SYLLABUS FOR AME 581

AME 581: **Introduction to Nuclear Engineering**
Prerequisites: AME 310, Math 245, Physics 153 or equivalents
Semester: Fall 2014
Time: Tu Th 11:00--12:20
Professor: S.S. Sadhal

- Office and office hours: OHE 400G,Tu Th 09:00-10:30, 2:00-3:00
- Phone and email: 213-740-0492, sadhal@usc.edu
- 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.
- Chart of the Nuclides: Use http://atom.kaeri.re.kr/

- **Grading Policy:**

Grade Breakdown

Homework:	15%	(due every Thursday at the end of class period)
Mid-Term Exam	35%	(October 7, 2014)
Final Exam	50%	(Dec 16, 2014, 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 be made for only family emergencies and documented illness or health-related emergencies. Other exceptions will be considered on a case-by-case basis.***

Breakdown of Course Material

Lec. No.	Lecture Dates	Topic(s)	Textbook Chapter(s)
1, 2 Week 1	Aug 26, 28	Introduction to atomic and nuclear physics, nuclear length- and time-scales, mass and energy, nuclear stability, radioactive decay, nuclear reactions, binding energy	1, 2
3, 4, 5 Week 2-3	Sept 2, 4, 9	Nuclear cross-sections, scattering and collisions, nuclear fission and fission neutrons, fission products,	3
6, 7 Week 4	Sept 11, 16	Nuclear reactors, fuels and fuel rods, breeding, light-water reactors, heavy-water reactors, and gas-cooled reactors,	4

		breeders,	
8, 9, 10, 11 Week 5-6	Sept 18, 23, 25 October 1	Neutron diffusion and moderation, Fick's law, the diffusion equation, group diffusion	5
12, Week 7	October 2	Nuclear reactor theory, basic homogeneous reactor types.	6
Week 7	October 7	***Mid-Term Examination***	
13, 14, 15 Week 8	Oct 9, 14, 16	Geometric buckling parameters, thermal reactors, heterogeneous reactors.	6
16, 17 Week 9	Oct 21, 23	Reactor kinetics, control rods, reactivity, temperature effects, poisoning,	7
18, 19, 20, 21 Week 10-11	Oct 28, 30, Nov 4, 6	Reactor heat transfer, power cycles, reactor heat generation, conduction, convection and two-phase flow, thermal design.	8
22, 23, 24 Week 12-13	Nov 11, 13, 18	Radiation protection, biological effects of radiation, radiation units, standards of radiation protection,	9
25, 26 Week 13-14	Nov 20, 25	Gamma-ray shielding, buildup factors, isotropic planar source models,	10
27, 28 Week 15	Dec 2, 4	Internal sources, reactor shielding and shield design, removal-diffusion method	10
	Dec 16, 2014, 08:00-10:00 am	***Final Examination***	