SYLLABUS FOR AME 581

AME 581:	:	Introduction	to Nuclear Engineering
Prerequis	ites:	AME 310, Ma	th 245, Physics 153 or equivalents
Semester:		Fall 2013	
Time:		Tu Th 11:00	-12:20
Professor	:	S.S. Sadhal	
0	Office and	office hours:	OHE 400G, Tu Th 09:00-10:30, 2:00-3:00
0	Phone and	email:	213-740-0492, sadhal@usc.edu

o TA(s): None

Course Requirements and Grades

- Required text: "Introduction to Nuclear Engineering (3rd Edition)," by John R. Lamarsh & Anthony R. Baratta, Prentice-Hall (2001), ISBN-10: 0201824981.
- Grading breakdown:

Homework:	15%	(due every Thursday at the end of class period)
Mid-Term Exam	35%	(October 8, 2013)
Final Exam	50%	(Dec 17, 2013, 08:00-10:00 am)
TOTAL	100%	

Final grade will depend entirely on the performance on the above components, and be independent of the financial support requirements (e.g., minimum grade requirement for tuition reimbursement).

Please schedule your work-related travel around the mid-term and final exams. Accommodation to take exams on different dates will only be made for family emergencies and documented illness or health-related emergencies.

Breakdown of Course Material

Lec. No.	Lecture Dates	Topic(s)	Textbook
			Chapter(s)
1, 2	Aug 27, 29	Introduction to atomic and nuclear	1, 2
Week 1		physics, nuclear length- and time-scales,	
		mass and energy, nuclear stability,	
		radioactive decay, nuclear reactions,	
		binding energy	
3, 4, 5	Sept 3, 5, 10	Nuclear cross-sections, scattering and	3
Week 2-3		collisions, nuclear fission and fission	
		neutrons, fission products,	
6, 7	Sept 12, 17	Nuclear reactors, fuels and fuel rods,	4
Week 4		breeding, light-water reactors, heavy-	
		water reactors, and gas-cooled reactors,	
		breeders,	
8, 9, 10, 11	Sept 19, 24, 26	Neutron diffusion and moderation, Fick's	5
Week 5-6	October 1	law, the diffusion equation, group	
		diffusion	

12,	October 3	Nuclear reactor theory, basic	6
Week 7		homogeneous reactor types.	
Week 7	October 8	Mid-Term Examination	
13, 14, 15	Oct 10, 15, 17	Geometric buckling parameters, thermal	6
Week 8		reactors, heterogeneous reactors.	
16, 17	Oct 22, 24	Reactor kinetics, control rods, reactivity,	7
Week 9		temperature effects, poisoning,	
18, 19, 20,	Oct 29, 31,	Reactor heat transfer, power cycles,	8
21	Nov 5, 7	reactor heat generation, conduction,	
Week 10-11		convection and two-phase flow, thermal	
		design.	
22, 23, 24	Nov 12, 14, 19	Radiation protection, biological effects of	9
Week 12-13		radiation, radiation units, standards of	
		radiation protection,	
25, 26	Nov 21, 26	Gamma-ray shielding, buildup factors,	10
Week 13-14		isotropic planar source models,	
27, 28	Dec 3, 5	Internal sources, reactor shielding and	10
Week 15		shield design, removal-diffusion method	
	Dec 17, 2013,	Final Examination	
	08:00-10:00 am		