# AN INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEM APPLICATIONS IN URBAN PLANNING (URBP-505)

## 3 Credits - Winter 2015

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**Office hours:**

David: Monday 1 pm – 3 pm, or email for an appointment or drop in office if the door is open at any time

Ahmed: Thursday 10 am – 11:45 am, or email for an appointment or drop in office if the door is open at any time

**Teaching Assistant:** David Verbich
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**Class Meeting:** Macdonald Harrington Building, Room 420, Tuesday 9:35 am to 10:55 am
**Lab Meeting:** Macdonald Harrington Building, Room 410, Monday 10:05 am to 11:25 am and Tuesday 11:05 to 12:25

### Course Description

This course will introduce students to geographical information system (GIS) concepts, provide a hands-on experience with GIS software, and explore how GIS can be applied in urban and regional planning contexts. Seminar topics include: geographic data and georeferencing; data modelling and collection; thematic mapping, visualization and map design; geodatabases; input and output techniques; spatial and network analysis techniques; and GIS applications in planning.

### Objectives

1. To provide an overview of GIS concepts and the range of GIS applications in urban planning.
2. To explore the usefulness of one of the leading GIS programs as a tool for professional urban planners and geographers.
3. To develop expertise in a specific GIS area of application by completing a 'final project' for a client.

### Course Structure

There is one 1.5 hours class lecture per week. The lecture will concentrate on GIS science. Students will have an opportunity to apply what is learned in the lectures in lab sessions. The lab assignments introduce students to relevant software and application of concepts. It is recommended that student use the drop-in lab time to work on their lab assignments.

Individual student participation in labs will be scheduled in one-hour and twenty minutes (Monday or Tuesday) blocks to allow time for personal "hands on" assistance with the course TA. A lab schedule sheet will be placed on the lab door. In addition, students are welcome to "drop in" for consultation with the instructors during the time blocked for the lab session for this course.

## Assignment and Evaluation Methods

| Description | Weighting |
|---|---|
| 19 lab exercises | 40 % (see last page of syllabus for the class schedules) |
| 2 assignments | 20 % (see last page of syllabus for the class schedules) |
| Reading reflections | 10 % (see last page of syllabus for the class schedules) |
| Class participation | 5 % |
| Final project | 25 % |

Assignment due dates are indicated in the class schedules (see last page). In fairness to all students, late assignments will automatically be downgraded unless there is a medical or family emergency: Late submissions will be marked down by 10% for every day except for an approved medical or family reason.

## Readings

There are two assigned books for this course they are available at the McGill bookstore.

Law, M. and Collins A. (2015). *Getting to Know ArcGIS for Desktop: Fourth edition,* ESRI Press

Longley, P., Goodchild M., Maguire D., and Rhind D. (2015). *Geographic Information Science and Systems: Fourth edition*, (John Wiley & Sons).

Additional readings will be uploaded to mycourses.

Getting to know ArcGIS comes with an ArcGIS 10.3 180 days trial version that you can download and use on your own laptops.

## Readings Reflections (10%)

One paragraph (200-300 words) of reflection should be submitted about a point you liked in the reading and you think it is important for practice. Reflections are due on **Mondays at 9:00 am**. Generally, the reflections should show your thoughts about the readings and the take home lessons. Reading reflections are submitted through mycourses. Marks will be assigned based on content and completion.

## Lab exercises (40%)

Each week students will be carrying out a set of exercises from the assigned book Getting to Know ArcGIS (2015) during the lab time except for the network and 3D analysts we will provide you with a detailed exercise with steps. Students are required to upload a pdf of the final output of each week's exercise to mycourses for evaluation. Weekly exercises are due on **Friday at 9:00 am**. Late submissions will be marked down by 10% for every day except for an approved medical or family reason.

Interaction with the TA with questions should be limited to the lab time since he has other work to do as a graduate student. Please respect this rule, you can drop by any of the professors' offices for feedback or questions at any time.

### Assignments (20%)

In addition to the weekly lab exercises students will be given two assignments. The grade assigned to these assignments is 20% of the final mark (10% each). The first assignment will involve mapping election results for the 2015 Canadian elections. Assignment will be distributed on **February 2nd 2016** and is due on **February 16th 2016** at **9:00 am**. You need to upload a pdf version of the assignment to mycourses by the due date and time. While the second assignment involves mapping and comparing results between the 2015 and 2011 elections. The assignment will be distributed on **February 16th 2016** and is due on **March 8th 2016** at **9:00 am**. You need to upload a pdf version of the assignment to mycourses by the due date and time. Late submissions will be marked down by 10% for every day except for an approved medical or family reason.

These assignments will measure your understanding and mastering of the GIS software and they build on the weekly exercises. You will not be given steps as in the lab exercises. We expect you to apply the tools you learned in the lab exercises to solve these assignments.

## Final Project (25%)

Each student is expected to work alone on a final GIS project of her/his choice. The objective, scope, methodology and expected output for each project are to be set out in a written proposal that is due online as a pdf document on mycourses as well as a printed version to the professors on **Monday March 7th 2016 at 9:30 am**.

The proposal should include sufficient information to enable a 'client' to establish the appropriateness and practicality of the project. It should include the project title, the project objectives or mandate, brief review of related literature (at least 3 articles to be included as references), and a description of data sources and data analysis routines that will be used. A maximum of 2 pages double spaced with 1 inch margins and 12 points font.

Students will schedule meetings with the professors during the lab time on **Monday March 7th 2016** and **Tuesday March 8th 2016** to discuss the proposals.

All projects will be formally presented at the end of term during the lecture time on **Tuesday April 5th 2016** and **Tuesday April 11th 2016**. Students will be provided with feedback on the projects. The final version of the document must be submitted in **paper format** and **online** through mycourses as a pdf. This document is due **Friday, April 15th at 11:00 pm.**

The final project paper should be 6000 - 7500 words long, including figures, tables, and references. Each figure or table will count for 250 words. The projects are intended to assess the capacity of ArcGIS to meet the requirements of particular "clients" who are concerned with specific planning problem. Possible topics include:

1. *Land suitability analysis*. The manipulation of environmental overlays to identify areas most suitable for particular land use classes.
2. *Parcel based information system*. Development of a flexible spatially referenced information system for a small municipality.
3. *Network analysis* for a pedestrian or vehicular system. Development of a transportation network model that may be used to assess facility location, service areas or optimal routing.
4. *Spatial analysis*. Analysis of the distribution of selected phenomena with respect to location and environmental features.
5. *Spatial epidemiology*. Use of GIS tools in Health Geography. Analysis of the spatial patterns of disease, accidents, BMI etc.
6. *Temporal analysis*. Analysis of spatial patterns over time.
7. *Systems modeling*. Development of a system to model changes over time.

Please do not limit yourself to the above ideas these are just suggestions from our side.

**Data Sources**

You can use any GIS data from any open source for example open street maps https://www.openstreetmap.org/#map=10/45.5121/-73.5493 the city of Montreal has also a set of open GIS data that can be used. The TRAM data archive is another source http://tramarchive.mcgill.ca/tram/ you will need to register and download the data you need. If the data is not present in the archive you can do a special request through the Geographic Information Systems library at McGill http://www.mcgill.ca/library/find/maps these requests takes time so please plan ahead. Please note many of the data obtained from various sources might requires manipulations to adjust projections.

In accordance with McGill University's Charter of Students' Right, students in this course have the right to submit in English or in French any written work that is to be graded.

## Academic Integrity

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information).

## Disabilities

If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 398-6009 (online at http://www.mcgill.ca/osd) before you do this.

## Safety

McGill University shall strive to be recognized as an environmentally safe and responsible institution, and as a model of environmentally responsible living. (see www.mcgill.ca/tls/policy/environmental_policy). For all emergencies please contact McGill security Services at 514-398-3000.

| Week | Date | Lecture | Readings | Lab date | Exercise | Chapters | Exercises | Notes |
|---|---|---|---|---|---|---|---|---|
| 1 | *Jan 7 **Thursday lecture** | Introduction to map and GIS basics | None | **No lab** | None | None | None | |
| 2 | Jan 12 **TRB** | GIS science<br>Nature of geographic data<br>Representing geography | 1<br>2<br>3 | Jan 11-12 | **Maps and data basics**<br>• Interacting with maps<br>• Interacting with data<br>• Exploring online resources | 3—5 | 3—5 | |
| 3 | Jan 19 | Georeferencing<br>Uncertainty<br>GI system software | 4<br>5<br>6 | Jan 18-19 | **Displaying and presenting data I**<br>• Coordinate and projection systems<br>• Symbolizing features<br>• Classifying features | 6—8 | 6—8 | |
| 4 | Jan 26 | Geographic data modeling<br>Data collection | 7<br>8 | Jan 25-26 | **Displaying and presenting data II**<br>• Labeling features<br>• Map composition | 9,10 | 9,10 | |
| 5 | Feb 2 | Cartography and map production<br>Geovisualization | 11<br>12 | Feb 1-2 | **Getting info about features**<br>• Querying data<br>• Feature selection<br>• Joins and Relates | 15—17 | 15—17 | Assignment 1 handed out |
| 6 | Feb 9 | Census units, boundaries and data | Arctur 3 | Feb 8-9 | **Work on assignment 1** | | | |
| 7 | Feb 16 | Creating and maintaining geodatabases | 9 | Feb 15-16 | **Creating and editing data I**<br>• Building geodatabases<br>Creating features **Creating and editing data II**<br>• Editing features<br>• Geocoding addresses | 11,12,13 | 11,12,13 | **Assignment 1 due**<br>Assignment 2 handed out |
| 8 | Feb 23 | Spatial data analysis | 13 | Feb 22-23 | **Preparing data for analysis** | 18 | 18 | |
| 9 | Feb 30 | NO CLASS OR LAB – STUDY BREAK | | | | | | |
| 10 | Mar 8 | Managing GI systems<br>Information and decision making<br>Navigating risks | 16<br>17<br>18 | Mar 7-8 | **Geoprocessing vector data** | 19 | 19 | **Project proposal due**<br>**Assignment 2 due** |
| 11 | Mar 15 | Spatial analysis and inference<br>Spatial modeling with GI systems | 14<br>15 | Mar 14-15 | **Spatial Analyst and 3D analyst** | 20, 3D | 20 | |
| 12 | Mar 22 | GIST | | Mar 21-22 | **Network Analyst**<br>• Network buffers<br>• OD data analysis | | | |
| 13 | Mar 29 | NO LECTURE – EASTER MONDAY | | | | | | |
| 14 | Apr 5 | Student presentations | | Apr 4-5 | | | | |
| 15 | Apr 12 | Student presentations | | Apr 11-12 | | | | |