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SCI 225.01: General and Chemical Science

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Science 225 GENERAL PHYSICAL AND CHEMICAL SCIENCE Autumn, 2000

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INTERNET SITE: www.physics.umt.edu/sci225

TEACHING ASSISTANTS: Greg Grallo, Deborah McArthur, Brian Boer

LECTURES: 3 one hour lectures/week, MWF at NOON, SC 131

DISCUSSION/LABORATORY PERIODS: 2 two hour sessions/week, TuW in SC 13, ThF in SC 225 229

MAIN REFERENCE: THE PHYSICAL SCIENCES - AN INTEGRATED APPROACH by Hazen and Trefil

GRADING:

EXAMS: Exams 1, 2, and 3 (15% each)	45%
FINAL EXAM: Tuesday, Dec. 19th, 8:00 am . . .	20%
LAB NOTEBOOK:	10%
PROJECT PRESENTATION:	10%
WEEKLY ASSIGNMENTS	10%
QUIZZES	5%

COURSE OUTLINE AND SCHEDULE:

Week 1: Sept. 5 - Sept. 8 (Monday, Sept. 4 - **HOLIDAY**, Labor Day)

LECTURES: Overview: Matter and Energy
DISCUSSION: Introductions, course policies
LAB: "Powers of Ten" video, Math and graph review
READING: Preface (pages v-vii), Chapter 1, Chapter 2 (pages 34-39), Appendix A (pages A-1 to A-7)

Week 2: Sept. 11 - 15

LECTURES: Motion, forces, and mechanical energy
DISCUSSION: Discussion on the scientific process; collecting and presenting data
LAB: Determining density changes in water
READING: Chapter 3 (pages 63-78), Chapter 4 (pages 83-90), Chapter 5 (pages 111-122)

Week 3: Sept. 18 - 22

LECTURES: Gravity, gravitational energy, thermal energy and heat
DISCUSSION: Demonstrations and problems concerning forces and motion
LAB: Measuring velocity, acceleration, force, and acceleration of gravity
READING: Chapter 4 (pages 92-98) and Chapter 5 (pages 122-137)

Week 4: Sept. 25 - 29 (Friday, Sept. 29 - **EXAM 1**)

LECTURES: Thermodynamics
DISCUSSION: Practice exam
LAB: Determination of heat capacities by calorimetry
READING: Chapter 6 (pages 141-162)

Week 5: Oct. 2 - 6

LECTURES: Electricity, magnetism, and electromagnetic energy
DISCUSSION: Electricity/magnetism demonstrations; discussions on uses of electrical energy
LAB: Electric circuits - Using light bulbs as resistors
READING: Chapter 7 (pages 167-196)

Week 6: Oct. 9 - 13

LECTURES: Light, the electromagnetic spectrum, and other wave energy
DISCUSSION: Demonstrations and applications of waves
LAB: Optics - Lenses and image formation
READING: Chapter 8 (pages 201-230)

Week 7: Oct. 16 - 20

LECTURES: Introduction to chemistry, chemical reactions, energy and atomic structure
DISCUSSION: First student project presentations
LAB: Chemical reactions
READING: Chapter 12 (pages 311-320) and Chapter 9 (pages 235-242)

Week 8: Oct. 23 - 27 (Friday, Oct. 27 - EXAM 2)

LECTURES: Atomic structure, chemical properties, and the Periodic Table
DISCUSSION: Practice exam
LAB: Atomic spectra and identification of elements
READING: Chapter 9 (pages 242-260)

Week 9: Oct. 30 - Nov. 3

LECTURES: Chemical bonds and building molecules
DISCUSSION: Chemical compounds and structure of molecules
LAB: Acid-base chemical reactions and antacids
READING: Chapter 11 (pages 285-293)

Week 10: Nov. 6 - 9 (Tuesday, Nov. 7 - HOLIDAY, Election Day) (Friday, Nov. 10 - HOLIDAY, Veteran's Day)

LECTURES: A molecular view of chemical compounds and reactions
DISCUSSION: NO sessions this week
LAB: NO sessions this week
READING: Chapter 11 (pages 293-306) and Chapter 12 (pages 322-328)

Week 11: Nov. 13 - 17

LECTURES: Radioactivity, nuclear forces and nuclear energy
DISCUSSION: Practice Exam
LAB: Separation and purification of substances by chromatography
READING: Chapter 14 (pages 377-406)

Week 12: Nov. 20 (Monday, Nov. 20 - EXAM 3) (Nov. 22 - 24, THANKSGIVING HOLIDAY)

LECTURES: Exam 3
DISCUSSION: NO sessions this week
LAB: NO sessions this week
READING: none

Week 13: Nov. 27 - Dec. 1

LECTURES: Nature and evolution of the stars
DISCUSSION: Planetarium demonstrations and star charts
LAB: Radioactivity simulations
READING: Chapter 21 (pages 611-640)

Week 14: Dec. 4 - 8

LECTURES: The solar system
DISCUSSION: Constructing models of the solar system and comparing the planets
LAB: Relationship between brightness and distance
READING: Chapter 17 (pages 461-489)

Week 15: Dec. 11 - 15

LECTURES: Evolution of the Universe
DISCUSSION: Second student project presentations
LAB: Final practice exam and review
READING: Chapter 22 (pages 645-670)

FINAL EXAM: Tuesday, Dec. 19th, 8:00 a.m. - 10:00 a.m.