

## Environmental Technology

Winter 2018

### ENVT 163A: WATER QUALITY

*3 credits, 14 weeks, 2 hours lecture per week, 3 hours laboratory per week*

*Course description:* This course provides an overview of water quality protection and pollution control of ground and surface water. Treatment of drinking water and municipal waste water, water quality guidelines for drinking water and surface water, pathogens, oxygen levels and nutrient loading, properties of water, related chemistry and terminology, ecology of lentic systems, turnover, thermal stratification, and hydrology of the northern river basin are discussed.

*Prerequisite:* CHEM 101 and EAS 100

#### Instructor

Dr. Blaine Legaree

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#### Office Hours

Mondays 1:00 – 2:00 pm  
Tuesdays 12:00 – 2:00 pm  
Wednesdays 10:00 – 11:00 am  
Fridays 10:00 – 11:00 am

#### Hours of Instruction

Lecture:	Wednesdays/Fridays	1:00 – 1:50 pm	Rm S214
Laboratory:	Tuesdays	2:00 – 4:50 pm	Rm S114, CC236 or Computer lab

#### Required Resources

1. **ENVT 163 Laboratory Manual**. Winter 2018 Edition. Keyano College.
2. **Laboratory coat**.
3. **Moodle** (<http://ilearn.keyano.ca>). The course outline, lecture notes and other resources will be made available on Moodle. \*\*Please download/print lecture notes before coming to class.

### Course Outcomes

Upon successful completion of this course, the student will be able to:

- Demonstrate an understanding of water chemistry, biology and fluid dynamics through laboratory and field exercises, assignments and tests.
- Discuss processes used in drinking water and wastewater treatment.
- Examine environmental issues related to water quality protection and pollution control.
- Discuss the challenges of water treatment and processing faced by industry and society.
- Create scientific lab reports that discuss and analyze laboratory data.

### Evaluation

Tests (4)	40%	Test dates TBA
Laboratory	35%	<i>Evaluation detailed in the laboratory manual.</i>
Final Examination	25%	<i>Date to be set by the Registrar</i>

A grade of C- is required for progression or transfer.

### Tests and Examinations

Test dates will be determined by class progress and will be approximately every 2-3 weeks.

Tests and exams may include both multiple choice questions and written answer questions, and will be based on material covered in lectures and labs.

The final lecture examination is cumulative and **must** be written in order to complete this course.

### Laboratory

The laboratory component is detailed in the course laboratory manual and includes written assignments and reports.

**Students are expected to attend all labs and complete all lab assignments in order receive a passing grade.**

**Late assignments will be penalized 10% per day late and will not be accepted if more than 5 days late.**

### Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
<b>Progression</b>	C-	1.7	60 – 63.9	
Poor	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
<b>Minimum Pass</b>	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

## Schedule of Topics

Lecture Topic	Readings and References**
1. Water Resources and Water Properties	Facts about Water in Alberta: <a href="http://aep.alberta.ca/water/water-conversation/documents/FactsAboutWaterAlberta-Dec2010A.pdf">http://aep.alberta.ca/water/water-conversation/documents/FactsAboutWaterAlberta-Dec2010A.pdf</a> Government of Canada Water Page: <a href="https://www.canada.ca/en/services/environment/natural-resources/water.html">https://www.canada.ca/en/services/environment/natural-resources/water.html</a> Natural Resources Canada Water Distribution Maps: <a href="https://www.nrcan.gc.ca/earth-sciences/geography/atlas-canada/selected-thematic-maps/16888">https://www.nrcan.gc.ca/earth-sciences/geography/atlas-canada/selected-thematic-maps/16888</a> Lower Athabasca Water Quality Monitoring Plan: <a href="https://www.ec.gc.ca/Publications/default.asp?lang=En&amp;xml=1A877B42-60D7-4AED-9723-1A66B7A2ECE8">https://www.ec.gc.ca/Publications/default.asp?lang=En&amp;xml=1A877B42-60D7-4AED-9723-1A66B7A2ECE8</a> U.S. Geological Survey's (USGS) Water Resources Page: <a href="https://www2.usgs.gov/water/">https://www2.usgs.gov/water/</a> <a href="http://water.usgs.gov/edu/watercycle.html">http://water.usgs.gov/edu/watercycle.html</a> <a href="http://water.usgs.gov/edu/waterproperties.html">http://water.usgs.gov/edu/waterproperties.html</a> <a href="http://water.usgs.gov/edu/mearthgw.html">http://water.usgs.gov/edu/mearthgw.html</a>
2. Water Chemistry	Much of the reference material in this unit can be found in your introductory chemistry (Chem 101) textbook or in the class notes. Milliequivalents are detailed in the notes. Water Hardness: <a href="http://www2.ca.uky.edu/wkrec/HARDNESS.PDF">http://www2.ca.uky.edu/wkrec/HARDNESS.PDF</a> <a href="http://dnr.wi.gov/regulations/labcert/documents/training/basics-genchem.pdf">http://dnr.wi.gov/regulations/labcert/documents/training/basics-genchem.pdf</a> Alkalinity calculations: <a href="http://www.ehow.com/how_5328969_calculate-alkalinity-caco.html">http://www.ehow.com/how_5328969_calculate-alkalinity-caco.html</a> <a href="http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/drinkingwaterlabs/AlkalinityConversions.pdf">http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/drinkingwaterlabs/AlkalinityConversions.pdf</a>
3. Water Biology	Waterborne Diseases: <a href="http://www.azdhs.gov/phs/oids/epi/waterborne/list.htm">http://www.azdhs.gov/phs/oids/epi/waterborne/list.htm</a> <a href="http://www.cdc.gov/nceh/vsp/training/videos/transcripts/water.pdf">http://www.cdc.gov/nceh/vsp/training/videos/transcripts/water.pdf</a> <a href="https://www.healthlinkbc.ca/healthlinkbc-files/water-borne-infections">https://www.healthlinkbc.ca/healthlinkbc-files/water-borne-infections</a> <a href="http://www.lenntech.com/library/diseases/diseases/waterborne-diseases.htm">http://www.lenntech.com/library/diseases/diseases/waterborne-diseases.htm</a> BOD: <a href="http://www.polyseed.com/misc/BODforwebsite.pdf">http://www.polyseed.com/misc/BODforwebsite.pdf</a> <a href="http://www.freedrinkingwater.com/water_quality/quality1/1-bod-effects-on-water-quality.htm">http://www.freedrinkingwater.com/water_quality/quality1/1-bod-effects-on-water-quality.htm</a>
4. Laboratory and Field Sampling Methods	See class notes. Spectrophotometry outlined here: <a href="http://chemwiki.ucdavis.edu/Physical_Chemistry/Kinetics/Reaction_Rates/Experimental_Determination_of_Kinetics/Spectrophotometry">http://chemwiki.ucdavis.edu/Physical_Chemistry/Kinetics/Reaction_Rates/Experimental_Determination_of_Kinetics/Spectrophotometry</a>
5. Hydraulics and Hydrology	See class notes Hydrostatic pressure: <a href="https://www.youtube.com/watch?v=KAy5P88lms">https://www.youtube.com/watch?v=KAy5P88lms</a> <a href="https://www.youtube.com/watch?v=C0ujLqKPWew">https://www.youtube.com/watch?v=C0ujLqKPWew</a> <a href="http://hyperphysics.phy-astr.gsu.edu/hbase/pflu.html">http://hyperphysics.phy-astr.gsu.edu/hbase/pflu.html</a> Continuity Equation: <a href="http://www.aplusphysics.com/courses/honors/fluids/continuity.html">http://www.aplusphysics.com/courses/honors/fluids/continuity.html</a>

6. Water Pollution & Water Quality Standards	MACs: Canadian Drinking Water Guidelines: <a href="https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water/canadian-drinking-water-guidelines.html">https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water/canadian-drinking-water-guidelines.html</a> MCLs: <a href="https://www.epa.gov/dwstandardsregulations">https://www.epa.gov/dwstandardsregulations</a>
7. Water Distribution Systems	See class notes
8. Water Processing	General Electric Handbook of Industrial Water Treatment: <a href="http://www.gewater.com/handbook/index.jsp">http://www.gewater.com/handbook/index.jsp</a> EPA Water Treatment Plant Animation <a href="https://www3.epa.gov/safewater/kids/wtp/flash/interactive.html">https://www3.epa.gov/safewater/kids/wtp/flash/interactive.html</a>
9. Wastewater Characteristics & Collection	<a href="https://home.howstuffworks.com/home-improvement/plumbing/sewer3.htm">https://home.howstuffworks.com/home-improvement/plumbing/sewer3.htm</a>
10. Wastewater Processing	<a href="http://www.fao.org/docrep/t0551e/t0551e05.htm">http://www.fao.org/docrep/t0551e/t0551e05.htm</a> <a href="http://www.calgary.ca/UEP/Water/Pages/Water-and-wastewater-systems/Wastewater-system/Wastewater-treatment-tour.aspx">http://www.calgary.ca/UEP/Water/Pages/Water-and-wastewater-systems/Wastewater-system/Wastewater-treatment-tour.aspx</a> <a href="https://guelph.ca/wp-content/uploads/IntroductionToWastewater.pdf">https://guelph.ca/wp-content/uploads/IntroductionToWastewater.pdf</a> <a href="http://www.scientificamerican.com/article/treating-sewage/">http://www.scientificamerican.com/article/treating-sewage/</a>

*\*\*The reference and reading material for this course is garnered from a variety of sources. For a complete detailed list of suggested readings for ENVT 163, see the course lecture notes.*

**Please Note** – To facilitate unforeseen time constraints, time allotted to each topic is subject to change.

## Performance Requirements

### Student Responsibilities

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

### Laboratory Safety

In the science laboratories, safety is important.

Students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

Before entering the lab, students are responsible reviewing the lab manual and relevant Safety Data Sheets for the purpose of evaluating risks associated to health. Some hazards used in the laboratory may have additional risks to those with pre-existing medical conditions.

### Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a student's learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

**Students are required to attend all labs unless excused for valid reasons. *Unexcused absence from any lab period or failure to submit a lab report may result in your being assessed a failing grade in the course. Absence from more than any two (2) laboratory periods for any reason may also result in a failing grade.***

### Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online Plagiarism Certificate at [learn.keyano.ca](http://learn.keyano.ca). Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate. If you completed this certification previously, show evidence to your instructor.

### Specialized Supports

#### Counselling and Accessibility Services

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

#### SKILL Centre

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.