2009 Winter Semester

ENGG*4260: WATER AND WASTEWATER TREATMENT DESIGN

Instructor:	Dr. Hongde Zhou	Room 1341, ext. 56990, hzhou@uoguelph.ca
	Office hour:	Friday 11:00AM to noon or via e-mail
GTA:	Chris Potvin:	Room 321, ext, 52132, cpotvin@uoguelph.ca
	Office hour:	Wednesday noon to 1:00PM

Meeting Times:	Room:		MCLN 107	
	Tuesday and Thursday		11:30AM to 12:50PM	
Labs:	Section 101:	Monday	08:30AM to 10:20AM,	THRN 1103
	Section 102:	Friday	12:30AM to 02:20PM,	THRN 1103

Prerequisites: ENGG *3100, ENGG *3590

Note: If you do not meet this requirement, see me immediately.

COURSE OBJECTIVES

The purpose of this course is to introduce students the current practices for the planning, design and operation of commonly used water and wastewater treatment facilities. Emphasis will be placed on integrating individual unit operations and processes to achieve the multiple treatment objectives while satisfying the given constraints. On successful completion of this course, you will be able to:

1) properly identify the critical issues and challenges in planning, design and operation of modern water and wastewater treatment facilities to meet not only current but also anticipated regulatory requirements,
2) develop reasonable working knowledge and hands-on experiences that can be used to devise and design the efficient and cost-effective treatment systems, and
3) gain the independent learning skills and enhance your ability to work effectively in teams through PBL format.

COURSE DESCRIPTION

The course mainly consists of four representative design projects in the field of water and wastewater treatment. They are:

1) Conventional coagulation/sedimentation/filtration for drinking water treatment
2) Chemical oxidation and disinfection
3) Biological processes for municipal wastewater treatment
4) Sludge processing and disposal

To complement these projects, the institutional, technological and environmental considerations governing water supply and wastewater discharge and the common approaches to estimate water use and wastewater generation will be reviewed. The applicability and limitations of these treatment technologies to resolve the current and emerging challenges such as the removal of harmful disinfection by-products, resistant microbial contaminants, biological nutrients, toxic synthetic organic compounds and water reuse will be highlighted.

COURSE FORMAT: PROBLEM BASED LEARNING (PBL)

The course will be mainly offered in PBL format. Thus, it is essential that you are ACTIVELY engaged in the meetings and TEACH each other. The PBL is only effective through frequent interactions with your peers. Through these interactions you will strengthen your own understanding through the frequent feedback from your peers and through the explanations to your peers. Note that we will help your meetings, we will help your teaching, we will answer questions - we will NOT run your meetings, we will NOT make your decisions.

Maximum group size is four students. Some groups of three may be permitted depending on the final numbers in the class. You may choose the group members but the members of your group for the first two projects should be completely different from those for the last two projects.

COURSE EVALUATION

Project Reports (4)	**40%**
Quizzes/Assignments	**20%**
Final Exam (2:30 - 4:30pm, April 11)	**40%**

Design Reports. Each project report must meet the requirements and formats specified in the course handout in order to achieve the perceived course objectives. The report should be technically sound, CLEARLY readable, and concise. Don't use your spare time to create a huge report!

Quizzes/Final Exam. All the quizzes and final exam will be open-book. You are allowed to bring the textbook, the course notes and non-communicating calculator but not the submitted project reports and assignments.

Other Policies. You must achieve a passing grade on the project section to pass the course. If you fail to do so, your final grade will be equal to that failing percentage.

If you miss a report or quizzes/assignments and have an acceptable, properly written excuse, the weight of the missed component will be added to the weight of the final exam.

Late submission of the project reports will be devalued by 50% per every day.

You may appeal any mark within one week after it has been posted on the course website with the written reasons for remarking.

Please also note that university policy specified in University Calendar will be followed strictly.

REQUIRED TEXTBOOK

Viessman, W. Jr., Hammer, M.J., Perez, E.M. and Chadik, P.A. (2009). *Water Supply and Pollution Control*. Pearson Prentice Hall,,U pper Saddle River, NJ, 843p.

Notes and selected publications on pertinent topics will be posted on the course website throughout the semester.

REFERENCE BOOKS

1 AWWA, (1999). *Water Quality and Treatment: A Handbook of Community Water Supplies*. 5th edition, McGraw Hill, New York, NY. **TD430 .W365 1999**

2 AWWA-ASCE, (2005). *Water Treatment Plant Design*. 4th edition, McGraw Hill, New York, NY. **TD434 .W38 2005**

3 Droste, R.L. (1997). *Theory and Practice of Water and Wastewater Treatment*. John Wiley & Sons, New York, NY, 800p. **TD430.D76 1997**

4 Eckenfelder, W.W. (2000). *Industrial Water Pollution Control*. 3rd edition, McGraw Hill, New York, NY, 584p. **TD745 .E23 2000**

5 Faust, S.D. and Aly, O.M. (1998). *Chemistry of Water Treatment*. Ann Arbor Press, Chelsea, MI, 581p. **TD433 .F38 1998**

6 Grady, C.P.L., Jr., Gaigger, G.T. and Lim, H.C. (1999). *Biological Wastewater Treatment*. 2nd edition, Marcel Dekker, New York, NY, 1076p. **TD755 .G72 1999**

7 Kawamura, S. (1991). *Integrated Design of Water Treatment Facilities*. John Wiley & Sons, New York, NY, 658p. **TH4538.K39 1991**

8 Metcalf & Eddy, Inc. (2003). *Wastewater Engineering: Treatment and Reuse*, 4th edition, McGraw Hill, Inc., New York, NY, 1796p

9 MWH Global, Inc. (2005). *Water Treatment Principles and Design*. 2nd edition, John Wiley & Sons, New York, NY, 1948p. **TD430 .W375 2005**

10 Qasim, S.R. (1999). *WastewaterTtreatment Plants: Planning, Design, and Operation*. Technomic Pub. Co, Lancaster, PA, 1107p. **TD746 .Q37 1999**

11 Qasim, S.R. (2000). *Water Treatment Plants:Pplanning, Design, and Operation*. Pearson Prentice Hall, Upper Saddle River, NJ, 884p. **TD434 .Q23 2000**

12 *Recommended Standards for Wastewater Facilities*. 1997 Edition, The Great Lakes – Upper Mississippi River Board of State and Provincial Public health and Environmental Managers, Albany, NY.

13 *Recommended Standards for Water Works*. 2003 Edition, The Great Lakes – Upper Mississippi River Board of State and Provincial Public health and Environmental Managers, Albany, NY, 124p.

14 Reynolds, T.D. and Richards, P.A. (1996). *Unit Operations and Processes in Environmental Engineering*, 2nd Edition, PWS Publishing Co. Boston, MA, 798p. **TD 430.R48 1996**

15 WEF and ASCE, (1998). *Design of Municipal Wastewater Treatment Plants*, Vol. 1, 2 and 3, 4th Edition, Alexandria, VA. **TD746 D48 1998**

16 WEF and IWA, (2003). *Wastewater Treatment Plant Design*. Edited by A. Vesilind, Water Environment Federation, Alexandria, VA. **TD746 W38 2003**

REFEREED JOURNALS

1 Water Research

2 Water Environment Research

3 American Water Works Association Journal

4 Journal of Environmental Engineering, ASCE

5 Environmental Science & Technology