, V	Final Portfolio
3. Risk & Change Management	I, V	Lab Assignments, Final Portfolio
4. User-centred Information Services	II, IV, V	Workshops, Lab Assignments
5. Research and Evaluation	I-V	Workshops, Lab Assignments, Final Portfolio
6. Workplace Skills & Attributes:		
(a) Collaborate & communicate	II, IV	Lab Assignments, Final Portfolio

(b) Organize, Plan & Manage	II-V	Lab Assignments, Final Portfolio
(c) Develop Personally & Professionally	I-V	Workshops, Lab Assignments, Final Portfolio

FORMAT & TECHNOLOGY

Technology Used:

Brightspace, ArcGIS and MS Excel software applications, and the digital, online environment in general, including downloading and uploading information and datasets.

Instructional Methods:

The course is a mix of traditional lecture and hands-on lab. This means:

- **In-person lecture delivery**. Most weeks, each class will begin with a lecture covering theory and/or applications. Weekly readings supplement lectures (there is no required textbook for this course).
- **In-person workshop/lab sessions**. The second half of class will be a hands-on workshop in MS Excel or ArcGIS Pro that provides practical applications related to lecture material. Workshops will be turned in via Brightspace one week after the workshop is introduced in class.
- **For students in quarantine or who cannot attend class for Covid-19-related issues.** Lectures will be made available through Brightspace and I or the TA will establish a synchronous, live session to help with the hands-on workshops.
- **Contact**. The Instructor and TA will be available to answer questions via email or during office hours (masks required). Teams meetings can also be requested.
- **Opportunities to Discuss**! Brightspace Discussion Boards will be created and maintained by the Instructor and TA for general comments and questions, but students are encouraged to form their own discussion groups (if they wish) on other platforms.
- **Assignments**. All assignments and weekly workshops will be handed in via Brightspace. ***NOTE: It is acceptable for students to talk to each other about the weekly workshops, but I expect each student to submit their own work. For LA01, LA02, and the Final Project especially, students should be working on their own.***

The Brightspace course site will house all course materials and be maintained as a resource and vehicle for announcements and notifications. Do not distribute any materials posted to Brightspace outside this class.

Learning Materials:

Readings supplement the lectures and in-class workshops. They can help you understand a topic better or act as a resource you can access anytime. I have tried to provide a wide range of resources: some are academic articles that illustrate GIS in research or some aspect of geospatial information, some are instructional, as in ESRI (ArcGIS) Help or QGIS's (an open source GIS) online handbook: *A Gentle Introduction to GIS.* Others are shorter, more general (more fun?) articles or podcasts. Readings may be found on the Brightspace site, through Dalhousie Libraries, or via the InterWeb.

There is no required text for this class.

GIS Resources

Dalhousie GIS Centre: https://libraries.dal.ca/hours-locations/gis-centre.html

Dal Libraries ArcGIS help: https://libraries.dal.ca/help/arcgis-help.html

Working from Home: https://cdn.dal.ca/content/dam/dalhousie/pdf/library/gis/InstallingArcGIS10_5AtHome.pdf

EVALUATION

NOTE: This course has two undergraduate seats (MGMT4507 and MGMT4681). Undergraduates will be evaluated according to the University Undergraduate Courses Grading Scale (out of a total of 75 points) and the work expected in the final project will reflect a fourth-year undergraduate course.

Weekly Workshops:

To become confident using ArcGIS and spreadsheet software like Excel, you need to practice *doing* it, therefore, most weeks will include a hands-on workshop. Individual workshop and assignment instructions will outline what you will need to upload to Brightspace (e.g., an Excel spreadsheet, a pdf of a GIS map, or a written document.)

Weekly workshop marks: Each workshop is worth 2% (2 points)

Complete. Excellent work regarding accuracy, thoroughness, and visual presentation/organization	2
Complete. Good work regarding accuracy, thoroughness, and visual presentation/organization	1.75
Complete. Satisfactory work regarding accuracy, thoroughness, and visual presentation/organization, or otherwise good work with significant problem in one area.	1.5
Mostly complete, but with significant problems in one area	1.25
Mostly complete, with significant problems in more than one area	1
Attempted but incomplete, with significant problems in more than one area	0.75
Attempted but incomplete with significant problems in all three areas	0.5
Not attempted, or unexcused absence	0

7 workshops @ 2% each = 14%	Due 1 Oct, 8 Oct, 15 Oct, 22 Oct, 5 Nov, 19 Nov, 3 Dec
1 workshop @ 4%	Due 26 Nov
ESRI Intro to GIS Module = 2%	Due any time before 24 Sept*

*****Completing this module early will help us ascertain if there are technical problems with ArcGIS before you begin the GIS-based workshops in Week 5.*

NOTE: The time it will take you to finish a given workshop may vary! Some of you may finish in class in 35-45 minutes, others may take 1.5 hours or more.

'Bigger' Assignments and Final Portfolios

Workshops will help you learn skills and software, but they will also prepare you for two intermediate Lab Assignments and help you design your final portfolio. Assignment guidelines will be posted separately to Brightspace.

Assignment	*Undergraduate %*	*Graduate %*	*DUE*
Workshops	20	20	**Weeks 3-4, 6-7, 9-12**
LA01: Reading a map/map metadata	15	20	**4 October**
LA02: Wind Energy Site: McAdam, NB	15	25	**15 November**
Final Project/Portfolio	25	35	**13 December**
Total	75	100	

Citation Style

Students should use the APA citation style in assignments to briefly identify (cite) other people's ideas and information and to indicate the sources of these citations in the References list at the end of the assignment. For more information on APA style, consult Dalhousie Library website at https://libraries.dal.ca/help/style-guides.html or the APA's Frequently Asked Questions about APA.

CLASS POLICIES

Working in a Face-to-face Environment

In a face-to-face class, the instructor, students, and guests are responsible for demonstrating mutual respect for others in their roles, knowledge, and expertise. However, it is entirely possible that we will be working in an in-person and online ***hybrid*** environment. Operating successfully in a ***hybrid*** environment requires cooperation, acceptance, inclusiveness, kindness, courtesy, and above all patience.

Working in an Online Environment

Online learning demands time management on the part of students and instructors. It sometimes seems like we are 'always available': we are not. Online learning puts a heavier burden of responsibility on the student to make time for learning the material, but offers increased flexibility of when and how that happens. Instructors and TAs must work harder to deliver the material in various forms, but at the same time we are faced with the potential misuse of our intellectual property. The instructors do not share your assignments with anyone else, please do not share their recorded lectures or other materials with anyone outside the class.

Stay in contact with the instructors, TAs, and classmates. We recognize this situation is highly unusual, but above all we want a successful term for everyone!

Attendance

We live in a changed world, so there may be significant 'ups' and 'downs' for you personally. Therefore, I won't record attendance specifically; instead I see it as the timely completion of the weekly workshops.

Late penalties for assignments

The virtual environment does not mean that we are always available and infinitely flexible. Things come up, and if we are not used to working in the online environment, they may come up unexpectedly.

If you need more time with an assignment, email me. I can give extensions for extended illness, and for medical, or family emergencies (see below), but other reasons are subject to my assessment. Try to submit assignments on time, however; extensions have a way of piling up at the end of term…

Late assignments that do not have my prior permission will be assessed a penalty of five percent per day, including weekends. I will not accept an assignment (without prior permission) seven days or more after the due date. In such cases the student will receive a grade of zero for the assignment.

Missed or Late Academic Requirements due to Student Absence:

Dalhousie University recognizes that students may experience short-term physical or mental health conditions, or other extenuating circumstances that may affect their ability to attend required classes, tests, exams or submit other coursework.

Dalhousie students are asked to take responsibility for their own short-term absences (3 days or less) by contacting their instructor by email prior to the deadline or scheduled time. For extended absences, please contact the instructor and the graduate coordinator of your program. NOTE: I will not require submission of the Student Declaration of Absence form, but I insist on an email to document the absence.

SIM GRADING POLICY

The following grading policy will be applied to all graduate students regardless of program. Undergraduate students will be graded according to University Undergraduate Courses Grading Scale.

A+	**90-100**	Demonstrates original work of distinction.
A	**85-89**	Demonstrates high-level command of the subject matter and an ability for critical analysis.
A-	**80-84**	Demonstrates above-average command of the subject matter.
B+	**77-79**	Demonstrates average command of the subject matter.
B	**73-76**	Demonstrates acceptable command of the subject matter.
B-	**70-72**	Demonstrates minimally acceptable command of the subject matter.
F	**<70**	Unacceptable for credit towards a Master's degree.

ACCOMMODATION POLICY FOR STUDENTS

The Student Accessibility Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students on the Halifax campus who request accommodation as a result of: a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (NS, NB, PEI, NFLD). If there are aspects of the design, instruction, and/or experiences within this course that result in barriers to your inclusion please contact the Student Accessibility Centre. Please visit www.dal.ca/access for more information and to obtain the Request for Accommodation form.

A note taker may be required as part of a student's accommodation. Visit https://www.dal.ca/campus_life/academic-support/accessibility/accommodations-/classroom-accommodation.html for more details.

Please note that your classroom may contain accessible furniture and equipment. It is important that these items remain in the classroom, undisturbed, so that students who require their use will be able to fully participate.

ACADEMIC INTEGRITY

In general:
At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect. As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

The commitment of the Faculty of Management is to graduate future leaders of business, government and civil society who manage with integrity and get things done. This is non-negotiable in our community and it starts with your first class at Dalhousie University. So when you submit any work for evaluation in this course or any other, please ensure that you are familiar with your obligations under the Faculty of Management's Academic Integrity Policies and that you understand where to go for help and advice in living up to our standards. You should be familiar with the Faculty of Management Professor and Student Contract on Academic Integrity, and it is your responsibility to ask questions if there is anything you do not understand.

Dalhousie offers many ways to learn about academic writing and presentations so that all members of the University community may acknowledge the intellectual property of others. Knowing how to find, evaluate, select, synthesize and cite information for use in assignments is called being "information literate." Information literacy is taught by Dalhousie University Librarians in classes and through Dalhousie Libraries' online Citing & Writing tutorials.

Do not plagiarize any materials for this course. For further guidance on what constitutes plagiarism, how to avoid it, and proper methods for attributing sources, please consult the University Secretariat's Academic Integrity page.

Please note that Dalhousie subscribes to plagiarism detection software that checks for originality in submitted papers. Any paper submitted by a student at Dalhousie University may be checked for originality to confirm that the student has not plagiarized from other sources. Plagiarism is considered a very serious academic offence that may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree. It is essential that there be correct attribution of authorities from which facts and opinions have been derived. At Dalhousie, there are University Regulations which deal with plagiarism and, prior to submitting any paper in a course; students should read the Policy on Academic Dishonesty contained in the Calendar.

Furthermore, the University's Senate has affirmed the right of any instructor to require that student assignments be submitted in both written and computer readable format, e.g.: a text file or as an email attachment, and to submit any paper to a check such as that performed by the plagiarism detection software. As a student in this class, you are to keep an electronic copy of any paper you submit, and the course instructor may require you to submit that electronic copy on demand. Use of third-party originality checking software does not preclude instructor use of alternate means to identify lapses in originality and attribution. The result of such assessment may be used as evidence in any disciplinary action taken by the Senate.

Finally:

If you suspect cheating by colleagues or lapses in standards by a professor, you may use the confidential email: ManagementIntegrity@dal.ca which is read only by the Assistant Academic Integrity Officer.

Faculty of Management clarification on plagiarism versus collaboration:

There are many forms of plagiarism, for instance, copying on exams and assignments. There is a clear line between group work on assignments when explicitly authorised by the professor and copying solutions from others. It is permissible to work on assignments with your friends but only when the professor gives you permission in the specific context of the assignment. University rules clearly stipulate that all assignments should be undertaken individually unless specifically authorised.

Specific examples of plagiarism include, but are not limited to, the following:

- **Copying a computer file from another student, and using it as a template for your own solution**
- **Copying text written by another student**
- **Submitting the work of someone else, including that of a tutor as your own**

An example of acceptable collaboration includes the following:

- **When authorised by the professor, discussing the issues and underlying factors of a case with fellow students, and then each of the students writing up their submissions individually, from start to finish.**

UNIVERSITY STATEMENTS

This course is governed by the academic rules and regulations set forth in the University Calendar and the Senate.

ACCESSIBILITY

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. We work collaboratively with Dalhousie and King's students, faculty, and staff to create an inclusive educational environment for students. The Centre is responsible for administering the university-wide Student Accommodation Policy working across all programs and faculties.

STUDENT CODE OF CONDUCT

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

DIVERSITY AND INCLUSION

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2).

INTERNATIONALIZATION

At Dalhousie, "thinking and acting globally" enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders."

RECOGNITION OF MI'KMAQ TERRITORY

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people. For more information about the purpose of territorial acknowledgements, or information about alternative territorial acknowledgements if your class is offered outside of Nova Scotia, please visit https://native-land.ca/.

The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit the office in the McCain Building (room 3037) or contact the programs at elders@dal.ca or 902-494-6803 (leave a message).

FAIR DEALING POLICY

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie.

COURSE SCHEDULE

The Course schedule may change throughout the term: dates may be altered due to weather (this is Nova Scotia after all!) and readings may be added or deleted. Academic journal articles can be found through Dalhousie Libraries https://libraries.dal.ca/research.html ; other materials will be posted to the course Brightspace page.

Week 1: 13-17 September

Course Introduction; Introduction to Geography, Environmental/Geospatial Data and Information, the language of spatial thinking; Data and data types

To do this week: Get used to the Brightspace page and understand how this course will run. Lecture and readings.

Thinking like a geographer is not just "Where is X?" or "What is the importance of Y?", but "How does Z work? What changes can be made to Z and what will happen? What is the context of Z and what will Z look like in the future? What comparisons can you make between X, Y, and Z, and what do they mean?" Thinking geographically allows you to create, acquire, and represent (i.e., "manage") geospatial information. In this first class I will introduce you to geography and some theories, terms, and "language;" and I will have you start asking geographic questions. By the last class, you might find it comes naturally…

Readings:

Cresswell, T. (2015). *Defining place*. In *Place: An introduction*. (2nd ed.). Chichester, UK: Wiley Blackwell. pp. 1-22. [pdf on Brightspace]

Goodchild, M. (2009). Neogeography and the nature of geographic expertise. *Journal of Location Based Services, 3* (2), 82-96

Williams, D. R. (2014). Making sense of 'place': Reflections on pluralism and positionality in place research. *Landscape and Urban Planning, 131*, 74-82.

A Few Resources: (*no need to look at all of these at once! More Web Resources on Brightspace*)

Afrobarometer. https://afrobarometer.org/ National public attitude surveys on democracy, governance, and society in Africa.

Assembly of First Nations. (2009) *Ethics in First Nations research*. Retrieved from http://www.afn.ca/uploads/files/rp-research_ethics_final.pdf

Native Land. https://native-land.ca/ Crowdsourced tool for mapping Indigenous territories, languages, and treaties worldwide.

Turnbull, D. (2008[1998]). *Maps are territories, Science is an atlas*. Retrieved from http://territories.indigenousknowledge.org/ *Note: The original book was published by The University of Chicago Press, 1998. Please understand that in 20 years, terminologies have changed, but the sentiment of the work – that of questioning the supremacy of Western cartography and geographical knowledge – is still very relevant.*

Mapping the Gay Guides. https://www.mappingthegayguides.org/map/ Understanding queer geographies with an online interactive map of gay-friendly establishments identified by the *Damron Address Book* (1965-1980)

Racial Equity: Tools to Address Racial Inequities (ESRI): https://www.esri.com/en-us/racial-equity/overview

Week 2: 20-24 September

Cartography: making and reading maps, critiquing maps, maps, power, and objectivity; layout, colour, and type

To do this week*: *Lecture and readings. Begin assignment LA01 – Reading maps/map metadata

NOTE: I will post several digital maps to our Brightspace page. You will choose 1 of these maps for LA01.

We struggle to understand our world and to represent it through various media. At some level, these representations are instinctual; at other levels they are mystifying. Were we ever really taught how to make or read maps? Professional cartographers certainly have, but as new software inspires the layperson to cartographic inclination, creating and reading maps has entered the digital democratic age with varying degrees of success. The first half of the class is devoted to how to manage geospatial information the way a cartographer would. The second half of this class is devoted to how to read a map as a geographer or cartographer might read it.

Readings:

Buckley, A., & Field, K. (2011). Making a meaningful map. *ArcUser, 2011* (Fall), 40-43 and online at http://www.esri.com/news/arcuser/0911/making-a-map-meaningful.html.

Harley, J.B. (2001). Texts and contexts in the interpretation of early maps. In Paul Laxton (Ed.) *The New Nature of Maps: Essays in the History of Cartography.* Baltimore and London: The Johns Hopkins University Press. [pdf available on Brightspace]

Kelleher, C. & Wagener, T. (2011). Ten guidelines for effective data visualization in scientific publications. *Environmental Modelling & Software, 26*(6), 822-827.

Robinson, A. H. & Bartz Petchenik, B. (1976). Mapping, language, and meaning. In *The Nature of Maps: Essays Toward Understanding Maps and Mapping*. Chicago: University of Chicago. [pdf on Brightspace]

As a cartographer, I have many sources on this topic! I can also ***recommend*** the following, or if there is an aspect of cartography you are particularly interested in, just let me know!

**Godlewska, A. & Grek Martin, J. (2011) *Map*. In J. A. Agnew & D. N. Livingstone (Eds.) *The SAGE handbook of geographical knowledge* (pp. 357-367). London: Sage. [pdf on Brightspace]

**Wood, D. and Fels, J. (2008). Cartographic constructions of the natural world. *Cartographica, 43*(3), 189–202.

Week 3: 27 September – 1 October

Fundamentals of Geospatial/Environmental Information: Data types and descriptive statistics (frequency, central tendency, distributions)

To do this week*: *Lecture and readings. Begin ws01: Excel pt. I

DUE: ESRI: Getting Started with GIS

By now you've had some experience thinking geographically, but before we start managing geospatial data through the ArcGIS software, it is wise to understand how to manage 'regular' or aspatial data. Part of this process is understanding how information about our world can be represented in the digital environment, and which types of information translate more easily (and which really, really don't). One way is to create data about our world through measurements and observations. Once we have the data, we can then use statistics to turn data into information…

Readings: (*You don't need to read all of these. I wanted to provide a few examples of the same material; just mentally add in your career title for 'nurse' or 'librarian' or 'environmental scientist' and they still work!)*

Byrne, G. (2007). A statistical primer: Understanding descriptive and inferential statistics. *Evidence Based Library and Information Practice,* 2(1), 32-47. (Concentrate on pp. 37-40, the inferential stats sections will be next week.)

Fisher, M.J. and Marshall, A.P. (2009). Understanding descriptive statistics. *Australian Critical Care,* 22, 93-97.

Wheater, C. P., & Cook, P. A. (2000). Describing data. In *Using Statistics to Understand the Environment* (pp. 25-49). New York, NY: Routledge. [pdf on Brightspace]

Resources:
Want to learn more about why statistics are important? Watch any TedTalk by the late Hans Rosling. One possibility is the following: https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen and you can also check out the website he started: https://www.gapminder.org/

Want more information about MS Excel? There are hundreds of online tutorials and here's one place to start…

Microsoft. *Excel training*. https://support.office.com/en-us/article/Excel-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb?ui=en-US&rs=en-US&ad=US I suggest starting with **Excel training / Use formulas and functions / Create formulas** if you are unfamiliar with Excel.

Week 4: 4-8 October

Fundamentals of Geospatial/Environmental Information: Classification of data and inferential statistics (introduction to Chi-square and linear regression)
To do this week*: *Lecture and readings. Begin ws02: Excel pt. 2
DUE: LA01: Reading maps, ws01

From last class we learned that descriptive statistics tell us some things about the data we have, but that isn't all stats has to offer. I must stress that this is not a stats class, merely an introduction to inferential statistics.

Readings:
Byrne, G. (2007). A statistical primer: Understanding descriptive and inferential statistics. *Evidence Based Library and Information Practice,* 2(1), 32-47.

Salkind, N. J. (2011). *Statistics for people who think they hate statistics* (4th ed, pp 163-180). Los Angeles and London: Sage Publications. [pdf on Brightspace]

***Extra practice with Chi-Square and Sampling (optional).*
*If you'd like to learn more about how Chi-Square works, or about sampling, here are two fun online tutorials presented as written instructions and a video brough to you by **Statistics How To:***

Statistics How To. *Chi-Square Statistic: How to Calculate It / Distribution*. http://www.statisticshowto.com/probability-and-statistics/chi-square/ and *Sampling in Statistics: Types and Error* http://www.statisticshowto.com/probability-and-statistics/sampling-in-statistics/

Ivo Dinov's Statistical Online Computational Resource. *Normal, Student's T, Chi-Square and F Statistical Tables.* http://www.socr.ucla.edu/Applets.dir/Normal_T_Chi2_F_Tables.htm

---

Week 5: University Closed on 11 October for Thanksgiving. This means we meet on 6 AND 7 December!

Week 6: 18-22 October

Introduction to Databases & Managing Geospatial Data; Geographic Information Systems (GIS); Properties of geospatial data

To do this week*: *Lecture and readings. Begin ws03: Introduction to ArcGIS

DUE*: ws02*

The week has finally arrived! You get to work with ArcGIS and start managing geospatial data.

Readings:

Burrough, P. A., McDonnell, R.A., & Lloyd, C. D. (2015). *Principles of geographic information systems* (pp 22-44). Oxford: Oxford University Press. [pdf on Brightspace]

ESRI's ArcMap. http://desktop.arcgis.com/en/arcmap/latest/map/main/mapping-and-visualization-in-arcgis-for-desktop.htm (Read: Introduction)

QGIS (n.d.) *A gentle introduction to GIS*. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: *Preamble*, *Introduction to GIS,* and *Data Capture*)

Young, J.C. (2016). Polar bear management in a digital Arctic: Inuit perspectives across the web. *The Canadian Geographer, 60* (4), 466-478.

*Note In lieu of textbooks that quickly go out of date, I will often refer you to ESRI's and QGIS's websites for relevant readings.

Recommended:

**Esri. (2015). *What is GIS?* Retrieved from http://www.esri.com/what-is-gis

**Evans, M.R., Oliver, D.; Zhou, X; & Shekhar, S. (2014). Spatial big data. In *Big data: Techniques and technologies in geoinformatics*. Hassan A. Karimi (Ed.) Boca Raton: CRC. (E-copy via Dalhousie Libraries, pdf accessible via BrightSpace)

Week 7: 25-29 October

Coordinate Systems and Projections; Spatial Reference (Guest lecture by Greg Baker, Maritime Provinces Spatial Analysis Research Centre, Saint Mary's University)

To do this week*: *Lecture and readings. Begin ws04: Projections

DUE*: ws03*

Contrary to what paper maps and computer screens insist, the world we live on is not flat. But did you know the world is not round, either?

Readings:

ESRI's What are map projections? http://desktop.arcgis.com/en/arcmap/latest/map/projections/what-are-map-projections.htm and How Buffer (Analysis) works https://pro.arcgis.com/en/pro-app/latest/tool-reference/analysis/how-buffer-analysis-works.htm

Kimmerling, A. J., Buckley, A. R., Muerhrcke, P. C., & Muerhrcke, J. O. (2016). Chapter 1: The earth and earth coordinates, in *Map use: Reading, analysis, interpretation* (8th ed.) Redlands, CA: Esri Press. https://esripress.esri.com/storage/esripress/images/315/mapuse_ch1.pdf [also available on Brightspace]

QGIS (n.d.) *A gentle introduction to GIS*. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: *Coordinate Reference Systems*)

Recommended:

Slocum, T. A., McMaster, R. B., Kessler, F. C. and Howard, H.H. (2009) *Thematic cartography and geovisualization* (3rd ed., pp. 113-128 and 153-172). Upper Saddle River, NJ: Pearson/ Prentice Hall. [pdf available on Brightspace]

Week 8: 1-5 November

Vector GIS: Properties of Vector data and how to use and analyze it

To do this week*: *Lecture and readings. Begin LA02 – Wind Energy NB *originally presented by SRES alumnus Jason Parisé*

DUE: ***ws04***

In week 3, we discussed different data types for GIS: raster and vector. This week we take a closer look at vector data and its pluses and minuses.

Readings:

Mock, B. (2019, January). *Why Detroit Residents Pushed Back Against Tree-Planting*, CityLab. https://getpocket.com/explore/item/why-detroit-residents-pushed-back-against-tree-planting?utm_source=pocket-newtab (also on Brightspace)

QGIS (n.d.) *A gentle introduction to GIS*. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: *Vector Data*, *Vector Attribute Data, Topology,* and *Vector Spatial Analysis (Buffers)*)

For Lab02:

Corscadden, K., Wile, A., & Yiridoe, E. (2012). Social license and consultation criteria for community wind projects. *Renewable Energy, 44*, 392-397.

Watson, I., Betts, S., & Rapaport, E. (2012). Determining appropriate wind turbine setback distances: Perspectives from municipal planners in the Canadian provinces of Nova Scotia, Ontario, and Quebec. *Energy Policy, 41*, 782-789.

Zimmerling, J. R., Pomeroy, A. C., d'Entremont, M. V., & Francis, C. M. (2013). Canadian estimate of bird mortality due to collisions and direct habitat loss associated with wind turbine developments. *Avian Conservation and Ecology, 8*(2), 10-22.

---

8 – 12 November Fall Break! (Yay!) University Closed on 11 November for Remembrance Day

---

Week 9: 15-19 November

Data Acquisition and Ethics; Metadata; Topics in Geospatial Information Management: Census Data (Guest Lecture by Jennifer Strang, GIS Centre, Dalhousie University)

To do this week*: *Lecture and readings. Begin ws05: Census Data

DUE: LA02

As you know, paper maps and cardboard globes are no longer the sole bearers of geospatial information. Digital media on various platforms have expanded the ways in which we understand, create, and display this information. Mobile devices and Global Positioning Systems (GPS) are alternatives to paper maps, due to their portability, while Google Maps and Geographic Information Systems (GIS) act in similar ways to globes and atlases by displaying varyingly complex geospatial situations. But the data, oh, the data!

Locational data is fantastic, but what is a military secret base if it can be spotted on Google Earth? How can location be used to identify an individual? Data is a treasure trove to researchers but privacy and security are questions that need good answers.

Readings:

Green, D.A. & Milligan, K. (2010). The importance of the long form census to Canada. *Canadian Public Policy, 36*(3), 383-388.

Monmonier, M. (1991). Datamaps: Making nonsense of the census. In *How to lie with maps* (pp. 139-162). Chicago: The University of Chicago. [pdf on Brightspace]

Walter, M., Andersen, Chris, & Ebooks Corporation. (2013). *Indigenous statistics: A quantitative research methodology*. Walnut Creek, CA: Left Coast Press. (Chapter 5, pdf on Brightspace or as an e-book through Dal Libraries)

For further reading:
DiBiase, D., Dutton, J. Sloan, J., & Baxter, R. (2012). Census data and thematic maps. In *Nature of Geographic Information*. Retrieved from https://www.e-education.psu.edu/natureofgeoinfo/c3_p1.html Pennsylvania State University & John A. Dutton e-Education Institute

---

Week 10: 22-26 November

Raster GIS: Properties of raster data and how to use and analyze it
To do this week*: *Lecture and readings. Begin ws06: Raster and Elevation
DUE: ws05

The yin to vector's yang, raster data behaves a bit differently…

Readings:
QGIS (n.d.) *A gentle introduction to GIS*. Retrieved from https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/index.html (Read: *Raster Data* and *Spatial Analysis (Interpolation)*)

Steinberg, S. J., & Steinberg, S. L. (2006). Analysis, interpretation, and application. *Geographic Information Systems for the Social Sciences* (pp. 22-25; 170-188). Thousand Oaks, CA: Sage Publications [pdf on Brightspace]

Week 11: 29 November – 3 December

Topics in Geospatial Information Management: Multi-Criteria Evaluation (MCE)
To do this week*: *Lecture and readings. Begin ws07: MCE
DUE: ws06

Multi-Criteria Evaluation can be a powerful way to bring together many aspects of a question – qualitative and quantitative and in both raster and vector data models -- and find out how they influence the phenomenon in a given location.

Readings:

Tuda, A.O., Stevens, T.F., & Rodwell, L.D. (2014). Resolving coastal conflicts using marine spatial planning. *Journal of Environmental Management, 133*, 59-68. (*Pay attention to the question the research is trying to answer, the criteria, and the methods. You do NOT have to understand the equations in order to understand this article!*)

Wright, D. J. (2012) Theory and application in a post-GISystems world. *International Journal of Geographical Information Science,* 26(12), 2197-2209. DOI:10.1080/13658816.2012.713957

Week 12: 6 December and 7 December

HGIS – GIS & the Humanities and Digital Conferences
To do this week*: *Lecture and readings. Final Portfolio Symposium
DUE: *ws07 on 6 December; PDF of Portfolio map Due 7 December (Grads only)*

One of the most interesting trends in GIS is Humanities research using GIS to visualize spatial dimensions of historical events and aspects of film and literature. The oft-touted "spatial turn" is taking shape as disciplines other than geography have realized that a geospatial perspective can shed light on new avenues of research.

Readings:

Bear Nicholas, A. (2017, June 27). Who owns Indigenous cultural and intellectual property? Retrieved from http://policyoptions.irpp.org/magazines/june-2017/who-owns-indigenous-cultural-and-intellectual-property/

Knowles, A.K., Westerveld, L. & Strom, L. (2015). Inductive Visualization: A Humanistic Alternative to GIS, *GeoHumanities, 1*(2), 233-265, DOI: 10.1080/2373566X.2015.1108831 http://www.tandfonline.com/doi/full/10.1080/2373566X.2015.1108831

Smith, L., & Ebooks Corporation. (2012). *Decolonizing methodologies : Research and indigenous peoples* (2nd ed.). London: Zed Books. (Chapter 10, pdf on Brightspace, also available as an e-book through Dal Libraries)

Travis, C. B. (2015). GIS and the poetic eye. In *Abstract machine: Humanities GIS* (pp. 47-57). Redlands, CA : Esri. [pdf available on Brightspace]

Resources:

The Digital Atlas of Roman and Medieval Civilizations. https://darmc.harvard.edu/

Undergrad and Grad PORTFOLIOS DUE 13 December 2021