



**EES1109 – Advanced Techniques in Geographic Information Systems**

**Mondays, 5:00 pm to 9:00 pm**

**Ian D. Smith**

**Office Hours (online, via request email to [ismith@Lydenv.com](mailto:ismith@Lydenv.com)) Mondays, 4:00 pm to 5:00 pm**

**COURSE DESCRIPTION**

This course covers an advanced set of techniques and applications for the effective use of Geographic Information Systems (GIS) in the environmental sciences. This course includes a substantial practical component, with firsthand demonstration and exercises that are designed to reinforce theoretical/technical concepts in cartography and spatial analyses. Technical issues to be discussed include data formatting and interoperability, effective cartographic representations, spatial frameworks/georeferencing, and spatial/textural data types. Applications of GIS within the environmental sector will be explored including terrain/bathymetric modelling and analyses, landuse and land cover analyses (with remotely sensed data), suitability analyses, and 2D/3D spatial data visualization.

**COURSE OBJECTIVES**

Students will be provided with the information to allow them to perform a variety of tasks within a spatial context, dealing with a number of GIS topics through a series of practical assignments as outlined in the SCHEDULE, below. The primary software that is to be used within this course is ESRI's ArcGIS Desktop platform (ver. 10.8.1) and the Spatial Analyst and 3D Analyst extensions. While ArcGIS is the primary means to explore spatial modelling and analyses, some discussion of alternatives will be made (lower cost alternatives such as Manifold, QGIS and GRASS).

## SCHEDULE

Teaching/Learning Plan:

Lecture/Week (Date/Time)	Topic	Evaluation
1 (Mon. Jan. 10; 5:00 pm to 9:00 pm)	Introduction (Lecturer, Students, Course)	None – Students to ensure that they can access U of T VPN and/or ArcGIS v. 10.8.1 software.
2 (Mon. Jan. 17; 5:00 pm to 9:00 pm)	Introduction (ArcGIS), Self-Directed GIS Workshop W1	Self-Directed Workshop W1 – ArcGIS (no grade).
3 (Mon. Jan. 24; 5:00 pm to 9:00 pm)	Spatial Referencing and Georeferencing in ArcGIS	Deliverable D1 introduced, due 07 February 2022 (25% of final grade).
4 (Mon. Jan. 31; 5:00 pm to 9:00 pm)	3D Analysis using ArcGIS	In-class Workshop W2 – ArcGIS 3D Analyst Extension (no grade).
5 (Mon. Feb. 07; 5:00 pm to 9:00 pm)	Spatial Analyses in ArcGIS	Deliverable D2 introduced, due 28 February 2022 (25% of final grade); Self-Directed Workshop W3 – ArcGIS Spatial Analyst Extension (no grade).
6 (Mon. Feb. 14; 5:00 pm to 9:00 pm)	Image Interpretation and Analysis	Deliverable D3 introduced, due 04 April 2022 (35% of final grade).
<b>Reading Week (Mon. Feb. 21)</b>		
7 (Mon. Feb. 28; 5:00 pm to 9:00 pm)	Image Enhancement and Processing	In-class Workshop W4 – ArcGIS Image Analyst Extension (no grade).
8 (Mon. Mar. 07; 5:00 pm to 9:00 pm)	Spatial Data Collection Technologies	None.
9 (Mon. Mar. 14; 5:00 pm to 9:00 pm)	Multi-Criteria/Suitability Analyses	In-class Workshop W5 – Suitability Analyses in ArcGIS (no grade).
10 (Mon. Mar. 21; 5:00 pm to 9:00 pm)	Spatial Interpolation	None.
11 (Mon. Mar. 28; 5:00 pm to 9:00 pm)	Variography and ArcGIS Geostats Analyst	None.
12 (Mon. Apr. 04; 5:00 pm to 9:00 pm)	Term Project Presentations	Deliverable D3a Report (25% of final grade) to be submitted before class; Peer presentation (10% of final grade).
1 to 12 (Through Semester)	Professionalism Assessment	In-class/field Assessment of Professionalism (15% of final grade).

## EVALUATION

**Deliverable (Assignment) One:** Georeferencing Historic Aerial Imagery using ArcMAP (25% of final grade):

- Introduced in Lecture Three (24 January 2022), and
- Due before Lecture Five (07 February 2022).

**Deliverable Two:** Terrain Analyses using ArgGIS and its 3D and Spatial Analyst Extensions (25% of final grade):

- Introduced in Lecture Five (07 February 2022), and
- Due before Lecture Seven (28 February 2022).

**Deliverable Three:** Term Project using ArcGIS – Technical Memorandum Report (D3a: 25% of final grade) and Peer Presentation (D3b: 10% of final grade):

- Introduced in Lecture Six (14 February 2022), and
- D3a due before Lecture Twelve (04 April 2022); presentations (D3b) during regularly scheduled lecture of 12 April 2022.

The evaluations will be carried out in accordance with the Graduate Grading and Evaluation Practices Policy (and how that policy is interpreted and applied in this Dept.) <http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/grading.pdf>

### **VERIFICATION OF ILLNESS**

A **Verification of Illness** (also known as a “doctor’s note”) is temporarily not required. Students who are absent from academic participation for **any reason** (e.g., COVID, cold, flu and other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on **ACORN under the Profile and Settings menu**. Students should also advise their instructor of their absence. Visit [COVID-19 Information for University of Toronto Students](#) page on the Vice-Provost, Students website for information on this and other frequently asked questions.

### **EMERGENCY PLANNING**

Students are advised to consult the university’s preparedness site (<http://www.preparedness.utoronto.ca>) for information and regular updates regarding procedures relating to emergency planning.

### **ACCESSIBILITY NEEDS**

The University of Toronto is committed to accessibility. If you require accommodations for a disability or have any accessibility concerns about the course, the classroom or course materials, please contact the UTSC Accessibility Services as soon as possible: <http://www.utsc.utoronto.ca/~ability/>. We also suggest you also refer to the following University of Toronto Scarborough Library link: <http://utsc.library.utoronto.ca/services-persons-disabilities>

### **PLAGIARISM**

University of Toronto Code of Behaviour on Academic Matters states that “it shall be an offence for a student knowingly: to represent as one’s own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism.”

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the UofT writing website at <http://advice.writing.utoronto.ca/using-sources/documentation>.

### **The full Code of Behaviour regulations could be found from consulting**

<https://www.sgs.utoronto.ca/policies-guidelines/academic-integrity-resources/>

The University of Toronto has a site license that enables all faculty and students to use Ouriginal, a new plagiarism prevention system. To learn more about the plagiarism detection software - <https://q.utoronto.ca/courses/46670/pages/integration-plagiarism-detection-tool> . Instructors can email [quercus.utsc@utoronto.ca](mailto:quercus.utsc@utoronto.ca) for direct assistance.

“Normally, students will be required to submit their course essays to the University’s plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool’s reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University’s use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).”

### **WRITING AND ENGLISH LANGUAGE**

As well as the faculty writing support, please see [English Language and writing support at University of Toronto](#) or the [Centre for Teaching and Learning](#) at UTSC.

The following is also useful:

Sylvan Barnett, *A Short Guide to Writing About Art*. 5-7th edition (New York: Harper-Collins, 1997)

William Strunk Jr., E.B. White. *The Elements of Style* (New York: MacMillan Publishing)

**LATE WORK**

Late deliverables will be assigned a penalty of 10% per day, assessed immediately after the due date and time noted in the deliverables' terms-of-reference.

**READINGS**

Readings are assigned and provided within the lecture materials presented within the Quercus system.

**FINAL EXAM DATE (IF APPLICABLE)**

N/A

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