

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

**CEE 3361b – Water Resources Management - Course Outline 2017/18**

This course presents introduction to water resources management for civil and environmental engineers. It covers broad range of topics relevant to current water resources management practice. Students will be exposed to methods and tools for effective management of water resources. Course will introduce Ontario water management rules and regulations and water management issues in the Upper Thames River Basin. The general objectives are for the student to become able to:

- Use engineering approach in addressing water resources management problems by understanding: definition of integrated water resources management; principles of sustainable development; characteristics of various management tools; various uses of water; water supply issues; and water demand issues.
- Understand and use the systems approach to water resources management.
- Develop an awareness of rules and regulations governing water resources management in Ontario and the Upper Thames River basin.
- Recognize the need for life-long learning, interdisciplinarity and use of systems approach in civil and environmental engineering as one of the cognitive paradigms for understanding complexity.

**Calendar Copy:**

Introduction to water resources management for engineers. Course topics include: water resources management principles; regulatory issues; management of water resources for sustainable development; tools for water resources management; economic analysis; water supply; water demand; climate change and water resources management; extremes (floods and droughts); water management in the Upper Thames River basin. Exposure to, and use of computer-based tools in solving water resources management problems.

3 lecture hours; 2 tutorial hours; half course

**Prerequisites:**

CEE2219; ES3340

**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.

**Corequisites:**

None

**Antirequisites:**

None

**Contact Hours:**

3 lecture hours/week; 2 tutorial hours; (recommended additional personal study - 5 hours). Attendance at the tutorial sessions is **mandatory**.

**Instructor:**

Dr. Slobodan P. Simonovic, Ph.D., P.Eng., ESB 3115, email: simonovic@uwo.ca. *Administrative support:* Room 3005.

**Textbook:**

Selected sections from:

Simonovic, S.P. *Managing water resources: Methods and tools for a systems approach*, Earthscan, London, Sterling VA, 2009;

Chin, D.A., *Water-resources Engineering*, Prentice Hall, Upper Saddle River, NJ, 2006. (Purchase recommended); and additional material to be made available on the course web site.

**Other References:**

Loucks, D.P., and E. Van Beek, *Water Resources Systems Planning and Management*, UNESCO, Paris, 2003. (Purchase optional).

**Computing:**

Assignments will require the use of computer tools to be provided by the instructor.

**Units:**

SI units will be used in lectures and examinations

**Specific Learning Objectives:**

1. Introduction. At the end of this section, the student should be able to:
  - a) Understand definitions of integrated water resources management; sustainable development; water purposes; water supply and water demand.
  - b) Use the water resources management process steps, concept of mathematical modelling and understand the utility of various water resources management tools.
2. Legal and regulatory issues. At the end of this section, the student should be able to:
  - a) Interpret rules and regulations guiding water resources management in the Province of Ontario.
  - b) Understand water resources management issues in the Upper Thames River basin.
3. Water resources management tools. At the end of this section, the student should be able to:
  - a) Use benefit-cost analysis for a water resources project (economic tools).
  - b) Use systems approach for addressing complex water resources management problems.
  - c) Use simulation, optimization and multi-objective analysis tools in water resources management (systems tools).
4. Climate change and water resources management. At the end of this section, the student should be able to:
  - a) Understand the impacts of climate change on water resources management.

b) Understand management of extremes (floods and droughts).

Instructor may expand or modify the material presented in the course as appropriate.

**General Learning Objectives** (E= Evaluate, T=Teach, I=Introduce)

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

**Evaluation:**

The final course mark will be determined as follows:

Assignments:	15%
Midterm exam:	35%
Final Exam:	50%
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Total	100%

- 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 who have failed this course previously must repeat all components of the course.** No special permissions will be granted enabling a student to retain assignment or test marks from previous years. Previously completed assignments cannot be resubmitted.
  - (c) Should any of the assignments conflict with a religious holiday that a student wishes to observe, the student must inform the instructor of the conflict no later than two weeks before the scheduled test. (For further information on Accommodations for Religious Holidays see [http://www.uwo.ca/univsec/handbook/appeals/accommodation\\_religious.pdf](http://www.uwo.ca/univsec/handbook/appeals/accommodation_religious.pdf))

**1. Assignments**

Due date for all assignments will be one week after the distribution of assignments. The following objectives are set for the course assignments (subject to change):

- 1 Basic calculations and units for water management
- 2 Watershed management systems formulation
- 3 Hydrologic and hydraulic analyses
- 4 Reservoir sizing and hydropower
- 5 Detention pond routing and weir design
- 6 Water supply project
- 7 System formulation problem
- 8 Economic feasibility
- 9 System dynamics simulation problems

- 10 Reservoir operations
- 11 Optimization of water quality management
- 12 Multi-objective selection of alternatives

### 2. Midterm exam

The midterm examination will be **closed book** exam and will cover material presented in the course up to the date of midterm. Only approved programmable calculators are permitted in the final exam. No communication devices will be allowed in the room during the exam.

### 3. Final exam

The final examination will be **closed book** exam and will cover all course material. Only approved programmable calculators are permitted in the final exam. No communication devices will be allowed in the room during the exam.

### 4. Use of English

In accordance with Senate and Faculty Policy, students may be penalised 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.

### **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.

### **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](http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf)

### **Attendance:**

Any students who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, 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 examination in the course.

### **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.

### **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. Please turn off your cell phone before coming to a class, tutorial or exam. 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](http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf)

**Notice:**

Students are responsible for regularly checking their email 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: Natural Science = 30% = 15.12 AU's; Engineering Science = 35% = 17.64 AU's; AU's; Mathematics = 35% = 17.64 AU's.**

**Additional information:**

Additional important rules and regulations are attached.

**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](http://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](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 5, 2017
Full courses and full-year half courses (i.e. "E", "Y" or no suffix):	November 30, 2017
Second term half or second term full course (i.e. "B" or "G"):	March 7, 2017

### **Contact Information:**

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