22.54 Neutron Interactions and Applications (Spring 2002) -- J. Yanch and S. Yip
Course Outline [26 lectures]

Why Are Neutrons Special? -- basic properties of neutron
Introduction to MCNP -- modeling neutron transport
Neutron Cross Sections and Scattering [4] --
- n-p scattering and scattering lengths
- reactions and optical model
- optics, diffraction and small angle scattering
- thermal neutron scattering and dynamic structure factor

Neutron Sources [3] --
- isotope-based
- accelerator-basd
- nuclear reactor

Neutron Detection [4]
Neutronics of Multiplying Media [4] --
- criticality, and
- neutron diffusion
- neutron slowing down
- the two-group two-region reactor

Neutron Transport/Shielding [2]
Scientific and Industrial Applications [3] --
- structure and dynamics of liquids and solids
- re ual strain
- industrial imaging, oil-well logging

Bionuclear Applications [4] --
- activation analysis
- fast neutron therapy
- BNCT
- body-composition studies

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Spring 2002

Class Syllabus

Date	Lecture Topic	Homework Assignments
Tuesday, February 5	Why are Neutrons Special? -- basic properties of neutron	
Thursday, February 7	Introduction to MCNP -- modeling neutron transport	
Tuesday, February 12	Neutron Cross Sections and Scattering -- n-p scattering, scattering lengths	
Thursday, February 14	-- reactions and optical model	
Tuesday, February 19	-- optics, diffraction, and small-angle scattering	
Thursday, February 21	-- thermal neutron scattering and dynamic structure factor	
Tuesday, February 26	Neutron Sources -- isotope-based	
Thursday, February 28	Neutron Sources -- accelerator-based	
Tuesday, March 5	Neutron Sources -- nuclear reactor	
Thursday, March 7	Neutron Detection	
Tuesday, March 12	Neutron Detection (continued)	
Thursday, March 14	Neutron Detection (continued)	
Tuesday, March 19	Neutron Detection (continued)	
Thursday, March 21	MidTerm Examination	
Tuesday, March 26	SPRING VACATION	
Thursday, March 28	SPRING VACATION	
Tuesday, April 2	Neutronics of Multiplying Media -- criticality, and	

Thursday, April 4	-- neutron diffusion	
Tuesday April 9	-- neutron slowing down	
Thursday, April 11	-- the two-group two-region reactor	
Tuesday, April 16	PATRIOTS DAY - HOLIDAY	
Thursday, April 18	Neutron Transport/Shielding	
Tuesday, April 23	Neutron Transport/Shielding (continued)	
Thursday, April 25	Scientific and Industrial Applications -- structure and dynamics of liquids and solids	
Tuesday, April 30	-- measurement of residual stress	
Thursday, May 2	-- industrial imaging, oil-well logging	
Tuesday, May 7	Bionuclear Applications -- neutron activation analysis	
Thursday, May 9	-- fast neutron therapy	
Tuesday, May 14	-- BNCT	
Thursday, May 16	-- Body Composition Studies	