NEW COURSE FORM

1.	General Information.										
a.	Submitted by the Colleg	ge of: Engineering				Today's [Date:	Ma	y 5, 20)11	
b.	Department/Division:	Civil Engineering									
c.	Contact person name:	Y. T. Wang		Email:	ywang@eng u	r.uky.ed	Phon	e:	7-593	37	
d.	Requested Effective Date: Semester following approval OR Specific Term/Year¹:										
2.	Designation and Description of Proposed Course.										
a.	Prefix and Number: CE 551										
b.	Full Title: Water and \	Wastewater Treatme	nt Engine	ering							
c.	Transcript Title (if full title is more than 40 characters): Water and Wastewater Treatment Eng.										
d.	To be Cross-Listed ² with (Prefix and Number):										
e.	Courses must be described by <u>at least one</u> of the meeting patterns below. Include number of actual contact hours ³ for each meeting pattern type.				ours ³						
	45 hrs Lecture	Laboratory ¹		Recitation	n	Discussion	n .	Indep. Stu		udy	
	Clinical	Colloquium		Practicum	ı	Research		Residency		У	
	Seminar Studio Other – Please explain:										
f.	Identify a grading system:										
g.	Number of credits: 3										
h.	Is this course repeatable for additional credit?					\boxtimes					
	If YES: Maximum number of credit hours:										
	If YES: Will this course	e allow multiple regis	trations d	luring the	same semest	er?	YE	S [NO [
i.	This course examines the scientific and engineering aspects of water and wastewater treatment. Conventional water treatment processes such as rapid mixing, flocculation, sedimentation, filtration, and disinfection as well as biological processes for wastewater treatment are analyzed. Sustainable alternative treatment techniques are also discussed.				oid						
j.	Prerequisites, if any:	CE 341, CE 351, and e	ngineerin	g standin	g or consent o	of instructo	r				
k.	Will this course also be	offered through Dista	ance Leari	ning?			YE	S ⁴		NO [
l.	Supplementary teaching	g component, if any:	Cor	nmunity-l	Based Experie	nce S	Service	e Lea	arning		Both
3.	Will this course be taug	ht off campus?					YE	S		NO [\boxtimes

¹ Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

² The chair of the cross-listing department must sign off on the Signature Routing Log.

In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, represents at least two hours per week for a semester for one credit hour. (from *SR 5.2.1*)

⁴ You must *also* submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

NEW COURSE FORM

4.	Frequency of Course Offering.
a.	Course will be offered (check all that apply):
b.	Will the course be offered every year?
	If NO, explain:
5.	Are facilities and personnel necessary for the proposed new course available?
	If NO, explain:
6.	What enrollment (per section per semester) may reasonably be expected? 15
7.	Anticipated Student Demand.
a.	Will this course serve students primarily within the degree program? YES NO
b.	Will it be of interest to a significant number of students outside the degree pgm? YES NO
	If YES, explain:
8.	Check the category most applicable to this course:
	☐ Traditional – Offered in Corresponding Departments at Universities Elsewhere
	Relatively New – Now Being Widely Established
	Not Yet Found in Many (or Any) Other Universities
9.	Course Relationship to Program(s).
a.	Is this course part of a proposed new program?
	If YES, name the proposed new program:
b.	Will this course be a new requirement⁵ for ANY program? YES ☐ NO ☒
	If YES ⁵ , list affected programs:
10.	Information to be Placed on Syllabus.
a.	Is the course 400G or 500?
	If YES, the differentiation for undergraduate and graduate students must be included in the information required in 10.b . You must include: (i) identification of additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR 3.1.4.)
b.	The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from 10.a above) are attached.

 $^{^{\}rm 5}$ In order to change a program, a program change form must also be submitted.

NEW COURSE FORM

Signature Routing Log

General Information:

Course Prefix and Number:

CE 551

Proposal Contact Person Name:

Y. T. Wang

Phone: 7-5937

Email: ywang@engr.uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
EQUATIVA TEAM	10/11/11	N. STAMANAN; 1 / 78012	Koin
CE Faculty	10/14/11	GE Blandford 17185\$ geblandwengr.	uky edu 42/5
Engineering Faculty	12/16/11	GE Blandford 71855 geblandwenge. Richard Sweigard 17-8827 rsweigar@engr.uky.edu	Richard Sweigard
		/ /	
		/ , /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁶
Undergraduate Council	2/14/2012	Sharon Gill	
Graduate Council	4/5/2012	Brian Jackson	
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

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⁶ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

Distance Learning Form

This form must accompany <u>every</u> submission of a new/change course form that requests distance learning delivery. This form may be required when changing a course already approved for DL delivery. All fields are required!

Introduction/Definition: For the purposes of the Commission on Colleges Southern Association of Colleges and Schools accreditation review, distance learning is defined as a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous. A distance learning (DL) course may employ correspondence study, or audio, video, or computer technologies.

A number of specific requirements are listed for DL courses. The *department* proposing the change in delivery method is responsible for ensuring that the requirements below are satisfied at the individual course level. It is the responsibility of the instructor to have read and understood the university-level assurances regarding an equivalent experience for students utilizing DL (available at http://www.uky.edu/USC/New/forms.htm).

Date: May 5, 2011

Course Number and Prefix: CE 551

	Instructor Name: Y. T. Wang Instructor Email: ywang@engr.uky.edu
	Check the method below that best reflects how the majority of course of the course content will be delivered. Internet/Web-based Interactive Video Hybrid Hybrid
	Curriculum and Instruction
1.	How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?
	The instructor will travel to the remote site (WKU) to observe office hours and conduct review sessions before each scheduled exam. While there, the instructor will proctor the exam, complete grading, and let distant learning students review the graded exam before returning. WKU students will come to UK campus for a combined lab session with UK students. The instructor will also take WKU students to Bowling Green munincipal water & wastewater treatment plants. Thus ample opportunities exist for interactions between students and faculty and among students. The attached course syllabus includes considerations for distance learning.
2.	How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc. Course materials will be presented using PowerPoint and OneNote. Specific learning objectives, outlines, and in-class exercise problems will be available as handout and are also downlodable before class. Homework assignments will be downloadable as well.
3.	How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc. All exams and quizzes will be proctored and the remote site coordinator will collect homework due and take attendance. The academic offense policy and other relavent information are specified in the syllabus.
4	Will offering this course via DL result in at least 25% or at least 50%* (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above? This course is one of the technical electives offered for the joint UK & WKU degree program, and its offering will not result in more than 25% of CE degree program being offered via DL.

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	If yes, which percentage, and which program(s)?
	*As a general rule, if approval of a course for DL delivery results in 50% or more of a program being delivered through DL, the effective date of the course's DL delivery will be six months from the date of approval.
5.	How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting? The remote site, WKU, will offer its own student services.
	Library and Learning Resources
6.	How do course requirements ensure that students make appropriate use of learning resources?
	Course notes, any supplemental materials, and assignments will be downloadable.
7.	Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.
	WKU students will use UK civil engineering lab for one lab session. WKU will provide travel supports for such activities.
	Student Services
8.	How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Teaching and Academic Support Center (http://www.uky.edu/TASC/index.php) and the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?
	As specified in the course syllabus, students experiencing any difficulty with delivery of course material in the classroom, can contact the ITV support personnel at the location, or inform the instructor.
9.	Will the course be delivered via services available through the Teaching and Academic Support Center? Yes No If no, explain how students enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

Distance Learning Form

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10.	Does t	he syllabus contain all the required components, below? 🔀 Yes
		Instructor's virtual office hours, if any.
		The technological requirements for the course.
		Contact information for TASC (http://www.uky.edu/TASC/ ; 859-257-8272) and Information Technology Customer Service Center (http://www.uky.edu/UKIT/ ; 859-257-1300).
		Procedure for resolving technical complaints.
		Preferred method for reaching instructor, e.g. email, phone, text message.
		Maximum timeframe for responding to student communications.
		Language pertaining academic accommodations:
	a	 "If you have a documented disability that requires academic accommodations in this course, please make your request to the University Disability Resource Center. The Center will require current disability documentation. When accommodations are approved, the Center will provide me with a Letter of Accommodation which details the recommended accommodations. Contact the Disability Resource Center, Jake Karnes, Director at 859-257-2754 or <a "="" href="mailto:jkarnes@email.uky.edu.">jkarnes@email.uky.edu." Information on Distance Learning Library Services (http://www.uky.edu/Libraries/DLLS) Carla Cantagallo, DL Librarian
	1 1 1 1	 Local phone number: 859 257-0500, ext. 2171; long-distance phone number: (800) 828-0439 (option #6) Email: dllservice@email.uky.edu
		DL Interlibrary Loan Service: http://www.uky.edu/Libraries/libpage.php?lweb_id=253&llib_id=16
11	1 the i	
11.		nstructor of record, have read and understood all of the university-level statements regarding DL. tor Name: Y. T. Wang Instructor Signature:
	Instruc	tor Name: Y. T. Wang Instructor Signature:

CE 551 WATER AND WASTEWATER TREATMENT ENGINEERING

Spring 2012 TR 9:30 am - 10:45 am

Location: CB 343

Instructor: Dr. Y.T. Wang, Professor, P.E.

365 Raymond Building, Department of Civil Engineering

University of Kentucky, Lexington, KY 40506

Phone: 7-5937, Fax: 7-4404, E-mail: ywang@engr.uky.edu

Web: www.engr.uky.edu/~ywang

Required Text: Water Supply and Pollution Control. Viessman and Hammer, 8th ed.,

2009, Pearson Prentice Hall, ISBN 0-13-233717-7.

Synopsis: This course examines the scientific and engineering aspects of water and

wastewater treatment. Conventional water treatment processes such as rapid mixing, flocculation, sedimentation, filtration, and disinfection as well

as biological processes for wastewater treatment are analyzed. Sustainable alternative treatment techniques are also discussed.

Goal: To introduce the principles of design and operation of water and wastewater

treatment processes.

Prerequisite: CE 341, CE 351, and engineering standing or consent of instructor

Student Learning Outcomes: Upon completion of this course, students should be able to

- 1. Discuss water quality parameters and testing procedures for common pollution parameters
- 2. Discuss an overview of water and wastewater treatment processes.
- 3. Describe the hydraulic characteristics of treatment processes as related to treatment efficiency.
- 4. Discuss physical principles and physical treatment processes.
- 5. Describe chemical principles and chemical treatment processes.
- 6. Understand biological principles and biological treatment processes.
- 7. Discuss sludge characteristics, processing, and disposal.
- 8. Discuss sustainable water & wastewater treatment processes.

<u>Topics</u> <u>Required Readings</u>

Water Quality Parameters Chapter 8
Processes for Treating Water and Wastewater Chapter 9

Hydraulic characteristics of Treatment

Processes Chapter 11 (pp.383-398) & Supplement

Physical Treatment Processes Chemical Treatment Processes

Biological Treatment Processes Processing of Sludge Sustainable Treatment Processes Chapter 10 & Supplement Chapter 11 (pp.373-382, pp.399-412, pp.419-452) Chapter 12 (Skip, 12.16) & Supplement Chapter 13 (pp.619-648, pp.655-686) Supplement

References

- 1. Water Quality, Tchobanoglous G., and Schroeder E., 1985. Addison-Wesley.
- 2. Unit Operations and Processes in Environmental Engineering. Reynolds, T. D., and Richards P.A., 2nd ed, 1996. PWS.
- 3. Water Quality & Treatment: A Handbook on Drinking Water. Edzwald, J.K., Editor. 6th ed. 2011. McGraw Hill.

Exams

No comprehensive final exam will be given. Three topic specific, equally weighted exams will be administered over a period of 75 minutes each on the following schedule:

Exam I: February 14
Exam II: April 5

Exam III: May 4 10:30 am - 11:45 am

Labs (Location: OHR C328)

- I. Solids determination, Dissolved Oxygen Determination, Biochemical Oxygen Demand, and Fecal Coliform. Lab report required.
- II. Tracer studies. Lab report required.

Field Trips

Water Treatment Plant. Trip report required Wastewater Treatment Plant. Trip report required

Grading Policy

Grades will be based on the total points accumulated for exams, homework assignments, lab and field trip reports, and class participation. The weighting scale is:

	Undergraduate	Graduate
Exam I	25%	25%
Exam II	25%	25%
Exam III	25%	25%
Homework & lab report	20%	10%
Class participation	5%	5%
Sustainable treatment proje	ect <u>0%</u>	<u>10%</u>
Total	100%	100%

Project reports should be around 15 doubled-spaced pages and contain at least 10 references and are due on the last day of class. The report point will be weighted among technical content (40%), writing (30%), and presentation (30%). The subject of report should be approved by the instructor before the end of the 4th week of the semester. Each graduate student should present his/her report in the class (15 minutes presentation).

Final grades will be decided from the weighted numerical score according to the following scale:

	Undergraduate	Graduate
90 - 100	Ā	Α
80 - 89	В	В
70 - 79	С	С
60 - 69	D	Е
< 60	E	E

There is no makeup on missed/late homework assignments. Makeup exams will only be given with valid acceptable excuse. Undergraduate students at UK will be provided with a midterm evaluation of course performance based on the criteria above.

Homework Policy

Homework will be assigned on a weekly basis. All assignments are due before class on the due date. The assigned work will require manual calculations. Some problems are also to be solved using programs such as MS Excel and MATLAB. Homework to be submitted must be legible (use a suitably dark pen or pencil). Late homework (submitted on due day) will be given a 20% point reduction. Homework submitted after the due day will not be graded. It is the student's responsibility to submit homework in time even if with excused absence unless a pre-arrangement is made with the instructor.

Class Participation

Class attendance is required and attendance will be taken. Absences will adversely affect the final grade. Forging a classmate's signature to indicate attendance will be considered to be a form of cheating. Late arrival and early departure (unexcused) will be considered as absence. Acceptable reasons for excused absences are consistent with university policy, but are typically:

- 1) serious illness;
- 2) illness or death of family member;
- 3) University-related trips;
- 4) major religious holidays;
- 5) other circumstances found to be "reasonable cause for nonattendance by the instructor."

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day for adding a class.

Classroom and Learning Accommodations

Students requiring such accommodation should provide documentation of the need during the first week of class. The Disability Resource Center (Room 2,Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) specifies the particular type of such accommodations on a student-by-student basis.

Cheating and Plagiarism

University policy on student conduct, including that regarding academic honesty, plagiarism and cheating will be followed. Use of a cell phone without explicit permission during exams or quizzes is not allowed, and will result in a charge of cheating. Student's work should be individual. For a discussion of the overall issue and guidelines, refer to the document on the website of the Ombud of the University of Kentucky at http://www.uky.edu/Ombud/Plagiarism.pdf. The Ombud web site also includes a link to a Prentice Hall Companion Website "Understanding Plagiarism" http://wps.prenhall.com/hss_understand_plagiarism_1/0,6622,427064-,00.html. All exams will be proctored. The minimum penalty for either of these offenses is an "E" for the assignment or examination, with suspension and dismissal also possibilities.

Student Interaction

Students are expected to maintain communication with the instructor and the TA through personal meetings (by arrangement or during office hours), e-mail or phone. The instructor will normally respond to e-mail or phone calls (received during normal office hours) within four hours of receipt. Students are expected to be familiar with, and have internet access, along with access to software for document creation and editing, and for preparation of presentations. This access is provided at a number of on-campus locations.

Teaching Assistant (TBA)

Andrew Brooks

Email: andrew.brooks@uky.edu Phone: (859) 257-3643 (Office) Office: 366 Raymond Building

Office hours: M & W: 10:00 am - 12:00 pm

Instructor Office Hour

Normally available 8:00 AM to 3:00 PM or by appointment. Students may contact the instructor through email or phone calls as described under "Student Interaction".

Access to Course Material

Course assignments and lecture notes will be available for download from the instructor's web link: www.engr.uky.edu/~ywang.

Course Schedule

TR (Tuesday Thursday)

17-Jan Tuesday Coerview of water & wastewater treatment processes (Chapter 9) 24-Jan Tuesday Reaction kinetics (Chapter 11 & supplement), HW 2 26-Jan Thursday Ideal reactors (Chapter 11 & supplement), HW 3 31-Jan Tuesday Ideal reactors (Chapter 11 & supplement), HW 3 31-Jan Tuesday Ideal reactors (Chapter 11 & supplement), HW 3 31-Jan Tuesday Ideal reactors (Chapter 11 & supplement) 31-Feb Tuesday Inursday Rapid mixing, flocculation (Chapter 10 & supplement) 31-Feb Tuesday Sedimentation (Chapter 10 & supplement) 31-Feb Tuesday Sedimentation in water & wastewater treatment (Chapter 10) 31-Feb Tuesday Gravity granular-media filtration (Chapter 10), HW 6 32-Feb Thursday Gravity granular-media filtration (Chapter 10), HW 6 33-Feb Tuesday Head losses through filtration, filter backwash (Chapter 10) 34-Feb Tuesday Coagulation & water softening (Chapter 11), HW 7 35-Feb Tuesday Coagulation & water softening (Chapter 11), HW 7 36-Mar Tuesday Spring Break Day 37-Mar Tuesday Spring Break Day 39-Mar Thursday Spring Break Day 39-Mar Thursday Tuesday C.t concept & disinfection (Chapter 11) 39-Mar Tuesday Coxidation pond, fixed-film biological processes (Chapter 12) 30-Apr Tuesday Thursday Characteristics and quantity of sludge (Chapter 13), HW 11 31-Apr Tuesday Thursday Field Trip I: Wastewater Treatment Plant 31-Apr Tuesday Characteristics and quantity of sludge (Chapter 13) 31-Apr Tuesday Student presentation, report due, class evaluation 31-Apr Tuesday Student presentation, report due, class evaluation	12-Jan	Thursday	Water quality parameters (Chapter 8)
24-JanTuesdayReaction kinetics (Chapter 11 & supplement), HW 226-JanThursdayAnalysis of experimental data (Chapter 11 & supplement)31-JanTuesdayIdeal reactors (Chapter 11 & supplement), HW 302-FebThursdayNon-ideal reactors (Chapter 11 & supplement)07-FebTuesdayLab II: Tracer study (Lab manual), HW 409-FebThursdayRapid mixing, flocculation (Chapter 10 & supplement)14-FebTuesdayStock's law and sedimentation (Chapter 10 & supplement), HW 516-FebThursdayExam I (HW 1-4 & Lab)21-FebTuesdaySedimentation in water & wastewater treatment (Chapter 10)23-FebThursdayGravity granular-media filtration (Chapter 10), HW 628-febTuesdayWater chemistry, alkalinity & hardness (Chapter 11), HW 706-MarThursdayVater chemistry, alkalinity & hardness (Chapter 11), HW 813-MarTuesdaySpring Break Day15-MarThursdaySpring Break Day20-MarThursdaySpring Break Day27-MarTuesdayC.t concept & disinfection (Chapter 11)29-MarThursdayField Trip I: Water Treatment Plant27-MarTuesdayProcess microbiology, growth kinetics & nutrient requirement (Ch 12)03-AprTuesdayCharacteristics, activated sludge processes (Ch 12), HW 1005-AprThursdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayChara	17-Jan	Tuesday	Lab I: Solids, DO, BOD, and FC test, HW 1
Thursday Analysis of experimental data (Chapter 11 & supplement) Tuesday Ideal reactors (Chapter 11 & supplement), HW 3 O2-Feb Thursday Non-ideal reactors (Chapter 11 & supplement) Tuesday Lab II: Tracer study (Lab manual), HW 4 O9-Feb Thursday Rapid mixing, flocculation (Chapter 10 & supplement) Tuesday Stock's law and sedimentation (Chapter 10 & supplement), HW 5 Feb Thursday Exam I (HW 1-4 & Lab) Sedimentation in water & wastewater treatment (Chapter 10) Sedimentation in water & wastewater 10, HW 6 Sefeb Tuesday Gravity granular-media filtration (Chapter 10), HW 6 Sefeb Tuesday Head losses through filtration, filter backwash (Chapter 10) Thursday Water chemistry, alkalinity & hardness (Chapter 11), HW 7 Coagulation & water softening (Chapter 11) Thursday Iron & manganese removal, disinfection (Chapter 11), HW 8 Spring Break Day Spring Break Day Spring Break Day C.t. concept & disinfection (Chapter 11) Field Trip I: Water Treatment Plant Tuesday Wastewater characteristics, activated sludge processes (Ch 12), HW 10 S-Apr Tuesday Characteristics and quantity of sludge (Chapter 13), HW 11 T-Apr Tuesday Tuesday Sustainable water & wastewater treatment processes Sustainable water & wastewater treatment processes Student presentation, report due, class evaluation	19-Jan	Thursday	Overview of water & wastewater treatment processes (Chapter 9)
31-JanTuesdayIdeal reactors (Chapter 11 & supplement), HW 302-FebThursdayNon-ideal reactors (Chapter 11 & supplement)07-FebTuesdayLab II: Tracer study (Lab manual), HW 409-FebThursdayRapid mixing, flocculation (Chapter 10 & supplement)14-FebTuesdayStock's law and sedimentation (Chapter 10 & supplement), HW 516-FebThursdayExam I (HW 1-4 & Lab)21-FebTuesdaySedimentation in water & wastewater treatment (Chapter 10)23-FebThursdayGravity granular-media filtration (Chapter 10), HW 628-febTuesdayHead losses through filtration, filter backwash (Chapter 10)01-MarThursdayWater chemistry, alkalinity & hardness (Chapter 11), HW 706-MarTuesdayCoagulation & water softening (Chapter 11)13-MarTuesdaySpring Break Day15-MarThursdaySpring Break Day20-MarTuesdayC.t concept & disinfection (Chapter 11)22-MarThursdayField Trip I: Water Treatment Plant27-MarTuesdayProcess microbiology, growth kinetics & nutrient requirement (Ch 12)03-AprTuesdayWastewater characteristics, activated sludge processes (Ch 12), HW 1005-AprThursdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge (Chapter 13)19-AprThursdayField Trip II: Wastewater Treatment Plant24-AprTuesdaySustainable water & wastewater treatment processes26-AprTh	24-Jan	Tuesday	Reaction kinetics (Chapter 11 & supplement), HW 2
02-FebThursdayNon-ideal reactors (Chapter 11 & supplement)07-FebTuesdayLab II: Tracer study (Lab manual), HW 409-FebThursdayRapid mixing, flocculation (Chapter 10 & supplement)14-FebTuesdayStock's law and sedimentation (Chapter 10 & supplement), HW 516-FebThursdayExam I (HW 1-4 & Lab)23-FebThursdaySedimentation in water & wastewater treatment (Chapter 10)28-febTuesdayGravity granular-media filtration (Chapter 10), HW 628-febTuesdayHead losses through filtration, filter backwash (Chapter 10)01-MarThursdayWater chemistry, alkalinity & hardness (Chapter 11), HW 706-MarTuesdayCoagulation & water softening (Chapter 11)08-MarThursdayIron & manganese removal, disinfection (Chapter 11), HW 813-MarTuesdaySpring Break Day20-MarTuesdayC.t concept & disinfection (Chapter 11)22-MarThursdayField Trip I: Water Treatment Plant22-MarTuesdayMembrane treatment processes (Chapter 11), HW 929-MarTuesdayWastewater characteristics, activated sludge processes (Ch 12), HW 1005-AprThursdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayField Trip II: Wastewater Treatment Plant24-AprTuesdaySustainable water & wastewater treatment processes26-AprThursdayStudent presentation, report due, class evaluation <td>26-Jan</td> <td>Thursday</td> <td>Analysis of experimental data (Chapter 11 & supplement)</td>	26-Jan	Thursday	Analysis of experimental data (Chapter 11 & supplement)
07-FebTuesdayLab II: Tracer study (Lab manual), HW 409-FebThursdayRapid mixing, flocculation (Chapter 10 & supplement)14-FebTuesdayStock's law and sedimentation (Chapter 10 & supplement), HW 516-FebThursdayExam I (HW 1-4 & Lab)23-FebThursdaySedimentation in water & wastewater treatment (Chapter 10)28-febTuesdayGravity granular-media filtration (Chapter 10), HW 628-febTuesdayHead losses through filtration, filter backwash (Chapter 10)01-MarThursdayWater chemistry, alkalinity & hardness (Chapter 11), HW 706-MarTuesdayCoagulation & water softening (Chapter 11)08-MarThursdayIron & manganese removal, disinfection (Chapter 11), HW 813-MarTuesdaySpring Break Day20-MarTuesdayC.t concept & disinfection (Chapter 11)22-MarThursdayField Trip I: Water Treatment Plant27-MarTuesdayMembrane treatment processes (Chapter 11), HW 929-MarThursdayProcess microbiology, growth kinetics & nutrient requirement (Ch 12)03-AprTuesdayWastewater characteristics, activated sludge processes (Ch 12), HW 1005-AprThursdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge (Ghapter 13)19-AprThursdayField Trip II: Wastewater Treatment Plant24-AprTuesdaySustainable water & wastewate	31-Jan	Tuesday	Ideal reactors (Chapter 11 & supplement), HW 3
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16-FebThursdayExam I (HW 1-4 & Lab)21-FebTuesdaySedimentation in water & wastewater treatment (Chapter 10)23-FebThursdayGravity granular-media filtration (Chapter 10), HW 628-febTuesdayHead losses through filtration, filter backwash (Chapter 10)01-MarThursdayWater chemistry, alkalinity & hardness (Chapter 11), HW 706-MarTuesdayCoagulation & water softening (Chapter 11)08-MarThursdayIron & manganese removal, disinfection (Chapter 11), HW 813-MarTuesdaySpring Break Day20-MarTuesdaySpring Break Day20-MarThursdaySpring Break Day27-MarTuesdayC.t concept & disinfection (Chapter 11)22-MarThursdayField Trip I: Water Treatment Plant27-MarTuesdayMembrane treatment processes (Chapter 11), HW 929-MarThursdayProcess microbiology, growth kinetics & nutrient requirement (Ch 12)03-AprTuesdayWastewater characteristics, activated sludge processes (Ch 12), HW 1005-AprThursdayExam II (HW 5-9)10-AprTuesdayCharacteristics and quantity of sludge (Chapter 13), HW 1117-AprTuesdayCharacteristics and quantity of sludge disposal (Chapter 13)19-AprThursdayField Trip II: Wastewater Treatment Plant24-AprTuesdaySustainable water & wastewater treatment processes26-AprThursdayStudent presentation, report due, class evaluation	09-Feb	Thursday	Rapid mixing, flocculation (Chapter 10 & supplement)
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26-Apr Thursday Student presentation, report due, class evaluation	19-Apr	Thursday	Field Trip II: Wastewater Treatment Plant
	24-Apr	Tuesday	Sustainable water & wastewater treatment processes
4-May Friday Exam III (HW 10-11)	26-Apr	Thursday	Student presentation, report due, class evaluation
	4-May	Friday	Exam III (HW 10-11)

Academic Integrity:

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

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