CE 408: **Risk Analysis in Civil Engineering** (3 units)

2011 Fall Semester — Course Syllabus

Lecture	TTh		2 - 3:20 p.m.	OHE 132 | DEN
Discussion	Th	Mahmoud Kamalzare	3:30 - 4:20 pm	WPH B28
Discussion	F	Daniel Lakeland	4 - 4:50 pm	OHE 100C
Instructor	Dr. Maria Todorovska			
Office	KAP 216a			
Phone	(213) 740-0616			
Email	mtodorov@usc.edu			
Office Hours	TuTh 1-2 pm and by appointment			
Teaching Assistant	Mahmoud Kamalzare		Daniel Lakeland	
Office	KAP 115		KAP 227	
Phone	(213) 821-6656			
Email	kamalzar@usc.edu		lakeland@usc.edu	
Office Hours	Mo 2-4 pm every other week T 11 am - 1 pm, Thu. 11 am - 1 pm		Mo 2-4 pm every other week F 1-4 pm	
Prerequisite(s)	Calculus, Matlab			
Co-requisite	N/A			
Textbook(s)	Alfredo H-S Ang & Wilson H Tang: PROBABILITY CONCEPTS IN ENGINEERING. 2nd ed. Wiley (Required) MATLAB Student's Version, MathWorks, 2007. Highly recommended			
Reference(s)				
Course Description	The role of risk and probability in Civil Engineering is described and basic probability concepts are presented. Probability distribution functions commonly used to model and analyze Civil Engineering problems are discussed. Methods for estimating parameters and determining distribution models from observational data are introduced. Monte Carlo simulation methods are practiced. Detailed examples of the application of probabilistic methods to structural, transportation, hydrological, and environmental system design are presented throughout the course.			

CE 408: **Risk Analysis in Civil Engineering** (3 units)

2011 Fall Semester — Course Syllabus

Homework	Due every Th at the beginning of class on instructor's desk. Solutions will be posted on the class web site shortly after the due date. <u>Policies:</u> • Homework received after the beginning of class will receive half credit. • No homework will be accepted after the end of class without an official excuse from the Civil Engineering Student Affairs Office. • You are responsible for the "Problems Due" and the "Suggested Problems." The latter will not be collected; however, each of the exams will have a problem similar to a problem in the "Suggested Problems" or examples given in class. • Any homework not submitted during class should be put in Dr. Todorovska'a mailbox in KAP213.
Homework format	• The problems you turn in must conform to the standards of good engineering practice. (See Homework Format instructions.) Nonconforming or illegible homework will not be graded. • The right answer with the wrong work will receive no credit. • Always include units on your answer. • Always include a discussion at the end explaining what your answer means.

Final grade schema	Homework	15	%
	Computer assignments	15	%
	Two Midterm exams	40	%
	Final Exam	30	%
	Total	100	%

Important dates

Sept. 9 - Last day to drop a class without a mark of "W"
Nov. 11 - Last day to drop a class with a mark of "W"

CE 408: **Risk Analysis in Civil Engineering** (3 units)

2011 Fall Semester — Course Syllabus

Tentative Course Schedule

Week		Topic	Reading Ch#	Comp. Assign. due	Tentative HW due***	Suggested problems
1	8/23	Ch. 1 Introduction	1			
	8/25	Ch 2 Events and Probability; Set Theory	2-2.2			
2	8/30	Math. of Prob.; Conditional Prob.;	2.3-2.3.2			
	9/1	Multiplication Rule; Theorem Total Prob	2.3.3, 2.3.4		B0,2.4, 2.5	2.1, 2.2
3	9/6	MATLAB Introduction	Notes on BB			
	9/8	Bayes Thm	2.3.5		2.10, 2.18,2.19,2.22,2.23	2.7, 2.13, 2.14, 2.15, 2.70
4	9/13	Ch 3 Random Variables: Distribs. & Statistics	3-3.1			
	9/15	Normal & Lognormal Distribs.	3.2-3.2.2		2.17, 2.24, 2.32, 2.48	2.29, 2.37, 2.66
5	9/20	Bernoulli seq.; Binomial & Geom. Distribs.	3.2.3-3.2.5			
	9/22	Poisson Process; Poisson & Exp. Distribs.	3.2.6-3.2.8		2.43, 2.58, 3.8, 3.9, 3.12	2.56*, 2.59, 2.68, 3.1, 3.5
6	9/27	Multiple RVs	3.3-3.4			
	9/29	********* MT EXAM 1 *********				
7	10/4	Ch 4 Functions of RVs; Derived Probability Distributions	4-4.21			
	10/6	Central Limit Thm.; Extreme Value Distrib.	4.2.2-4.2.3	CA1	3.39, 3.41, 3.46, 3.47, 3.49	3.36, 3.38, 3.44, 3.45
8	10/11	Moments of R.V.s	4.3			
	10/13	Hypergeom., Uniform & Beta Distrib..	3.2.9-3.2.11		3.7*, 3.30, 3.32, 3.56*, 3.58*	3.16,3.24, 3.26, 3.33, 3.59
9	10/18	Ch 6 Statistical Inference; Sampling and Pt. Est.	6-6.2	CA2		
	10/20	Maximum Likelihood Estim; Testing of Hypotheses	6.3		4.1, 4.8, 4.17, 4.38, 4.33	4.2, 4.7, 4.21, 4.23, 4.36
10	10/25	Review				
	10/27	******** MT EXAM 2 ********				
11	11/1	Confidence Intervals Estimation; Measurement theory	6.4-6.6			
	11/3	Ch 7 Determination of Probability Distrib. Models Chi-Square Test for Goodness of Fit	7-7.1,7.3-7.3.1		B1, B2, B3, B4	Examples 6.1-6.4
12	11/8	Kolmogorov-Smirnov Test for Goodness of Fit	7.3.2			

CE 408: **Risk Analysis in Civil Engineering** (3 units)

2011 Fall Semester — Course Syllabus

	11/10	Anderson-Darling Test for Goodness of Fit	7.3.3-7.5		6.2, 6.11, B5	6.4, 6.10
13	11/15	Ch 8 Regression & Correlation Analyses	8-8.2.1, 8.3	CA3		
	11/17	Variance & Multiple Linear Regression	8.2.2-8.2.3,8.5		7.4cd, 7.9c, 7.10, 7.13	7.3bc, 7.5, 7.7, 7.11c
14	11/22	Nonlinear Regression	8.6-8.8			
	11/24	No class, Thanksgiving			8.15, 8.1**	8.6, 8.10
15	11/29	Ch 9 The Bayesian Updating Approach	9			
	12/1	Review		CA4	8.16, 8.18	8.19
16	12/8	******Final exam (comprehensive)******				

* Please note the *Textbook Errata* under *Course Documents* on Blackboard
** This homework can be turned in class on Tu 11/29
*** The actual HW assignments will be given in class and posted on the course web site.

BB = Blackboard
Homeworks B0 – B5 = The assignments are on Blackboard in Selected Homework Assignments

CE 408: **Risk Analysis in Civil Engineering** (3 units)

2011 Fall Semester — Course Syllabus

STATEMENT ON ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own.

All students are expected to understand and abide by these principles. *SCampus,* the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

http://www.usc.edu/dept/publications/SCAMPUS/gov/

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at:

http://www.usc.edu/student-affairs/SJACS/

STATEMENT FOR STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible.

DSP Contact Information

Location: STU 301

Hours open: 8:30 a.m. until 5:00 p.m., Monday — Friday

Phone number: (213) 740-0776