

# GEOG 3730 Course Outline

## Geographic Information Systems

### 1. General Information

- Lecturer: David Walker  
(David.Walker@Umanitoba.ca)
- Office Location: 253 Wallace Bldg.
- Lecture: 221 Wallace Building
- Time: 8:30 AM – 9:45 AM T/R
- Lab Location: 321 Wallace Building
- Lab Time B01/B02: 2:30 - 5:15 PM T/W  
B03: 5:30 – 8:25 PM T

**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. Prerequisite: a grade of C or better in a minimum of three credit hours from Geography, Geology or Environment courses numbered at the 1000 and/or 2000 level, or permission of instructor or department head. Not to be held with GEOG 2250

**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.

### 2. Materials

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

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

**Recommended Textbook:** O'Sullivan, D. and D. Unwin. 2010. *Geographic Information Analysis*. 2<sup>nd</sup> Edition. John Wiley and Sons.

**Required Electronic Devices and Software:** None. All software and hardware is provided in the lab.

**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 a learning management system (such as UM Learn), or 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 <http://umanitoba.ca/copyright/> or contact [um\\_copyright@umanitoba.ca](mailto:um_copyright@umanitoba.ca). Citation of copyrighted or any source materials in written assignments for this course should use the APA or Council of Science Editors reference styles as outlined in the following:

American Psychological Association. (2009). *Publication manual of the American Psychological Association* (6th 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.

**Lab Software:** We will primarily use ArcGIS ArcDesktop and Idrisi which are provided in 321 Wallace. If you are not familiar with these programs please take the time to run through their tutorials. 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, and web applications, knowledge of these are assumed.

### 3. Evaluation

Mid-term ( <b>Oct. 31, 2019; Boo!</b> )	25%
Labs* (5 at 5% each)	25%
Final Exam (2hrs)	50%

\*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 materials including specifics of each assignment and instructions for their completion (written and supplemental), and data and software, are provided in 321 Wallace. All assignments **MUST** be completed on the lab computers in 321 Wallace 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 (e.g. new computer virus or system patch) 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 made to the written lab instructions.

**Policy on Technology and Lab Use:** It is the 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 instructor and/or the University of Manitoba. Students should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking) or online and offline gaming during scheduled class time. If a student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it.

**Lab Server Use and Policy:** All lab materials are provided on the Geography Lab Server in 321 Wallace. Detailed instructions for using the server will be provided during the first lab session. In brief, the lab server has three folders visible to each student: a **hand-out**, **hand-in** and **home** folder that contains your own **user folder** (named using the lab ID assigned to you in the first lab e.g. **geo99**). Lab assignments are provided in the **hand-out 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**.

The **user folder** is for course materials only. Papers and documents related to other courses are strictly not allowed to be saved in this directory. Multimedia and other files downloaded from the Internet 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 following naming format:

LASTNAME\_STUDENT#\_LABID\_ASSIGNMENT#

e.g. SMITH\_999999\_geo99\_LAB1[.pdf/.docx/.zip]\*

\*Extension depends on document type.

All assignments **MUST** be **named properly**, be **complete** and **MUST open** to be considered finished. In many instances we can accept screen captures of deliverables inserted into a single Word document or PDF of results. Specific instructions will be provided in the lab. The written report and deliverables must be organized and follow the instructions provided in the lab assignments.

Assisting each other in the lab is encouraged but all final reports and interpretation **MUST** be independent. Any work not deemed independent will be treated as an academic offense (See section 6 for pertinent information). Use of copyrighted material without permission, and inaccurate or incomplete referencing of source material Will also be treated as an academic offense. Late submissions will be awarded an automatic "F" unless a medical certificate is provided. Failure to hand-in one or more assignments will result in a grade of "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. 18, 2019 for withdrawal without academic penalty. The mid-term will be scheduled prior to this date to provide feedback.

**Attendance:** The course will run from Sept. 4 to Dec. 6, 2019 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 offences. 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 (if they weren’t recently

fired by Central Administration) 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 by subject:

<http://bit.ly/WcEbA1> or name:  
<http://bit.ly/1tJ0bB4>.

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. For a listing of all libraries, please consult the following: <http://bit.ly/1sXe6RA>. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries’ homepage:

[www.umanitoba.ca/libraries](http://www.umanitoba.ca/libraries).

### **Section (b) Mental Health**

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

**Student Counselling 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.

*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.

*University Health Service*

<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.

*Health and Wellness Educator*

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

[Katie.Kutryk@umanitoba.ca](mailto: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 and 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](http://umanitoba.ca/student/records/academiccalendar.html) <http://umanitoba.ca/student/records/academiccalendar.html> is an important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

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 and Services Information

### Respectful Work and Learning Environment

[http://umanitoba.ca/admin/governance/governing\\_documents/community/230.html](http://umanitoba.ca/admin/governance/governing_documents/community/230.html)

### Student Discipline

[http://umanitoba.ca/admin/governance/governing\\_documents/students/student\\_discipline.html](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](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](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:

[http://umanitoba.ca/admin/governance/media/Intellectual\\_Property\\_Policy\\_-\\_2013\\_10\\_01.pdf](http://umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.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](mailto:student_advocacy@umanitoba.ca)