



## COURSE SYLLABUS

### ENVS 821

## Sustainable Water Resources

Course Instructor	Dr. Kerry McPhedran <a href="mailto:kerry.mcphedran@usask.ca">kerry.mcphedran@usask.ca</a>				
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Course Schedule	2019-2029 Term 2				
Course notes:	See course website <a href="http://bblearn.usask.ca">http://bblearn.usask.ca</a>				
Assessment:	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Assignments</td> <td style="width: 50%;">80% (see grading scheme)</td> </tr> <tr> <td>Final Term Project</td> <td>20%</td> </tr> </table>	Assignments	80% (see grading scheme)	Final Term Project	20%
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Final Term Project	20%				
Delivery	Course includes lectures, guest lectures, presentations, collaborative learning exercises and an experiential learning opportunity.				

This course will explore different approaches and issues related to sustainable water management. Current threats to water resources in terms of water availability, water quality, and ecosystem services will be examined, and evolving methods to manage water resources more sustainably will be discussed.

### *Course Objectives:*

This course covers a broad range of issues and concepts in water resource sustainability. Materials will cover global and regional water-related challenges, including case studies from a variety of Canadian provinces. Students will build an understanding of the importance of water to society across multiple sectors, the varied threats to water resources, and be aware of the complexity of water management and approaches for water resource management. All students are expected to have a basic understanding of the water cycle and have the ability to read and synthesize literature from a number of disciplines. Students across all disciplines are invited to enroll in the course. These multiple perspectives will help enhance the interdisciplinary nature of discussions on water resource sustainability.

By the end of the course, you should have acquired the following:

- Current knowledge of Canada's water resources, water problems, and major management approaches and challenges.
- Understanding of contemporary principles and theories of water management.
- An ability to evaluate the strengths and weaknesses of current and emerging approaches to dealing with water-related challenges.
- Practical understanding of water management in selected real-world settings.
- Improved research, writing and critical thinking skills.

### *Course Overview:*

This course is designed in modules, allowing detailed exploration of several major themes related to water resources, ultimately building towards developing an integrated view of sustainable water resource management.

The course will use experiential learning, case studies, seminars, lectures and collaborative research to help build a strong understanding of challenges associated with water resource sustainability, and encourage students to think towards better means of accounting for multiple perspectives, and managing water resources in light of the multiple uses and values associated with water.

Readings have been selected to provide background information, and support student involvement in classroom discussions and activities. Assignments allow students to explore several aspects of sustainable water resources, and encourage collaborative learning in development of a deep understanding of an issue of interest, or region of interest, as it relates to sustainable water resources.

Course communications will be coordinated via BBLearn.

### *Readings:*

Instead of a text book, we will be using reports, journal articles and selected book chapters that you will access through the University of Saskatchewan library or the BBLEARN site. Assigned readings are critical to learning in this course. Much of what you'll need to learn is contained in the readings rather than in the lectures. It is not possible to do well in this course without completing the scheduled readings on time. Also, it is anticipated that students enrolling in the course will have diverse backgrounds. Students needing to strengthen their background understanding are encouraged to contact the instructor for additional resources.

## Grading Scheme:

	% of final grade	Due Date*
Assignment 1 – Reflexive writing – daily synopsis and critical reflection	30% (5% each paper)	TBA
Assignment 2a – Case study project proposal	10%	TBA
Assignment 2b – Case study project presentation	20%	TBA
Assignment 2c – Case study project report	20%	TBA
Final Term Project	20%	*
Total	100%	

Information on literal descriptors for grading at the University of Saskatchewan can be found at: <http://students.usask.ca/current/academics/grades/grading-system.php>

Please note: There are different literal descriptors for undergraduate and graduate students.

More information on the Academic Courses Policy on course delivery, examinations and assessment of student learning can be found at [http://www.usask.ca/university\\_secretary/council/academiccourses.php](http://www.usask.ca/university_secretary/council/academiccourses.php)

## Summary of Evaluation Components

*Details of each assignment and grading rubrics are provided on BBLearn.*

### Assignment 1: Reflexive writing

**Purpose:** Assigned readings, lectures, and discussion are essential to understanding in this course. In reflection of six of the eight major topics of the course, you will submit brief reviews of 300-400 words. In your reviews, you will address the implications for water management for each topic and include personal insights. Reviews will be graded based on the quality and originality of your insights and should link to course materials and include citations and a references list. Six reviews worth 4% each can be submitted over the period of the course. You may submit a seventh review if desired and the worst mark of the seven reviews submitted will be deleted from your final grade. Reviews are due on BBLearn before the beginning of the next class. Late submissions will not be accepted.

### Assignment 2a, 2b & 2c: Case study project – defining and addressing water resource challenges

Your tasks in this group project assignment will be to analyze water management challenges in a setting that your group has chosen, and to propose ways of addressing those challenges. Detailed instructions are contained in separate documents available on the BBLearn course website. Rubrics for each assignment are also supplied on the BBLearn site. The assignment has three components:

- A Project Proposal, worth 12 percent of the course grade.
- A Project Presentation, worth 20 percent of the course grade.
- The Final Report, worth 20 percent of the course grade.

### *Assignment 2a: Case study – project proposal*

**Purpose:** To define the scope and deliverables of the case study project, develop a project work plan and designate responsibilities. Specific guidelines are provided for group projects including information on the allocation of individual grades to group members.

**Description:** The case study proposal will guide the preparation, and grading of the case study project. Expectations for the project proposal are described on a separate document on the BBLearn site. Students will work in groups of three or four, which will be formed on the first day of class.

### *Assignment 2b: Case study – presentation*

**Purpose:** To have students investigate a setting as a team and identify water-related problems and assess management options associated with the multiple uses of water in a given setting.

**Description:** Students will work as groups to present on their case studies on varied water resource challenges in a specific setting and argue for their specific recommendations. The final presentation should align with the proposal (assignment 3a) reflecting instructor comments, with any further changes to the proposal discussed with the instructor in advance.

### *Assignment 2c: Case study – report*

**Purpose:** To have students investigate in more depth the strengths, challenges, weaknesses and opportunities associated with any one specific management option identified in their case study presentation.

**Description:** Collectively students from each group will decide on one management option each from their presentation and explore this management options in more depth independently to identify trade-offs for practice in a given setting. Students will be expected to identify both the benefits and drawbacks of the management option and explore the different effects the water management option will have on different water users. Students will also justify their support for this management option relative to alternatives. Expectations are explored in more depth on the BBLearn site. Each paper should be approximately 2000 words in length (excluding references). As for all assignments in the course, the submission should include appropriate references and a list of citations.

### *Assignment 3: Final Term Project*

**Purpose:** The exercise will allow a deepening water management problem and test students' abilities to integrate knowledge from a variety of sources to provide critical information for decision making.

**Description:** During this project, groups of students will role play two weeks in the life of a particular person assuming a particular role in an organization that is involved in the management of water resources. Groups will receive a suite of emails every other day for which they will need to reply, and begin a set of tasks (from prioritizing, conducting research, fact checking, calibrating equipment and taking measurements, predicting outcomes, assembling a working group, writing a policy brief, suggesting appropriate actions, etc.). Students will have to integrate knowledge and skills learned from the suite of Winter 2020 MWS courses to make decisions on how to reply and what actions to initiate.

### *Submitting Assignments*

Written assignments must be submitted at the start of class. Where no class is scheduled on the due date, they should be submitted via email. You should keep a personal copy of all assignments submitted. Late assignments will be accepted up to one week after the assignment due date, but will be penalized at 10% per day. Students may submit late assignments electronically to [kerry.mcphedran@usask.ca](mailto:kerry.mcphedran@usask.ca). Where extenuating circumstances exist, students are advised to contact the instructor immediately to make suitable arrangements regarding extensions.

### *Integrity Defined (from the Office of the University Secretary)*

Integrity is expected of all students in their academic work – class participation, examinations, assignments, research, practice – and in their non-academic interactions and activities as well.

### **What academic integrity means for students**

- Perform your own work unless specifically instructed otherwise. Check with your instructor about whether collaboration or assistance from others is permitted.
- Use your own work to complete assignments and exams.
- Cite the source when quoting or paraphrasing someone else's work. Discuss with your professor if you have any questions about whether sources require citation.
- Follow examination rules.
- Discuss with your professor if you are using the same material for assignments in two different courses.
- Be truthful on all university forms.
- Use the same standard of honesty with fellow students, lab instructors, teaching assistants, sessional instructors and administrative staff as you do with faculty.

Please refer to the following resources for additional information on academic conduct, penalties and appeals:

[http://www.usask.ca/university\\_secretary/council/reports\\_forms/reports/guide\\_conduct.php](http://www.usask.ca/university_secretary/council/reports_forms/reports/guide_conduct.php)

[http://www.usask.ca/university\\_secretary/honesty/academic\\_misconduct.php](http://www.usask.ca/university_secretary/honesty/academic_misconduct.php)

### Course schedule and draft reading list:

Finalized reading lists will be available on BBLearn. All readings will be available online via the University of Saskatchewan Library or other sources.

Date	Topic	Important concepts	Readings
Day 1	Introduction to the course/course overview	<ul style="list-style-type: none"> <li>• Canadian water management division of responsibilities</li> <li>• Management vs policy vs governance</li> <li>• Hard path, soft path, demand management</li> </ul>	<ul style="list-style-type: none"> <li>• Polis Project. 2005. At a watershed: Ecological governance and sustainable water management in Canada., University of Victoria, Victoria, BC.</li> <li>• Loucks, D. P. 2000. Sustainable water resources management. <i>Water International</i> 25:3-10.</li> <li>• Brown, R. R., &amp; Farrelly, M. A. (2009). Delivering sustainable urban water management: a review of the hurdles we face. <i>Water Science and Technology</i>, 59(5), 839-846.</li> <li>• Lautze, J., de Silva, S., Giordano, M., &amp; Sanford, L. (2011). Putting the cart before the horse: water governance and IWRM. <i>Natural Resources Forum</i>, 35, 1-8.</li> </ul>
Day 2	Water quantity and water quality management	<ul style="list-style-type: none"> <li>• Concerns regarding water availability (global)</li> <li>• Flood and drought management (e.g., floodplain mapping and priority of use measures)</li> <li>• Nutrient management (e.g., agricultural waste control)</li> <li>• Urban versus rural differences</li> </ul>	<ul style="list-style-type: none"> <li>• Noble, B. F., P. Sheelanere, and R. Patrick. 2011. Advancing watershed cumulative effects assessment and management: Lessons from the South Saskatchewan River Watershed, Canada. <i>Journal of Environmental Assessment Policy and Management</i> 13:567-590.</li> <li>• Gleick, P. H. and M. Palaniappan. 2010. Peak water limits to freshwater withdrawal and use. <i>Proceedings of the National Academy of Sciences of the United States of America</i> 107:11155-11162.</li> <li>• Senhorst, H. A. J., &amp; Zwolsman, J. J. G. (2005). Climate change and effects on water quality: a first impression. <i>Water Science and Technology</i>, 51(5), 53-59.</li> <li>• Ward, R. C., Timmerman, J. G., &amp; Adriaanse, M. (2003). <i>In search of a common water quality monitoring framework and terminology</i>. Paper presented at the Monitoring Tailor-Made IV/2003</li> </ul>
Day 3	Wastewater management	<ul style="list-style-type: none"> <li>• Sanitation and waste basics</li> <li>• Centralized versus decentralized systems</li> <li>• Compliance</li> </ul>	<ul style="list-style-type: none"> <li>• Lofrano, G. &amp; Brown, J. (2010) Wastewater management through the ages: A history of mankind <i>Science of the Total Environment</i> 408: 5254-5264</li> </ul>

			<ul style="list-style-type: none"> <li>• Chambers, P., Allard, M., Walker, S., Marsalek, J., Servos, M., Busnarda, J., Munger, K., Adare, K., Jefferson, C., Kent, R. &amp; Wong., M. (1997) Impacts of Municipal Wastewater Effluents on Canadian Waters: A Review <i>Water Quality Research Journal of Canada</i> 32(4) 659:713</li> <li>• University of Guelph (n.d.) <i>Your Septic System</i> Canada Mortgage and Housing Corporation, Ottawa, ON</li> <li>• OpenWash (2017) Introduction to Sanitation and Waste Management (Ch1) In Urban Sanitation and Solid Waste Management. The Open University: London</li> </ul>
Day 4	Water security	<ul style="list-style-type: none"> <li>• Climate change/population growth/land use changes</li> <li>• Water use planning and permitting</li> <li>• Conflict resolution and priority of uses</li> <li>• Environmental Flow Needs</li> <li>• Cumulative effects</li> </ul>	<ul style="list-style-type: none"> <li>• Wheeler H. and P. Gober. 2013. Water security in the Canadian Prairies: science and management challenges. <i>Phil. Trans. R. Soc. A.</i> 371: 20120409</li> <li>• Bakker, K., &amp; Allen, D. (2015). Canadian Water Security Assessment Framework: Tools for Assessing Water Security and Improving Watershed Governance.</li> <li>• de Loë, R., Varghese, J., Ferreyra, C., &amp; Kreutzwiser, R. (2007). <i>Water Allocation and Water Security in Canada: Initiating a Policy Dialogue for the 21st Century</i>. Guelph: Guelph Water Management Group, University of Guelph.</li> </ul>
Day 5	Water users	<ul style="list-style-type: none"> <li>• Water and agriculture</li> <li>• Water and energy</li> <li>• Ecosystem services</li> <li>• Water and gender</li> <li>• Stakeholder management</li> </ul>	<ul style="list-style-type: none"> <li>• Vugteveen, P., Lenders, H. J. R., Devilee, J. L. A., Leuven, R. S. E. W., van der Vereen, R. J. H. M., Weiring, M. A., &amp; Hendriks, A. J. (2012). Stakeholder value orientations in water management. <i>Society and Natural Resources</i>, 23, 805-821.</li> <li>• Fan, G &amp; Zietsma, C. (2017). Constructing a shared governance logic: The role of emotions in enabling dually embedded agency. <i>Academy of Management Journal</i> 60(6) 2321-2351.</li> <li>• Gallego-Ayala, J., &amp; Juárez, D. (2014). Integrating stakeholders' preferences into water resources management planning in the Incomati River Basin. <i>Water Resources Management</i>, 28(2), 527-540.</li> </ul>
Day 6	First Nations	<ul style="list-style-type: none"> <li>□ Access to drinking water versus First Nations water rights</li> <li>□ Technical versus governance approaches</li> </ul>	<ul style="list-style-type: none"> <li>• von der Porten, S., &amp; de Loë, R. C. (2014). How collaborative approaches to environmental problem-solving view Indigenous peoples: a systematic review. <i>Society and Natural Resources</i>, 27(10), 1040-1056.</li> <li>• Wilson, P. (2004). First Nations integrated watershed management. In D. Shrubsole (Ed.), <i>Canadian Perspectives on</i></li> </ul>

			<p><i>Integrated Water Resources Management</i> (pp. 69-83). Cambridge, Ontario: Canadian Water Resources Association. Syilx Nation</p> <ul style="list-style-type: none"> <li>• Siwtk™ Declaration - <a href="https://www.syilx.org/wp/wp-content/uploads/2016/11/Okanagan-Nation-Water-Declaration-Final-CEC-Adopted-July-31-2014.pdf">https://www.syilx.org/wp/wp-content/uploads/2016/11/Okanagan-Nation-Water-Declaration-Final-CEC-Adopted-July-31-2014.pdf</a></li> </ul>
Day 7	Transboundary management	<ul style="list-style-type: none"> <li>□ Political boundaries and scale</li> <li>□ Coordination of water allocation systems</li> <li>□ Transboundary water issues in Canada and internationally</li> </ul>	<ul style="list-style-type: none"> <li>• Wolf, A. T. (2010). <i>Sharing Water Sharing Benefits: Working Towards Effective Transboundary Water Resources Management</i>. Paris: United Nations Educational, Scientific and Cultural Organization.</li> <li>• Biswas, A. K. (2008). Management of transboundary waters: an introduction. In C. Tortajada, O. Varis, &amp; A. K. Biswas (Eds.), <i>Management of Transboundary Rivers and Lakes</i> (pp. 1-20). Berlin: Springer.</li> <li>• Matthews, O. P., &amp; St.Germain, D. (2007). Boundaries and transboundary water conflicts. <i>Journal of Water Resources Planning and Management</i>, 5(1), 386-396.</li> </ul>
Day 8	Integrated Water Resource Management	<ul style="list-style-type: none"> <li>• IWRM practices, principles, application and evolution</li> <li>• Comparative overviews of ecosystem and adaptive management</li> </ul>	<ul style="list-style-type: none"> <li>• Schoeman, J., Allan, C., &amp; Finlayson, C. M. (2014). A new paradigm for water? A comparative review of integrated, adaptive and ecosystem-based water management in the anthropocene. <i>International Journal of Water Resources Development</i>, 30(3), 377-390.</li> <li>• Global Water Partnership Technical Advisory Committee. (2009). <i>Lessons from Integrated Water Resources Management in Practice</i>. Stockholm, Sweden: Global Water Partnership.</li> <li>• Medema, W., McIntosh, B. S., &amp; Jeffrey, P. J. (2008). From premise to practice: a critical assessment of integrated water resources management and adaptive management approaches in the water sector. <i>Ecology and Society</i>, 13(2), 29-46.</li> <li>• Melnychuk, N., Jatel, N. &amp; Warwick Sears, A. L. (2017). Integrated water resource management and British Columbia's Okanagan Basin Water Board. <i>International Journal for Water Resource Development</i>. 33(3): 408-425.</li> </ul>
Day 9	Application	<ul style="list-style-type: none"> <li>• Fieldtrip to Saskatoon Water Treatment Plant</li> </ul>	<ul style="list-style-type: none"> <li>• Saskatoon Water and Wastewater Utilities Annual Report (2017) <i>City of Saskatoon</i></li> </ul>

<b>Day 10</b>	<b>Presentations</b>	<ul style="list-style-type: none"><li>• <b>Peer-led learning</b></li></ul>	<ul style="list-style-type: none"><li>• <b>One reading determined by each group</b></li></ul>
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### *Assessment Issues and Grade Disputes*

A student shall be permitted to see any examination unless otherwise stated at the beginning of the course. Students dissatisfied with the assessment of their work in any aspect of course work, including midterm or final examination should consult the University policy '*Student Appeals or Evaluation, Grading and Academic Standing*' found at the Office of the University Secretary ([http://www.usask.ca/university\\_secretary/policies/student/policy-on-student-appeals-of-evaluation,-grading-and-academic-standing.php](http://www.usask.ca/university_secretary/policies/student/policy-on-student-appeals-of-evaluation,-grading-and-academic-standing.php)).

### *Disability Services for Students (DSS)*

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://www.students.usask.ca/disability/>, or contact DSS at 966-7273 or [dss@usask.ca](mailto:dss@usask.ca). Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.

### *University Learning Centre (ULC)*

The ULC offers academic support to UofS students, including: workshops, writing help, math help, community service-learning, learning communities, study skills support, technology help and Peer Mentor Programs. More information can be found at <http://www.usask.ca/ulc/>

### *Academic Honesty*

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct ([http://www.usask.ca/university\\_secretary/honesty/StudentAcademicMisconduct.pdf](http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf) ) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals ([http://www.usask.ca/university\\_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf](http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf) )

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at: [http://www.usask.ca/university\\_secretary/pdf/dishonesty\\_info\\_sheet.pdf](http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf)