

GEOG 3730 Course Outline

Geographic Information Systems

1. General Information

- Lecturer: David Walker
email: (David.Walker@Umanitoba.ca)
- Office Location: 253 Wallace
- Office Hours: By Appointment
- Lecture Room: 165 EITC
- Lecture Time: 10:00 AM – 11:15 AM T/R
- Lab Location: 321 Wallace
- Lab Time B01: 2:30-5:15 PM T
B02: 2:30-5:15 PM W
B03: 5:30–8:25 PM T

Note: Details in this course outline are intended to be complete and accurate, but may be subject to change as a result of unforeseeable circumstances.

Course Outline: The course introduces students to the evolving science, technology and applications of Geographic Information Systems (GIS). Related geospatial technologies such as Global Navigation Satellite Systems and Remote Sensing, as well as the field of Geomatics will be introduced.

Course Goals: (1) Familiarize students with GIS and related geospatial technologies; (2) Demonstrate how these technologies can assist in the “5 M’s” of GIS Science: Mapping, Measuring, Monitoring, Modeling, and Managing for a variety of human and environmental processes and patterns; and (3) provide practical “hands-on” experience in the computer processing of spatial data with a variety of GI systems.

Course Delivery: Classes and Labs will be in-person. However, should the need arise some lectures and labs may be done remotely. This might be the case especially if an instructor or TA is ill. The University does not have ‘substitutes’ for course delivery in case of illness, as long as symptoms are not too

severe, I will provide my lectures via on-line conferencing software (e.g. Zoom) or as recordings.

Temporary Absence Policy: The University requests that students and staff *remain at home if ill*. To that end, the University has adopted a policy for temporary absences that applies when a student is unable to complete a scheduled test, assignment or exam. See Schedule “A” at the end of this document for more details.

For chronic/long-term conditions that are physical, mental, or emotional, and that impact academic performance, please read the pertinent sections in Schedule “A”.

On-line Etiquette: Should some classes or lab sessions be held on-line the following etiquette protocols apply: during GEOG 3730 lectures and labs it is required that students mute computer microphones and cameras. Conferencing software used in class has a ‘raise hand’ and chat features that allow questions to be communicated. On-line meetings outside of lab and lecture slots can also be arranged to cover more complex topics and questions.

2. Materials

Required Textbook: *Longley, Paul A., Michael F. Goodchild, David J. Maguire, David W. Rhind. 2015. *Geographic Information Systems and Science*. 4th Edition. John Wiley & Sons.

*Previous editions of the textbook do not have the same content/sequencing. Use at your own risk.

Required Electronic Devices and Software: GEOG 3730 will be taught in person, but may need to use on-line conferencing and other web-based platforms should the need arise.

All other hardware and software will be provided in the computer lab.

Course Notes and Written Lab Materials: Course notes as a general policy *are not provided for this class*. It is the responsibility of students to arrange note taking in case of absences. That said, **some** figures, tables and slides will be made available on UMLearn and are identified as such during class. All lab materials are provided in pdf form on the Lab Server.

Using Copyrighted Material: Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to any website, unless an exception to the Copyright Act applies or written permission has been confirmed. For more information, see the University's Copyright Office website at umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca. Citation of copyrighted or any source materials in written assignments for this course should use either of the reference styles below:

American Psychological Association. (2019). Publication manual of the American Psychological Association (7th ed.). Washington, DC.

Council of Science Editors. Style Manual Committee. (2014). *Scientific style and format : The CSE manual for authors, editors, and publishers* (8th ed.). Chicago (IL): Council of Science Editors in cooperation with The University of Chicago Press.

Recording Class Lectures: Dr. David Walker and the University of Manitoba hold copyright over the course materials, presentations and lectures that form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without

permission of Dr. David Walker. Course materials (both paper and digital) are for the participant's private study and research.

Software: We will primarily use QGIS and ArcGIS Desktop software installed on the lab computers. The labs are designed to introduce these software resources, but ultimately it is the responsibility of the student to learn these packages. Advanced computer applications and databases make use of the file system of a computer, spreadsheets, computer networks and web applications, knowledge of these are assumed.

3. Evaluation

Mid-term (Oct. 31, 2023 in class)	25%
Labs* (5 at 6% each)	30%
Final Exam (2hrs)	45%

*Lab report due dates will be provided in lab, but typically each lab is due two weeks after being assigned.

4. Lab Assignments

Lab Attendance: All lab materials including specifics of each assignment and instructions for their completion (written and supplemental), will be provided on-line through the **Lab Server**. All assignments **must** be completed and handed in using the **Lab Server**. Because computer software is constantly changing, it may be necessary to provide oral instructions during lab time for unforeseen and unforeseeable events necessary to complete an assignment. These instructions will be provided **in the lab** in a clear and concise manner. It is the responsibility of students to incorporate any and all changes. Attendance during your registered lab section is essential.

Policy on Technology and Lab Use: It is general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. Technology provided in classrooms and labs is only for educational use and for

activities approved by your instructor and/or the University of Manitoba. This includes any technologies or software made available through on-line access. Students should not participate in personal direct electronic messaging/posting activities (social media) or online and offline gaming during scheduled class or lab time.

Lab Server Use and Policy: Detailed instructions for using the server, including connecting to it, will be provided during the first lab and subsequent lab sessions. In brief, the lab server has multiple folders for various classes and individuals on a **User (E)** drive. The materials for this class are in a **GEOG 3730** folder. In this folder there are three folders: **Data**, **Hand_In** and **Home**, with the latter containing your own **user folder**. This folder will be named using a **LabID** that will be assigned to you in the first lab (e.g. **geog3730_1**). Lab assignments and tutorials are provided in the **data folder** and **MUST** be copied to your **user folder BEFORE you start working on them**. Your **user folder** is the working directory where you keep copies of files in progress, backups and files to be handed in. Once an assignment is **completed** and **no later** than the designated due date, it must be saved to the lab **hand-in folder**.

Your **user home folder** is for course materials only. Materials related to other courses, or multimedia and other files must relate to course materials. Saving inappropriate, copyright restricted or illegal materials on the lab server may result in academic punishment and or other penalties.

Lab Report Submissions: Lab reports can consist of **multiple** components including a written report and other digital deliverables (e.g. maps, databases, posters, graphs etc.). When more than one document and deliverables are required, students should place all required files in a **new folder** in their **user folder** and then **zip the file into a compressed archive** (instructions will be

provided in lab). Electronic project submissions (whether a single file or zip archive) must be **NAMED** using the naming format specified in the lab.

All assignments **MUST** be **named properly**, be **complete**, and **MUST open** to be considered finished. The written report and deliverables must also be **organized** and follow the instructions provided in the lab assignments.

Assisting each other in the lab is encouraged, but all final reports and interpretations **MUST** be independent. Any work not deemed independent will be subject to disciplinary action as academic misconduct. Use of copyrighted material without permission, and inaccurate or incomplete referencing of source material are also academic misconduct and will be treated as such. **You have 24 hours** to verify that your assignment is received in the Hand-in folder on the server. This can be done in lab by asking the TA. **Improperly named Labs or failing to verify a hand-in** will result in a score of **0 (ZERO)** for the lab. Late submissions or failing to hand in a lab will result in an automatic “F” for the course.

5. Grade Distribution Scale

A+	>= 90%
A	80 – 89%
B+	75 - 79%
B	70 - 74%
C+	65 – 69%
C	60 – 64 %
D	50 - 59%
F	<= 49%

6. Academic Regulations and Expectations

Last VW date: Nov. 21, 2023 for withdrawal without academic penalty. One term test and several labs will be scheduled prior to this date to provide feedback.

Attendance: The course will run from Sept. 6, 2023 to Dec 11, 2023 and will be worth 3 credit hours. Regular attendance over this period is expected of all students enrolled in this course. Please note the following penalty: a student may be debarred from class, laboratories, and examinations by action of the dean/director for persistent non-attendance, or failure to produce assignments to the satisfaction of the instructor. Attendance of **all** laboratories and completion of **all** laboratory assignments is required to achieve a passing grade.

Plagiarism: Plagiarism, cheating or impersonation in the completion of assignments, and at examinations, are very serious offenses. Students caught plagiarizing on tests and laboratories may be debarred from class with further risk of academic penalty and possible expulsion. All graded work must be independent.

7. Academic Supports

The University of Manitoba provides many services and supports to encourage good scholarship and overall health and wellness including: instruction to improve writing skills, best use practices for copyrighted materials, and supports for studying for examinations etc., personal health (both mental and physical) including: student advocacy, student counseling and health services, etc. and supports for assaults (both verbal and physical). These are designed to make each student's experience positive, safe and assist in successful completion of courses and programs of study. The University provides and encourages all members and students to maintain a respectful work and learning environment. Policies have been developed regarding threatening behavior, or assaults whether verbal or physical to support victims and discipline offenders. For more information on these and for details regarding other policies, procedures and services

mentioned in this course outline see Schedule "A".

8. Outline of Main Topics*

- I. Introduction to GIS
 - What is GIS
 - GIS Case Studies
- II. Representing Geography
 - Geographic Representations
 - Nature of Geographic Data
 - Spatial Autocorrelation
 - Spatial Sampling
 - Georeferencing
 - Global Navigation Systems
- III. Creating, Maintaining and Using Geographic Databases
 - GIS Data Collection and Correction
 - Geographic Databases
 - Accessing Geographic Data
 - Distributed GIS
- IV. Geographic Data Analysis
 - Geovisualization
 - Vectors and Rasters
 - Measurement and Transformation
 - Uncertainty in GIS
- V. Spatial Data Modeling
 - Types of Models
 - Tools for Modeling
- VI. Future of GIS

*This outline may change without notice.

Schedule “A”

SECTION (A) ACADEMIC SUPPORTS

Writing and Learning Support

The Academic Learning Centre (ALC) offers services that may be helpful to you throughout your academic program. Through the ALC, you can meet with a learning specialist to discuss concerns such as time management, learning strategies, and test-taking strategies. The ALC also offers peer supported study groups called Supplemental Instruction (SI) for certain courses that students have typically found difficult. In these study groups, students have opportunities to ask questions, compare notes, discuss content, solve practice problems, and develop new study strategies in a group-learning format.

You can also meet one-to-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. If you are interested in meeting with a writing tutor, reserve your appointment two to three days in advance of the time you would like to meet. Also, plan to meet with a writing tutor a few days before your paper is due so that you have time to work with the tutor’s feedback. These Academic Learning Centre services are free for U of M students. For more information, please visit the Academic Learning Centre website at:

<http://umanitoba.ca/student/academiclearning/>

You can also contact the Academic Learning Centre by calling 204-480-1481 or by visiting 201 Tier Building.

University of Manitoba Libraries (UML)

As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found at:

<https://libguides.lib.umanitoba.ca/>

In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. When working remotely, students can also receive help online, via the Ask-a-Librarian chat. For a listing of all libraries or to access the chat, please consult the library main page:

www.umanitoba.ca/libraries

SECTION (B) ILLNESS & MENTAL HEALTH

For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.

Temporary Absence and Illness

The University has adopted a policy for temporary absences, when a student is unable to complete a scheduled test, assignment or exam, due to a brief absence. Temporary absences must be declared, see the following website for details:

<https://umanitoba.ca/student-supports/academic-supports/student-advocacy/self-declaration-policy-students#policy-definition-and-self-declaration-form>

For chronic/long-term conditions that are physical or mental, and that impact academic performance, see the sections below.

Student Accessibility Services (SAS)

While SAS describes their office as “providing supports for students with disabilities,” it is important to note that they can help accommodate a wide range of chronic/long-term conditions that are physical, cognitive or emotional. If you need help and support as a student, reach out!

You can register or access accessibility resources using the following link:

<https://umanitoba.ca/student-supports/accessibility>

Student Counseling Centre

Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or

depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. *Student Counselling Centre*:

<http://umanitoba.ca/student/counselling/index.html>

474 University Centre or
S207 Medical Services
(204) 474-8592

Student Support Case Management

Contact the Student Support Case Management team if you are concerned about yourself or another student and don't know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team. Contact the Student Support Intake Assistant:

<http://umanitoba.ca/student/case-manager/index.html>

520 University Centre
(204) 474-7423

University Health Service

Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation. See:

<http://umanitoba.ca/student/health/>

104 University Centre, Fort Garry Campus
(204) 474-8411 (Business hours or after hours/urgent calls)

Health and Wellness

Contact our Health and Wellness Educator if you are interested in information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault:

<http://umanitoba.ca/student/health-wellness/welcome.html>

Katie.Kutryk@umanitoba.ca
469 University Centre
(204) 295-9032

Live Well @ UofM

For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:

<http://umanitoba.ca/student/livewell/index.html>

SECTION (C) COPYRIGHT INFORMATION

All students are required to respect copyright as per Canada's *Copyright Act*. Staff and students play a key role in the University's copyright compliance as we balance user rights for educational purposes with the rights of content creators from around the world. The Copyright Office provides copyright resources and support for all members of the University of Manitoba community. For more information:

<http://umanitoba.ca/copyright>

SECTION (D) RIGHTS & RESPONSIBILITIES

Your rights and responsibilities

As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you. Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school. The Academic Calendar is an important source of information. View the sections (1) *University Policies and Procedures* and (2) *General Academic Regulations*:

<http://umanitoba.ca/student/records/academiccalendar.html>

While all of the information contained in these two sections is important, the following information is highlighted.

- If you have questions about your grades, talk to your instructor. There is a process for term work and final grade appeals. Note that you have the right to access your final examination scripts. See

the Registrar's Office website for more information including appeal deadline dates and the appeal form:

<http://umanitoba.ca/registrar/>

- You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the **Academic Integrity** regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the **Academic Integrity Site** for tools and support:

<http://umanitoba.ca/academicintegrity/>

View the **Student Academic Misconduct** procedure for more information.

- The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected to conduct yourself in an appropriate respectful manner. Policies governing behavior are included in the next section.

SECTION (E) POLICIES & INFORMATION

Respectful Work and Learning Environment

http://umanitoba.ca/admin/governance/governing_documents/community/230.html

Student Discipline

http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html and,

Violent or Threatening Behaviour

http://umanitoba.ca/admin/governance/governing_documents/community/669.html

- If you experience **Sexual Assault** or know a member of the University community who has, it is important to know there is a policy that provides information about the supports available to those who disclose and outlines a process for reporting. The **Sexual Assault** policy may be found at:

http://umanitoba.ca/admin/governance/governing_documents/community/230.html

More information and resources can be found by reviewing the Sexual Assault site:

<http://umanitoba.ca/student/sexual-assault/>

Intellectual Property

For information about rights and responsibilities regarding **Intellectual Property** view the policy:

https://umanitoba.ca/governance/sites/governance/files/2021-06/Intellectual%20Property%20Policy%20-%202013_10_01%20RF.pdf

Department Policies

For information on regulations that are specific to Environment and Geography, read the section in the Academic Calendar for the Department and on:

<http://umanitoba.ca/faculties/environment/departments/geography/index.html>

Contact an **Academic Advisor** within our faculty/college or school for questions about your academic program and regulations:

<http://umanitoba.ca/academic-advisors/>

Student Advocacy

Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns.

<http://umanitoba.ca/student/advocacy/>
520 University Centre
204 474 7423
student_advocacy@umanitoba.ca