# Course Outline Form: Fall 2017

## General Information

**Course Code:** ENVS\*4390

**Course Title:** Soil Variability and Land Evaluation

**Course Description:** This course integrates formal in-field (including a two-day camp & excursions during orientation week) and laboratory training, with classroom discussions of concepts, to guide independent group projects on the gathering and interpreting of soilscape information. The principal focus is on soil, as a spatially- and temporally-variable product and component of ecosystems; special consideration is given to the factors controlling soil processes, from local to global scales. An examination of methods, for describing and quantifying the distribution of soils, includes survey and sensor-based techniques, in conjunction with data trend analysis and modelling. Students are required to notify the instructor in the preceding Winter semester of their intention to participate.

**Credit Weight:** 1.0

**Academic Department (or campus):** School of Environmental Sciences

**Campus:** Guelph

**Semester Offering:** Fall 2017

**Class Schedule and Location:** Lectures ALEX 124 TTH 10:00 – 11:20

Labs (section 01) ALEX 124 F 10:30 - 11:20

## Instructor Information

Instructor Name: Dr. Richard J Heck, P.Ag.

Instructor Email: rheck@uoguelph.ca

Instructor Phone and Extension: 519-824-4120 x52450

Office location and office hours: ALEX 140; appointments arranged by email

## GTA Information

GTA Name: n/a

GTA Email: n/a

GTA office location and office hours: n/a

## Course Content

### Specific Learning Outcomes:

Upon completion of this course, students should be able to…

1) comprehend the techniques for in-field description of soils and their landscape setting.

2) recognize the major types of landforms and soils in SW Ontario, under both natural and managed ecosystems.

3) understand principal controls on the distribution of soils and dynamics of the dominant processes occurring in them.

4) be acquainted with both traditional and evolving approaches gathering, processing and interpreting soilscape information.

5) use the Canadian System of Soil Classification and recognize the main international systems.

6) apply major national systems/frameworks to evaluate and rate land capability or suitability.

7) working within a group context, collect key characteristics of a focus landscape, then integrate/rationalize with existing land resource information and primary literature.

### Lecture Content:

|  |  |  |
| --- | --- | --- |
| #) Date | Topic | Evaluation |
| 1) Sep 12 | 1 Soil & the Pedosphere | Midterm Exam |
| 2) Sep 14 | 2.1 Controls on Soil Variability - Site Factors | Midterm Exam |
| 3) Sep 19 | 2.2 Controls on Soil Variability - Flux Factors | Midterm Exam |
| 4) Sep 21 | 2.3 Controls on Soil Variability - Soil Through Time | Midterm Exam |
| 5) Sep 26 | 2.4 Controls on Soil Variability - Human Impact on Soil | Midterm Exam |
| 6) Sep 28 | 3.1 Soil Development - Gains & Losses | Midterm Exam |
| 7) Oct 3 | 3.2 Soil Development - Translocations & Transformations | Midterm Exam |
| 8) Oct 5 | 3.3 Soil Development - Soil Morphogenesis | Midterm Exam |
| 9) Oct 12 | 3.4 Soil Development - Soil Quality | Midterm Exam |
| 10) Oct 17 | 4.1 Soilscape Inventory - Traditional Soil Survey & Mapping (Legacy Surveys, SLC – CANSIS) | Midterm Exam |
| 11) Oct 19 | 4.2 Soilscape Inventory - Application of Geophysical Techniques (Inversion) | Midterm Exam |
| 12) Oct 24 | 4.3 Soilscape Inventory - Application of Remote Sensing (Systems, Segmentation, Indices) | Midterm Exam |
| 14) Oct 31 | 5.1 Quantifying Soilscape Variability - Conventional Statistics & Geostatistics | Final Exam |
| 15) Nov 2 | 5.2 Quantifying Soilscape Variability - Modelling the Soil Continuum | Final Exam |
| 16) Nov 7 | 6.1 Soil Classification - Basic Concepts | Final Exam |
| 17) Nov 9 | 6.2 Soil Classification - Wetland Soils | Final Exam |
| 18) Nov 14 | 6.3 Soil Classification - Woodland Soils | Final Exam |
| 19) Nov 16 | 6.4 Soil Classification - Grassland Soils | Final Exam |
| 20) Nov 21 | 6.5 Soil Classification - Azonal Soils | Final Exam |
| 21) Nov 23 | 7.1 Land Evaluation Systems - Canada Land Inventory (Ontario Implementation) | Final Exam |
| 22) Nov 28 | 7.2 Land Evaluation Systems - Ecological & Agri-Environmental Systems | Final Exam |
| 23) Nov 30 | 7.3 Land Evaluation Systems - Land Suitability Rating Systems | Final Exam |

### Labs:

|  |  |  |  |
| --- | --- | --- | --- |
| #) Date | Activity | Due Date | Grade |
| 1) Sep 15 | Airphotos & Satellite Imagery for Soilscape Evaluation - accessing & interpreting stereo airphotos, ortho airphotos and satellite imagery. | same day | 1% |
| 2) Sep 22 | Digital Elevation Models in Soilscape Evaluation - accessing digital elevation models & landform segmentation | same day | 1% |
| 3) Sep 29 | Geological Inventory Resources for Soilscape Evaluation - accessing & interpreting geological spatial data and reports. | same day | 1% |
| 4) Oct 6 | Ecological Inventory Resources for Soilscape Evaluation - accessing & interpreting ecological spatial data and reports. | same day | 1% |
| 5) Oct 13 | Soil Inventory Resources for Soilscape Evaluation - accessing & interpreting soil spatial data and reports. | same day | 1% |
| 6) Oct 20 | Land Capability Inventories for Soilscape Evaluation - accessing & interpreting land capability data and reports. | same day | 1% |

### Seminars:

N/A

### Course Assignments and Tests:

| **Assignment or Test** | **Due Date** | **Contribution to Final Mark (%)** | **Learning Outcomes Assessed** |
| --- | --- | --- | --- |
| Field Camp & Excursion Exercises/Notes | same day, Sep 5 to 8’17 | 15 | 1, 2, 3, 4, 5, 6, 7 |
| Laboratory Exercises (best 5 of 6) | on same day as lab | 5 | 4, 5, 6 |
| Group Project Plan | Sep 25’17 | 5 | 7 |
| Midterm Examination | Oct 26’17 (in class) | 25 | 2, 3 & 4 |
| Project Preliminary Technical Report | Oct 23’17 | 10 | 7 |
| Project Final Technical Report | Nov 13’17 | 10 | 7 |
| Group Project Oral Presentation | tbd, Nov 27 to Dec 1’17 | 10 | 7 |
| Final Examination (scheduled by registrar) | Dec 15’17 (08:30-10:30), local tbd | 20 | 5, 6 & 7 |

Additional Notes (if required):

Best five of six laboratory exercises will be counted toward final grade.

### Final examination date and time: Friday, December 15, 2017; 08:30 to 10:30 AM

### Final exam weighting: 20%

## Course Resources

### Required Texts:

Heck, R.J., Kroetsch,D.J., Lee,H.T., Leadbeater,D.A, Wilson, E.A. & Winstone, B.C. 2017 “Characterizing Sites, Soils & Substrates in Ontario Volume 1-Field Description Manual” School of Environmental Sciences, University of Guelph.

### Recommended Texts:

1) Fanning, D.S. & Fanning, M.C.B. 1989. “Soil: Morphology, Genesis and Classification” Wiley;

2) Schaetzl, R. & Anderson, S. 2005. “Soils: Genesis and Geomorphology” Cambridge University Press.;

3) Constantini, E.A.C. 2009. “Manual of Methods for Soil and Land Evaluation” Science Publishers.

4) Soil Classification Working Group. 1998-revised. “The System of Soil Classification for Canada” Publication 1646. Canada Department of Agriculture. NRC Research Press, Ottawa.

### Lab Manual:

Copies of “Characterizing Sites, Soils & Substrates in Ontario Volume 2-Compendium of Interpretive Frameworks” and “Munsell Soil Color Charts” will be provided for field activities.

### Other Resources:

Any relevant course material, including Field Camp/Excursion outlines, Field Forms, Laboratory Exercises and Lecture Presentations, will be posted for students on CourseLink.

### Field Trips:

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Activity | Due Date | Grade |
| Sep 5 | Field Camp/Excursion – University of Guelph Arboretum & Hand Texturing | same day | 4% |
| Sep 6 | Field Camp/Excursion – Guelph Turfgrass Institute & Guelph Drumlin Field (UofG Elora Research Station) | same day | 5% |
| Sep 7 | Field Camp/Excursion – Flamborough Plain (Kirkwall area), Haldimand Clay Plain (Cayuga area), Norfolk Sand Plain (UofG Simcoe Research Station) | same day | 3% |
| Sep 8 | Field Camp/Excursion – Paris Moraine & Outwash Plain (Starkey Conservation Area/Arkell Springs), Blackbridge Road/Speed River & Luther Marsh Conservation Area | same day | 3% |
| Sep 9 to 25 | Independent Group Project – reconnaissance of study area sub-region (required for Group Project Plan) | Sept 25 | 5% |
| Sep 30 to Oct 23 | Independent Group Project - in-field survey of study area sub-region (required for Preliminary Technical Report) | Oct 23 | 10% |

\*Equipment (including reflective vests and safety supplies) and transportation (rental vehicles) will be provided for the Field/Camp Excursions. Equipment will be provided for Group Projects, but students are responsible for their own transportation.

### Additional Costs:

### - Students must use appropriate clothing for field work, including protective footware.

## Course Policies

### Grading Policies:

### 10% reduction of grade (evaluated), for item in question, for each week or part thereof. Items not received before the date set for start of final exams, will be assigned a grade of 0 (zero).

### Course Policy on Group Work:

### Technical reports/oral presentations will be completed in groups of 3 or 4.

### Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

## University Policies

### Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml).

### Academic Misconduct:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml).

### Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the [Student Accessibility Services website (http://www.uoguelph.ca/csd/)](http://www.uoguelph.ca/csd/).

### Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the [Course and Instructor Evaluation Website](https://courseeval.uoguelph.ca/) **for more information.**

For this course, the course evaluation will be conducted in-class, near the end of the semester; the specific time to be scheduled by the Director of the School of Environmental Sciences.

### Drop period:

The drop period for single semester courses starts at the beginning of the add period and extends to the Fortieth (40th) class day of the current semester (the last date to drop a single semester courses without academic penalty) which is listed in [Section III (Schedule of Dates) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/).

The drop period for two semester courses starts at the beginning of the add period in the first semester and extends to the last day of the add period in the second semester.

Information about Dropping Courses can be found in [Section VIII (Undergraduate Degree Regulations and Procedures) of the Undergraduate Calendar](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml).

## Additional Course Information

#### Independent Group Project Technical Reports & Presentation

(Instructions and Guidelines)

Overview - this group exercise constitutes 35% of the final course grade:

Each group of 3 or 4 will research relevant literature, acquire available biophysical resource inventories (including, but not restricted to, soils, geology, physiography and ecology) for an assigned sub-region of a study area to be determined (within or near Guelph), as well as conduct in-field surveys (including, but not limited to, soil and vegetation). This information is to be collated, synthesized and interpreted. Special guidance, with respect to aspects to be considered, will be provided once study area has been selected.

\* Group Project Plan (5% final grade) – due Sep 25’17, feedback same week:

Structure: cover page; table of contents; goals & objectives; identification of study area sub-region; existing biophysical resource inventories and type of literature to be reviewed; in-field survey activities to be conducted, with methods and resources/equipment to be used; timeline for project development (considering reports and presentation); distribution of tasks among group members; references cited.

Formatting: 2 to 3 pages; font size 12 Times New Roman (for graphics use sans serif); 1.5 line spacing; 1” margins; section headings/subheadings, tables and graphics, and pages to be numbered. Use referencing style of ‘Canadian Journal of Soil Science - CJSS’.

Evaluation (by instructor) Criteria: presentation, organization, content, synthesis, writing style. Rubric to be provided at start of class.

\* Project Preliminary Technical Report (10% final grade) – due Oct 23’17, feedback same week:

Structure: cover page; table of contents; list of tables; list of figures; introduction, with goals & objectives; relevant excerpts of existing biophysical resource inventories; type of literature encountered; description of in-field survey activities, with methods and resources/resources used; presentation (summary tables or graphics) of results of in-field survey; strategy for interpretation of material; references cited.

Formatting: 10 to 15 pages (not including references and appendices); font size 12 Times New Roman (for graphics use sans serif); 1.5 line spacing; 1” margins; section headings/subheadings, tables and graphics, and pages to be numbered. Summary tables and graphs to be inserted in report body; other materials (including previous feedback from instructor) go in appendix. Use referencing style of CJSS.

Evaluation (by instructor) Criteria: presentation, organization, content, synthesis and writing style. Rubric to be provided at start of class.

\* Project Final Technical Report (10% final grade) – due Nov 13’15, feedback same week:

Structure: cover page; table of contents; list of tables; list of figures; introduction, with goals & objectives; review of literature; characterization of study area sub-region, using relevant excerpts of existing biophysical resource inventories; description of in-field survey activities, with methods and resources/resources used; results of in-field survey & discussion; summary and conclusions; references cited.

Formatting: 15 to 20 pages (not including tables and figures, references and appendices); font size 12 Times New Roman (for graphics use sans serif); 1.5 line spacing; 1” margins; section headings/subheadings, tables and graphics, and pages to be numbered. Summary tables and graphs to be inserted in report body; other materials (including previous feedback from instructor) go in appendix. Use referencing style of CJSS.

Evaluation (by instructor) Criteria: presentation, organization, content, synthesis and writing style. Rubric to be provided at start of class.

\* Group Oral Presentation (10% of final grade) – Nov 27 to Dec 1’17 (location & time TBD):

Time Slot: 20 minutes per group.

Format: computer (with PowerPoint) and projector will be available.

Evaluation (by instructors and students – all students must attend other presentations) Criteria: suitability/quality of AV aids, organization, presentation style, content and audience engagement. Students who do not submit the evaluation forms, will lose 1 point off their final grade. Rubric to be provided at start of class.