

## LWS / SOIL 515

# WATERSHED SCIENCE

TERM 1 – September – December, 2019

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on in their culture, history, and traditions from one generation to the next on this site.

|                       |                          |  |
|-----------------------|--------------------------|--|
| <b>Instructor</b>     | Sandra Brown, MCML 229   | e-mail: <a href="mailto:sandra.brown@ubc.ca">sandra.brown@ubc.ca</a> |
| <b>Course modules</b> | E-textbook and Canvas    |  |
| <b>Tutorial</b>       | Wed 4:30-6:00 (MCML 258) |  |
| <b>Prerequisite</b>   | None                     |  |
| <b>Credits</b>        | 3                        |  |

## Course Overview

Watersheds are effective integrators of environmental processes; combining inherent conditions, the cumulative impacts of land use, and water management to determine the water flow and water quality conditions upon which humans and ecosystems depend.

This course presents a comprehensive overview of watershed science, and the principles of integrated watershed management.

Course Format: This course is offered in a blended online / on-campus learning environment. Students have access to an E-textbook and Canvas which contains the course material, participate in weekly tutorials on-campus or online discussions, and complete project oriented assignments.

The course has the following components:

- A multimedia textbook that can be accessed online from your desktop and most mobile platforms (iOS, Android) - see "E-Textbook" section below.
- Course information is posted on UBC Canvas, including course announcements, discussion boards, links to resources, review questions, etc.
- Assignments will be posted on UBC Canvas.
- Tutorial session for on-campus students; online moderated discussion sessions for off-campus students.

## Course Content

The course covers fundamental aspects of watershed management: a list of topics is provided below. In addition, a number of case studies have been included, which are linked to one or more topics.

- Hydrology and sediment dynamics
- Water quality and aquatic biota
- Land use and its interactions with water
- Water governance and watershed management
- Community-based approaches

## Learning Outcomes

1. Describe the framework of watershed-based evaluations
2. Characterize the components of watersheds
3. Describe essential tools and techniques to conduct watershed-based evaluations
4. Investigate links between land use activities and their interactions and impacts on water resources
5. Discuss approaches to deal with complexity, integration and cumulative effects
6. Examine the importance of community-based approaches to watershed management
7. Undertake a watershed assessment
8. Develop potential management options to address societal challenges around water resources in a watershed context

The course is not intended to cover all aspects of hydrology, water chemistry or aquatic health but will provide an overview of each topic and illustrate the major interrelationships between them and land use activities. At the end of the course, students will have an understanding of the consequences of the main human activities on water resources. They should be able to examine the health of a watershed, diagnose the causes, and make suggestions of options and policies on how to improve the watershed system.

## E-Textbook

The main readings for the SOIL 515 course are based upon the Integrated Watershed Management E-textbook. The E-textbook is designed so that it can be accessed through your web browser on your desktop and most mobile devices (iOS, Android). Access to the textbook will be emailed to registered students the first week of classes. Additional readings will be posted in canvas.

## Assessment and Grading

| Component                                    | Grading           |
|--|-------------------|
| Assignments – watershed reports (3)          | 45% of final mark |
| Review papers (6)                            | 45% of final mark |
| Course Participation (tutorial / discussion) | 10% of final mark |

### Assignments:

**Review papers:** There are 6 short (500 word) review papers focused key topics covered in the course. These thematic short papers draw from both the course E-textbook and external literature sources. Due dates will be posted in canvas. Topics include hydrology, water balance, water quality, water use and allocation, cumulative effects and water management.

**Reports:** There are 3 reports in this course which combined cover the major components of a watershed assessment and an initial assessment of potential management options. These reports are project oriented, building on concepts covered in the course E-textbook and tutorial (or discussion) sessions. Due dates and details will be posted in canvas.

**Tutorial participation / discussion:** Students are responsible for weekly readings and are expected to participate in in-class discussions, to make group and individual presentations, and to present their final watershed assessments (as per the course schedule).

### Guidelines & grading rubric for LWS 515 / SOIL 515 review papers

- Maximum 500 words (not including references, tables, figures)
  - Include tables and/or figures as appropriate to support your discussion
  - Cite information sources in the text
  - For definitions, clearly indicate the source of your definition; e.g. Brown (2016) defines.....
  - -10% deduction for exceeding the word count
- Due prior to tutorial (4:30 p.m. Wednesdays) – as topics will be discussed in-class, no late assignments will be accepted. Assignments should be uploaded as one doc or pdf file to canvas.
- Reports must be written in your own words
  - We encourage group work, sharing of resources and/or ideas
  - But reports must be written independently
- Six topics in total; topics assigned 1 week prior to due date (see course schedule)

### Paper format

- Use subheadings to indicate what specific question(s) you are responding to
  - e.g. Paper 1 on the hydrologic cycle would have two subheadings
- When defining terms, consider including both a definition and a brief discussion of it's importance
- Provide sufficient information to support your rationale, e.g. if you are asked how something might change, provide information on why (and support your rationale with literature); if you are asked what (e.g. what are the main factors), do not simply provide a list, but describe and discuss the importance of each factor.
- Provide citations within the text (e.g. Brown, 2017) and a list of references (including refereed journal articles, textbooks and internet sources). Review papers should include a minimum of 5 references, use of secondary information sources (e.g. textbooks) is acceptable, include refereed journal articles where you can, most literature cited should be current (i.e. last 10 years). Consider the credibility of online resources, and provide the url within your list of references.

### Grading

- 80% based on content
- 10% layout, structure, logical flow, writing style, grammar, spelling (readability)
- 5% references
- 5% graphics, figures, tables

### Guidelines & grading rubric for LWS 515 / SOIL 515 watershed assessment reports

- Maximum 1,500 words excluding Figures, Tables and References
- Submit in docx or pdf format; upload your file to canvas
- Specifics for each report provided in canvas
- Reports must be written in your own words
- 3 assessment reports in total; see canvas for details and due dates

Grading rubric for watershed reports:

|  | Excellent  | Good  | Satisfactory  | Unsatisfactory  |
|--|--|---|---|---|
| Problem statement / topic focus<br>(5%)    | Introduction clearly and concisely outlines the topic and why it is important                                  | Introduction outlines the topic and its importance  | Introduction outlines the topic; relevance unclear  | Topic not clearly defined   |
| Depth of content / discussion<br>(50%)     | In-depth discussion and elaboration of relevant soil concepts and processes                                    | Demonstrates knowledge of soil concepts   | Omission of some pertinent content  | Cursory discussion, lacks depth, missing key soil concepts  |
| Integration of knowledge<br>(30%)          | Integrates concepts, synthesis of ideas; recognizes complexity   | Integrates concepts, synthesis of ideas   | Partial synthesis of ideas; inter-relationships not fully developed   | Lacks integration   |
| Summary<br>(5%)                            | Concluding remarks explore implications  | Some conclusions not supported  | Conclusions not fully documented  | Cursory or repetitive   |
| Organization / structure / grammar<br>(5%) | Well written report, flows logically, concepts linked; minimal grammar or spelling errors                      | Well written report, logical structure, minimal grammar or spelling errors                        | Well written report, lacks flows, some grammatical errors   | Report unorganized, difficult to read; many grammatical / spelling errors   |
| Sources<br>(5%)                            | Well referenced (15+ citations); 5+ references from refereed journal articles; 5+ current sources <sup>1</sup> | Good blend of references including journal articles; 10+ references cited; most references recent | Reliance on textbook or limited journal article citations; 5-10 references listed; many dated references (more than 10 years out of date) | Lacked sufficient references; reliance on textbook or internet sources <sup>2</sup> ; limited use of journal articles |

<sup>1</sup> current sources published within last 10 years

<sup>2</sup> internet sources for refereed journal articles or relevant reports is acceptable; consider the credibility of online sources

Grading rubric for SOIL 515 / LWS 515 presentations:

|                           | Excellent  | Good  | Satisfactory   | Unsatisfactory  |
|---------------------------|--|---|--|---|
| Visuals / slides<br>(20%) | Clear, graphic, engaging, relevant, uncluttered                | Clear, relevant, uncluttered  | Relevant, too much information   | Unclear, too much information                             |
| Message<br>(50%)          | Clear, concise message; conveyed the science and its relevance | Clear, concise message; conveyed the science; lacked clarity in why it is important | Clear message; lacked clarity in science and its importance                  | Key point(s) unclear                                      |
| Delivery<br>(20%)         | Within time, spoke clearly, good eye contact, enthusiastic     | Within time, spoke clearly  | Roughly within time limit, referred to notes on occasion, lacked eye content | Read notes, over time, hard to hear / spoke to the screen |
| Questions<br>(10%)        | Answered questions well; demonstrated knowledge of the topic   | Answered questions well   | Answered questions satisfactorily  | Struggled with questions                                  |

## Schedule

### Course Schedule (2019W Term 1)

| Period  |                | Module (Online E-Textbook)                                    | Tutorial (Wednesdays 4:30-6:00 pm McMI room 258) |  |
|---------|----------------|---|--|--|
| Week 1  | Sept 4-7       | Introduction to Watershed Management<br>Methods: stream focus | Sept 4   | Overview of course: review papers, project, tutorial sessions<br><b>Introduction to water and watersheds</b>                                       |
| Week 2  | Sept 8-14      | Watershed Science – the hydrological cycle                    | Sept 11  | <b>The hydrological cycle</b><br>Break out groups, presentations, plenary discussion<br>Watershed signup   |
| Week 3  | Sept 15-21     | Watershed Science: Water Balances                             | Sept 18  | <b>Water balance</b><br>Break out groups, presentations, plenary discussion<br>Your watershed assessment – part I                                  |
| Week 4  | Sept 22-28     | Watershed science: sediment dynamics                          | Sept 25  | Working session – data sources and analysis  |
| Week 5  | Sept 29- Oct 5 |   | Oct 2  | Working session – precipitation and hydrologic variability   |
| Week 6  | Oct 6-12       | Land use and Water  | Oct 9  | <b>Natural versus anthropogenic impacts:</b> Sumas watershed case study  |
| Week 7  | Oct 13-19      | Watershed science: water quality                              | Oct 16   | <b>Water Quality</b><br>Designing a monitoring program – parameters, standards & indices   |
| Week 8  | Oct 20-26      | Water governance: water use, policy and allocation            | Oct 23   | <b>Water Use &amp; Allocation</b><br>Plenary water scarcity  |
| Week 9  | Oct 27-Nov 2   | Community watershed approaches                                | Oct 30   | <b>Community</b> water management – case study Colombia  |
| Week 10 | Nov 3-9        | Case study watersheds I                                       | Nov 6  | <b>Cumulative effects:</b> integrating water and land use management in a watershed context<br>Break out groups, presentations, plenary discussion |
| Week 11 | Nov 10-16      | Case study watersheds II                                      | Nov 13   | <b>Water &amp; watershed management</b><br>Break out groups, presentations, plenary discussion   |
| Week 12 | Nov 17-23      |   | Nov 20   | Working session – presentation prep  |
| Week 13 | Nov 24-29      | Summary & Review  | Nov 27   | Student <b>presentations</b> (watershed projects)  |

## Academic Integrity

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on [the UBC Senate website](#).

Academic honesty is a core value of scholarship. Cheating and plagiarism (including both presenting the work of others as your own and self-plagiarism), are academic offences that are taken very seriously at the University of British Columbia. By registering for courses at UBC, students have initiated a contract with the university that they will abide by the rules of the institution. It is the student's responsibility to inform themselves of the University regulations. Copying directly from the lessons, articles or websites is considered plagiarism, a mark of zero will be given (as a minimum penalty), and serious offenses will be reported to the Associate Dean Academic for review. Ensure that you understand what qualifies as plagiarism before you hand in your assignment. Never use another author's ideas or phrasing without indicating a source; use quotation marks when quoting, and acknowledge the source. Definitions of Academic Misconduct can be found on the following website:

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,959#10894>

If you are unsure of whether you're properly citing references, please ask your instructor for clarification before the assignment is submitted. Improper citation will result in academic discipline.