Western University - Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 3362A - Drinking Water Quality & Treatment Outline 2018/2019

In the course, students will be taught the basic principles of water quality and treatment. The course will introduce the need for proper treatment of domestic water for human consumption (ie: pathogen removal) and the problems associated with inadequate treatment. The course will also focus on drinking water treatment technologies, ranging from very simple low-tech solutions to larger technologies typically found in North America. Finally, the course will study the identification of drinking water sources with adequate quality and quantity.

Calendar Copy:

In the course, students will be taught the basic principles of water quality and treatment with particular focus on developing communities. Specific topics will include drinking water quality guidelines and legislation, identifying drinking water sources with adequate quality and quantity, drinking water treatment technologies and water distribution systems. (0.5 course)

Contact Hours:

3 lecture hours/week; 3 design laboratory/tutorial hours; (recommended additional personal study - 3 hours).

Attendance at the tutorial/laboratory session is **mandatory**

Prequisites:

CEE 2217A/B or CBE 2220A/B

Note: It is the **student's responsibility** to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the **student's responsibility** to ensure that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Antirequisite conditions.

Instructor:

Dr. Martha Dagnew, CMLP 1302

Email: mdagnew@uwo.ca

Admin. Asst.: Stephanie Laurence, Spencer Engineering Building Room 3005, Email: civil@uwo.ca

Course Textbook:

Droste, R.L., ***Theory and Practice of Water and Wastewater Treatment***, J. Wiley & Sons

Other References:

Field Engineering: An Introduction to Development Work and Construction in Rural Areas. Editor (Peter Stern), Intermediate Technology Publications, 1993.

Evaluation for Village Water Supply Planning, Technical Paper Services 15, S. Cairncross et al., Published for IRC International Reference Centre for Community Water Supply and Sanitation by John Wiley & Sons, Inc., 1980

The Worth of Water, Technical Briefs on Health, Water and Sanitation, Intermediate Technology Publications, London, 1991.

A Handbook of Gravity-Flow Water Systems for Small Communities, Intermediate Technology Publications, Thomas D. Jordan, Jr., 1984.

Small Community Water Supplies, Technical Paper Series 18, Published by IRC International Reference Centre for Community Water Supply and Sanitation, reprinted, 1998.

Environmental Engineering in Developing Countries, Eli Dahi (Editor), 2nd Edition, Environmental Development Corporation, Copenhagen, Denmark, 1997.

Low-Cost Sanitation: A Survey of Practical Experience, J Pickford, Intermediate Technology Publications, London, 1995.

Linking Technology Choice with Operation and Maintenance for Low-Cost Water Supply and Sanitation, F. Brikke et al., Operation and Maintenance Working Group of the Water Supply and Sanitation Collaborative Council, World Health Organization, 1997.

Laboratory Schedule (subject to change)

Week of:	Laboratory Session
Sept. 10	An introduction to lab safety, equipment and expectations.
Sept. 17	Basic water tests: pH, alkalinity, acidity, hardness, color and turbidity
Sept. 24	Coliform enumeration
Oct. 1	Coagulation and flocculation using Jar Test and Charge Coagulant Analyzer Methods
Oct. 15	Chlorine Demand and Ammonia Removal of Colour and Turbidity by use of Sand and Carbon Filtering Oxygen Demand and Nitrates
Oct. 22	Oxygen Demand and Nitrates BOD, COD, Total suspended and dissolved solids, ammonia and nitrates
Oct. 29	Sand filter, suspended solids and particle size distribution measurement
Nov. 5	TBD (Plant Tour or Project Session)
Nov. 12	TBD (Plant Tour or Project Session)
Nov. 19	TBD (Plant Tour or Project Session)
Nov 26	TBD (Plant Tour or Project Session)

Specific Learning Objectives:

1) Drinking water quality
   a) water borne diseases and the effects on human health
   b) anthropogenic sources of drinking water contamination and the effects on human health
   c) other sources of drinking water contamination and the effects on human health
   d) drinking water standards & legislation in North America and the rest of the world

2) Identifying drinking water sources with adequate quality and quantity
   a) hydrological cycle
   b) groundwater sources –quantity and quality and well hydraulics

3) Drinking water treatment technologies
   a) ideal flow systems / chemical reaction engineering
   b) nonideal flow systems / tracer studies
   c) disinfection/oxidation
   d) colloidal stability / coagulation
   e) flocculation / sedimentation
   f) other clarification processes / filtration
   g) filtration
   h) adsorption / gas transfer
   i) membrane filtration

Instructor may expand on material presented in the course as appropriate.

General Learning Objectives

E=Evaluate, T=Teach, I=Introduce

Problem Analysis	E	Team Work		Ethics and Equity	
Investigation		Communication		Economics and Project Management	
Design	E	Professionalism		Life-Long Learning	
Engineering Tools		Impact on Society			

Evaluation:

The final course mark will be determined as follows:

Quiz #1 and Quiz #2	20%
Laboratory Reports and Assignments	15%
Project	15%
Final Examination	50%

Note:

a) **Students must pass the final examination to pass this course**. Students who fail the final examination will be assigned the aggregate mark, as determined above, or 48%, whichever is less.
b) **Students must turn in all laboratory reports, and achieve a passing grade in the laboratory component, to pass this course.** Students who do not satisfy this requirement will be assigned 48% or the aggregate mark, whichever is less.
c) **Students who have failed this course previously must repeat all components of the course**. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.

Use of English

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

Accessibility:

Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Attendance:

Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

Cheating:

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

For more information on scholastic offenses, please see:
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

Plagiarism Checking:

The University of Western Ontario uses software for plagiarism checking. Students are required to submit their Laboratory Reports in electronic form to Turnitin.com for plagiarism checking.

Conduct:

Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.
On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct: http://www.uwo.ca/univsec/board/code.pdf

Sickness and Other Problems:

Students should **immediately consult** with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

For more information concerning medical accommodations, please see:
http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

Notice:

Students are responsible for regularly checking their email, course website (https://owl.uwo.ca) and notices posted outside the Civil and Environmental Engineering Department Office

Consultation:

Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

Course breakdown:

Engineering Science = 75% = 42.53 AU's; Engineering design = 25% = 14.18 AU's

The document "INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMINT ASSIGNMENTS AS SCHEDULED" is part of this course outline.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

IF, ON MEDICAL OR COMPASSIONATE GROUNDS, YOU ARE UNABLE TO WRITE TERM TESTS OR FINAL EXAMINATIONS OR COMPLETE COURSE WORK BY THE DUE DATE, YOU SHOULD FOLLOW THE INSTRUCTIONS LISTED BELOW. YOU SHOULD UNDERSTAND THAT ACADEMIC RELIEF WILL NOT BE GRANTED AUTOMATICALLY ON REQUEST. YOU MUST DEMONSTRATE TO YOUR DEPARTMENT (OR THE UNDERGRADUATE SERVICES OFFICE) THAT THERE ARE COMPELLING MEDICAL OR COMPASSIONATE GROUNDS THAT CAN BE DOCUMENTED BEFORE ACADEMIC RELIEF WILL BE CONSIDERED. DIFFERENT REGULATIONS APPLY TO TERM TESTS, FINAL EXAMINATIONS AND LATE ASSIGNMENTS. PLEASE READ THE INSTRUCTIONS CAREFULLY. (SEE THE 2017 UWO ACADEMIC CALENDAR).

A. *GENERAL REGULATIONS & PROCEDURES*

1. All first year students will report to the Undergraduate Services Office, SEB 2097, for all instances.

2. If you are an upper year student and you are missing a test/assignment/lab or exam that is worth MORE THAN 10% of your final grade, you will report to the Undergraduate Services Office, SEB 2097. Otherwise, you will report to your department office to request relief.

3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.

4. Documentation must be provided as soon as possible. If no one is available in your Department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.

5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. *TERM TESTS*

1. If you are in first year and you are unable to write a term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.

2. If you are an upper year student and you are unable to write a term test, inform your instructor PRIOR to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office. If the test is worth MORE THAN 10% of your final grade you will report to the Undergraduate Services Office, SEB 2097 to request relief. Otherwise, you will report to your department office to request relief.

3. Be prepared to provide supporting documentation to the Department Chair and/or the Undergraduate Services Office (see next page for information on documentation).

4. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair or the Undergraduate Services Office is required when rescheduling term tests.

C. *FINAL EXAMINATIONS*

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.

2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.

3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. **It is the student's responsibility to check the date, time and location of the Special Examination.**

D. *LATE ASSIGNMENTS*

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4. i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.
   ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.

E. *SHORT ABSENCES*

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. *EXTENDED ABSENCES*

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or Ms. Karen Murray in the Undergraduate Services Office, if you are in first year.

G. *DOCUMENTATION*

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. *ACADEMIC CONCERNS*

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).

2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**

3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

Calendar References: Check these regulations in your 2017 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness: http://westerncalendar.uwo.ca/2017/pg117.html
Academic Accommodations for Students with Disabilities: http://westerncalendar.uwo.ca/2017/pg118.html
Academic Accommodations for Religious or Holy Days: http://westerncalendar.uwo.ca/2017/pg119.html
Course Withdrawals: http://westerncalendar.uwo.ca/2017/pg157.html
Examinations: http://westerncalendar.uwo.ca/2017/pg129.html
Scheduling of Term Assignments: http://westerncalendar.uwo.ca/2017/pg135.html
Scholastic Offences: http://www.westerncalendar.uwo.ca/2017/pg111.html
Student Medical Certificate: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf
Engineering Academic Regulations: http://www.westerncalendar.uwo.ca/2017/pg1442.html

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

***Drop Deadlines*:**

First term half course (i.e. "A" or "F"):	November 12, 2018
Full courses and full-year half courses (i.e. "E","Y" or no suffix):	November 30, 2018
Second term half or second term full course (i.e. "B" or "G"):	March 7, 2019

Contact Information:

Undergraduate Services Office:	SEB 2097	Telephone: (519) 661-2130	E-mail: engugrad@uwo.ca
Dept. of Chemical and Biochemical Engineering & Green Process Engineering:	TEB 477	Telephone: (519) 661-2131	E-mail: cbeugrad@uwo.ca
Dept. of Civil and Environmental Engineering:	SEB 3005	Telephone: (519) 661-2139	E-mail: civil@uwo.ca
Dept. of Electrical and Computer Engineering, Software Engineering & Mechatronics Engineering:	TEB 279	Telephone: (519) 661-3758	E-mail: eceugrad@uwo.ca
Dept. of Mechanical and Materials Engineering:	SEB 3002	Telephone: (519) 661-4122	E-mail: mmeundergraduate@uwo.ca