GEO350: Landform Field and Laboratory Techniques (4 credits)
Fall 2016
Course Information and Syllabus

Schedule:	M, 2:00 to 5:40 pm	Instructor:	Dr. Sean J. Bennett
Location:	135 Wilkeson	Office:	126 Wilkeson Quad
Email:	seanb@buffalo.edu	Office Hours:	M 12:00 to 1:00 pm

Course objectives: This course is intended to introduce students to data collection techniques in Earth Systems Science. Students will actively participate in the data collection, data analysis, and error determination, individually and in groups, in both field and laboratory settings. Many of the topics will be linked to relevant environmental and geomorphic issues, and points for discussion will be posed. Students will develop and enhance their skills in data collection, reduction, and analysis, analytical thinking, scientific writing, and the preparation of professional reports.

Course Learning Objectives and Assessment Instruments

Program Learning Outcome	*Depth**	*Specific outcome objectives for GEO 350*	*Assessment instrument*
Provide breadth of knowledge of basic principles and concepts	1	Provide a broad background in the collection, processing, and analysis of Earth Systems Science data in both field and laboratory settings	Exercises 1-10
Provide depth within specialized areas	2	Learn to use, apply, and assess surveying equipment, with applications to landforms	Exercises 1-3
		Learn to use, apply, and assess various current meters to measure flow velocity and the stream gauging techniques in both field and experimental settings	Exercises 4 & 10
		Learn to use, apply, and assess water quality sensors and water quality analysis	Exercise 5
		Learn to use, apply, and assess evaporation pans and water budget analysis	Exercise 6
		Learn to collect, process, and characterize soils	Exercises 7 & 8
		Learn to use, apply, and assess hand-held global positioning systems	Exercise 9
Provide an understanding of experimental/research design and methodology	2	The scientific method will be presented and consistently applied in each written assignment	Exercises 1-10
Develop approaches for integration of information	1	Provide an overview of commonly used techniques for data collection and processing, including numerical analysis	Exercises 1-10
Encourage critical thinking and hypothesis building	2	Students will learn to critically assess all data collected and to define uncertainties, and to formulate and test hypotheses based on the observations made	Exercises 1-10
Provide skills in writing and communication	2	Each student will be required to write ten (10) laboratory reports following strict guidelines, and to give two (2) oral presentations on select exercises	Exercises 1-10, Presentations
Provide contemporary information	1	Present and discuss relevant topics in Earth Systems Science including stream channel assessment, water quality determination, and state-of-the-art instrumentation	Exercises 1-10
Encourage appreciation of scientific values	2	Apply the basic principles of surveying, river and hydrologic science, mathematics, chemistry, and soil science to the collection, processing, analysis, and presentation of data	Exercises 1-10

*Depth: 0 - not covered; 1 - moderately covered; 2 - extensively covered

Course format: Ten (10) field and laboratory exercises and five (5) in-class discussions. Field and laboratory exercises will take place regardless of weather conditions, and all students should be dressed appropriately. Each exercise will be introduced and demonstrated in the field, a brief lecture on safety issues will be provided, and a handout will provide detailed information regarding objectives, data collection techniques, data processing and presentation requirements, and

expectations. Communication, announcements, data sharing, and other pertinent information will be provided via email and UB*learns*.

In-class meetings will be devoted to discussing upcoming exercises, previous activities and prepared reports, feedback on grades and suggestions for improvement, and student presentations.

Meeting times, locations, and tasks may vary depending upon the scheduled activity, weather, and/or other opportunities. Your flexibility and willingness to drive to remote locations would be appreciated.

Students should come prepared for outdoor activities lasting several hours. Recommended materials include clipboard or field notebook, calculator, backpack, pens and pencils, and knee or hip boots (when required).

Course Syllabus

Exercise No.	Date	Activity	Assignments Due	
			Report	Presentations
1	Aug. 29	*In-class meeting*; Topographic Surveying I		
	Sept. 5	NO CLASS		
2	Sept. 12	Topographic Surveying II	1	
	Sept. 19	*In-class meeting and student presentations*	2	1
3	Sept. 26*	Hydraulic Geometry and Gradient of Stream Channels		
4	Oct. 3*	Measurement of Stream Discharge	3	
5	Oct. 10*	Water Quality of Streams	4	
	Oct. 17	*In-class meeting and student presentations*	5	2, 3, and 4
6	Oct. 24*	Rainfall and Evaporation		
7	Oct. 31*	Soil Analysis I	6	
8	Nov. 7	Soil Analysis II	7	
	Nov. 14	*In-class meeting and student presentations*	8	5, 6, and 7
9	Nov. 21	Global Positioning Systems		
10	Nov. 28	Hydraulic Flumes and Flow Velocity	9	
	Dec. 5	*In-class meeting and student presentations*	10	8, 9, and 10

*These activities will be conducted off-site at a location to be determined. The dates for these exercises may be changed owing to weather conditions.

Course requirements: No formal text is available for this course—all materials will be provided to the students and made available on UB*learns* by the Friday before Monday's class. All students are expected to read and understand the assignment, and to be prepared to discuss the activity, prior to coming to class. Students also will be required to sign a standard "Assumption of Risk" form before the term begins.

Assessment:

1. Ten (10) written laboratory assignments (20 points each), summarizing all results prepared individually but based on individual, team, or class-wide data collection. Assignments sent to the instructor by email **will not** be accepted.
2. Two (2) presentations (20 points each), summarizing the field and laboratory activity, prepared as a group, and presented to the class via computer and projector (i.e., PowerPoint Presentation). All members of the group are expected to participate in the presentations. A group member will receive a "0" grade if they are absent for or did not contribute substantively to the presentation.
3. Field attendance is mandatory (5 points each).
4. Those individuals who miss a field campaign are solely responsible for securing collected data from a student colleague (not the instructor) to complete the written assignment. Should a student miss a field campaign, (a) that student will not receive the 5 points for attendance, and (b) the completed assignment will be worth a maximum of 10 points (50%) rather 20 points. Thus, each absence from a field campaign will result in a 15 point (5%) reduction in the final grade (see below).
5. Participation (10 points) includes asking questions and participating in discussions, being prepared for the activity, assisting in field and laboratory campaigns, and a willingness to assist other students.

Grading matrix: Below is a table listing all activities, their number and worth (points), and their percentage of total used to determine the student's final grade.

Activity	*Total Number*	*Points per Event*	*Total Points*	*% of Total*
Field attendance	10	5	50	17
Laboratory reports	10	20	200	67
In-class presentations	2	20	40	13
Participation	N.A.	N.A.	10	3
Total			300	100

Penalty for late reports: All assignments submitted after close of business on due date will be assessed a 2-point (10%) deduction per day. Presentations not given on the prescribed day will receive a "0" grade.

Final grade: Below is a table that lists the range of percentages (first and second column) and the equivalent University letter grade (last column) I will use for grading. For example, should your cumulative average for all assignments plus participation equal 75% (i.e., 225 out of 300 points), you will receive a final grade of C+ (75% is greater than or equal to 74% and less than 77%). All numerical grades will be rounded up or down to the nearest integer. The Instructor reserves the right to adjust the scores of the cumulative average if it is necessary to boost the performance of the entire class. This will be done numerically and of equal weight for every student.

Greater than or equal to (%)	Less than (%)	Equivalent University letter grade
90		A
87	90	A–
84	87	B+
80	84	B
77	80	B–
74	77	C+
70	74	C
67	70	C–
64	67	D+
60	64	D
	60	F

Tutoring and Example Excel Spreadsheets

Two mechanisms will be used to facilitate student learning and success.

1. Following the conclusion of each field or laboratory activity, the instructor will provide a 1-hour tutorial on the required processing, presentation, and interpretation of the data collected. This will include a review of the goals and procedures of the activity, inspection and collation of all data collected, and a hands-on demonstration of all data processing and presentation to be accomplished using Excel. This ensures that all students understand fully what is required of each task, which will be especially helpful to those students not yet proficient in data analysis, reduction, and presentation using Excel.
2. For select exercises only, an Excel spreadsheet of a worked example, with all necessary equations and accompanying graphs constructed, will be provided on UB*learns*. This ensures that all students will master the data processing and presentation required.

General guidelines for laboratory reports:

Reports will be assessed on the following criteria (grading matrix): Format and Organization (2 points), Content, Accuracy, and Quality (14 points), Presentation and Overall Writing Quality (4 points)

- All laboratory reports must have the following headings: (a) Objectives, (b) Procedure, (c) Results, (d) Discussion, (e) Conclusions, and (f) References (if necessary)
- All figures and tables require a caption and must be numbered sequentially in order of appearance
- Equations should be numbered sequentially in order of appearance, and all variables defined
- All material presented must be accurately and correctly cited
- Citations and references should follow the style and format of the *American Geophysical Union*

General guidelines for writing:

- Plagiarism or the submission of work not your own will result in "0" grade for the assignment (please be aware of UB's policy on academic dishonesty: http://undergrad-catalog.buffalo.edu/policies/course/integrity.shtml)
- Write in third person rather than first (i.e., use "Soil samples were collected at…" rather than "I collected soil samples…")
- Use a formal, scientific, and professional voice—avoid slang, editorial, and colloquial language, never use contractions, and never misspell, misquote, or misrepresent anything
- Write concisely—avoid wordiness, redundancy, and ambiguity
- Keep observations, measurements, and results separate from interpretations
- Choose a tense and use it consistently—activities are typically presented using past tense, while results are typically discussed using present tense (i.e., "Samples were collected…," "A contour plot of elevation is shown in Figure 1," and "The bulk density of the soil increases with depth below the surface (Figure 2).")
- For each exercise, I will ask questions about the data collected. Do not answer these explicitly, but incorporate these points into your "Discussion."

General guidelines for presentations:
Presentations will be assessed on the following criteria (grading matrix): Format and Organization (2 points), Content, Accuracy, and Quality (14 points), and Overall Quality of Presentation and Teamwork (4 points)

- Comprised of a PowerPoint Presentation (10 to 20 slides) of informative pictures and text, presented at the front of the class, showing various aspects of the activities undertaken, focused on "people" conducting work (i.e., all pictures should be active with people), objectives and procedures, results, discussion, and conclusions
- Text should be a concise and chronological (bulleted; a few lines long), that accompanies or complements the figures
- Presentations should follow the same format as the report: (a) Objectives, (b) Procedure, (c) Results, (d) Discussion, (e) Conclusions, and (f) References (if necessary)
- Speak to the audience and not the screen, use a relaxed, confident, and authoritative tone, make eye contact with the audience, and minimize gestures
- Respect each other at all times—there is zero tolerance for insensitive or discriminatory language and pictures (please be reminded of UB's policy "No person, in whatever relationship with the State University of New York at Buffalo, shall be subject to discrimination on the basis of age, creed, color, handicap, national origin, race, religion, sex, or marital or veteran status")

Information about UB's Accessibility Resources Office can be found here: http://www.student-affairs.buffalo.edu/ods/. All students wishing to receive assistance must register with that office.

Classroom Policies: I shall follow and strictly enforce the *Obstruction or Disruption in the Classroom* policies as described in the Undergraduate Catalog (see http://undergrad-catalog.buffalo.edu/policies/course/obstruction.shtml).