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

CEE 3362a – Drinking Water Treatment and Quality - Course Outline 2020

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 and the problems associated with inadequate treatment. The course will also focus on drinking water treatment processes and 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)

Prerequisites:
CEE 2217A/B or CBE 2220A/B

Antirequisites:
None

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.

Contact Hours:
3 lecture hours/week;
Lectures will be delivered synchronously through Zoom and video record of the synchronous lecture will be posted to the course OWL site. Lectures will be organized into learning modules which students should review on a weekly basis. Quizzes at the end of each module will be used to track participation. Review of lecture material and self-study should take approximately 6 hours per week.

3 laboratory - tutorial hours/week.
Laboratory modules will be delivered asynchronously and pre-recorded videos will be posted to the course OWL site according to the laboratory schedule outlined below. A 3-hour laboratory/tutorial session will be delivered synchronously through Zoom each week during the scheduled lab (tutorial) hours. The laboratory and tutorial sessions will be run alternatively (i.e. one week lab, the second week tutorial). Laboratory schedules are outlined below and attendance is mandatory. Tutorials are not mandatory but students seeking assistance with the weekly assignments or clarification on lecture material are strongly encouraged to attend. The link to the Zoom meeting will be posted to OWL.
Instructor:
Dr. Martha Dagnew, CMLP 1302
mdagnew@uwo.ca
Office hours via Zoom (link will be posted on course OWL site)
Date and time: To be determined

Administrative Assistant: Sandra McKay (smckay@uwo.ca)

Textbook:
Droste, R.L., Theory and Practice of Water and Wastewater Treatment, J. Wiley & Sons, 2nd edition

Other References:

Units:
Both SI and FPS unit systems may be used in lectures, tutorials and examinations.

Specific Learning Objectives:
The lectures and tutorial assignments will prepare students to do the following [Graduate attribute Indicator].

1. Drinking water quality [IESE 1, IESE 3]
   a. Recognize water borne diseases and the effects on human health
   b. Understand anthropogenic sources of drinking water contamination and the effects on human health
   c. Identify other sources of drinking water contamination and the effects on human health
   d. Recognize drinking water standards & legislation in North America and the rest of the world

2. Identifying drinking water sources with adequate quality and quantity [IESE 2]
   a. Understand hydrological cycle
   b. Identify groundwater and surface water sources –quantity and quality and well hydraulics
   c. Design distribution systems meeting water quality and quantity demands

3. Design drinking water treatment processes and technologies involving [D3 and D4]:
   a. Reactor flow fundamentals,
   b. Screening technologies
   c. Colloidal stability, coagulation and mixing principles
   d. Flocculation/sedimentation processes
   e. Sand filtration and other advanced processes such as membrane filtration
   f. Chlorination and other advanced disinfection processes such as UV and oxidation
   g. Adsorption

The instructor may expand or revise material presented in the course as appropriate.

General Learning Objectives:
E=Evaluate, T=Teach, I=Introduce; (I) = Introduction, (D) = Developing, (A) = Advanced level

<table>
<thead>
<tr>
<th>Knowledge Base</th>
<th>Engineering Tools</th>
<th>Impact on Society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Analysis</td>
<td>E</td>
<td>Team Work</td>
</tr>
<tr>
<td></td>
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<td>Ethics and Equity</td>
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<tr>
<td>Investigation</td>
<td>E</td>
<td>Communication</td>
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<td>Economics and Project Management</td>
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<tr>
<td>Design</td>
<td>E</td>
<td>Professionalism</td>
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<td>Life-Long Learning</td>
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</tbody>
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The impact of engineering on society and the environment [IESE 1,2,3] and the ability to design solutions for water treatment processes [D3, D4] are evaluated at the “advanced” level.
Evaluation:
The final mark will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Weekly lab reports and bi-weekly assignments</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm exam</td>
<td>15%</td>
</tr>
<tr>
<td>Written Final Examination</td>
<td>40%</td>
</tr>
<tr>
<td>Oral Final Examination</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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1. **Quizzes and Examinations:**
A two-hour midterm exam will be held during a tutorial hour. The midterm exam date is *tentatively* scheduled for Friday, October 23. The exam will be conducted via the OWL platform.

A three-hour written final examination will be held during the regular examination period. The written examination will be followed by a 15-minute oral examination in which the written examination will be reviewed and discussed with the student.

2. **Bi-weekly Assignments:**
Assignments will be given on a bi-weekly basis. Assignments are to be submitted prior to the due date to OWL. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. Extensions are to be negotiated with the course instructor, not the teaching assistants.

3. **Laboratories:**
Labs will be presented through pre-recorded video and students are required to complete a laboratory report based on provided data. Below is a *tentative* laboratory schedule (subject to change):

<table>
<thead>
<tr>
<th>Week of</th>
<th>Laboratory session</th>
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</thead>
<tbody>
<tr>
<td>September 14</td>
<td>An introduction to lab safety and expectations.</td>
</tr>
<tr>
<td>September 21</td>
<td>Basic water tests: pH, alkalinity, acidity, hardness, color and turbidity</td>
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<tr>
<td>September 28</td>
<td>Biological oxygen demand, total suspended solids and nitrate</td>
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<tr>
<td>October 12</td>
<td>Coagulation and flocculation using Jar Test through turbidity and color measurement</td>
</tr>
<tr>
<td>October 26</td>
<td>Coliform enumeration</td>
</tr>
<tr>
<td>November 09</td>
<td>Sand filter performance characterization based on total solids, turbidity and particle size distribution measurement</td>
</tr>
<tr>
<td>November 23</td>
<td>Chlorine Demand for raw and filtered water</td>
</tr>
</tbody>
</table>

4. **Participation:**
Class and lab participation will be assessed through iclicker and class exercise online submissions

**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 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.
**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

**Attendance:**
Any student who, in the opinion of the instructor, has not engaged sufficiently in 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.

**Accommodation:**
Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: [Academic Accommodation for Students with Disabilities](#).

**Academic Consideration for Student Absence**
Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student’s final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student’s final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation. Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.

For Western University policy on Consideration for Student Absence, see [Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs](#) and for the Student Medical Certificate (SMC), see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

**Religious Accommodation**
Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the [Western Multicultural Calendar](#).

**Use of Recordings:**
All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals under special circumstances. Please contact the instructor if you have any concerns related to session recordings.
Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.
**Conduct:**

Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please “arrive” to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- [suggested for classes larger than 30 students] In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- [suggested for cases where video is used] please be prepared to turn your video camera off at the instructor’s request if the internet connection becomes unstable
- unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

**Online Proctoring Notice:**

1. If using Proctortrack or alternative remote proctoring solution only:
   Tests and examinations in this course will be conducted using the remote proctoring service, Proctortrack. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link: https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf.
   Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link: https://www.proctortrack.com/tech-requirements/.

2. If using Zoom Only:
Tests and examinations in this course will be conducted using Zoom. You will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session will not be recorded.*

More information about the use of Zoom for exam invigilation is available in the Online Proctoring Guidelines at the following link:

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link:
https://support.zoom.us/hc/en-us.

* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please discuss this with your instructor in advance of the test or examination.

3. If using both Zoom and Proctortrack or alternative remote proctoring solution:
Tests and examinations in this course will be conducted using both Zoom and the remote proctoring service, Proctortrack.
When Zoom is used for exam invigilation, you will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session using Zoom will not be recorded.*
Proctortrack will require you to provide personal information (including some biometric data). The session will be recorded. By taking this course, you are consenting to the use of this software. More information about remote proctoring is available in the Online Proctoring Guidelines at the following link:
Completion of this course will require you to have a reliable internet connection and a device that meets the system and technical requirements for both Zoom and Proctortrack. Information about the system and technical requirements are available at the following links:
https://www.proctortrack.com/tech-requirements/,
https://support.zoom.us/hc/en-us.

* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please discuss this with your instructor in advance of the test or examination.

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 the Instructor in tutorial sessions. Office hours will be arranged for the students to meet with the Instructor and teaching assistants. Other individual consultation can be arranged by appointment with the instructor.

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