

SOUTHERN CONNECTICUT STATE UNIVERSITY
CHE 445 – Chemical Hazards and Laboratory Safety
Spring Semester, 2012
Thursday – 11:10 am – 12:00 pm

Name: Dr. Gregory S. Kowalczyk
Office: 330 Jennings Hall
Phone: 203-392-6268
E-mail: KowalczykG1@southernct.edu

Office Hours:
Monday and Wednesday: 2:00 – 3:00 pm
Tuesday: 10:00 am – 12:00 noon
Thursday: 11:00 – 12:00 noon

Course number: CHE 445

Credit Hours: 1

Prerequisite(s): CHE 370

Course Title: Chemical Hazards and Laboratory Safety

COURSE DESCRIPTION:

The study of the principles and methods of handling hazardous materials in the laboratory. Coverage includes: the nature and scope of hazards in the laboratory, overview of applicable regulations, fundamentals of chemical hygiene, material safety data sheets and chemical toxicity.

COURSE CONTRIBUTION:

Upon satisfactory completion of this course, the student will be familiar with hazards associated with specific classes of chemicals, know where to find information on chemical safety and toxicity, know how to determine the relative toxicity of chemicals, know what precautions to take when using a chemical, how to carry out reactions safely, be able to recognize hazards associated with laboratory equipment, know how to ensure minimum exposure to chemicals, know first aid procedures, emergency procedures for spills and proper waste disposal procedures. The course will also introduce the student to chemical safety in an industrial, non-laboratory, and environment.

LEARNER OUTCOMES & ASSESSMENTS: *Link all course outcomes to NCATE and INTASC standards*

1. Know the hazards associated with a particular family of chemicals. (INTASC: 1,4, NSTA: 1, 2, 3)
2. Know where to find information on chemical hazards and toxicity. (INTASC: 1,4, NSTA: 1, 2, 3)
3. Know what precautions to take when handling chemicals. (INTASC: 1, NSTA: 1, 2, 3)
4. Learn how to carry out chemical reactions safely in the laboratory (INTASC: 1,4, NSTA: 1, 2, 3)
5. Be aware of hazards associated with laboratory equipment (INTASC: 1, 4, NSTA: 1, 2, 3)
6. Know how to use PPE effectively. (INTASC: 1,4, NSTA: 1, 2, 3)
7. Learn first aid procedures. (INTASC: 1,4, NSTA: 1, 2, 3)
8. Learn how to respond to chemical spills. (INTASC: 1,4, NSTA: 1, 2, 3)
9. Learn how to identify hazardous waste. (INTASC: 1,4, NSTA: 1, 2, 3)

MODES OF LEARNING

The course is only lecture. The lecture portion of the course relies heavily on narrative and examples. Students are taught how to recognize certain chemical hazardous through the examples and their knowledge of Chemistry. There are about 6 homework assignments where students are required to do research on chemical hazards and make evaluations of hazardous conditions. A term paper is also assigned where students research some area of chemical hazards in industry or a laboratory situation.

Expected Student Learning Activity	Weekly Hours for Course	Total Hours for Course (14-Week Semester)*	Term Credits Earned
Lecture Hours (Contact Time)	1	14	
Reading and Study Time	2	28	
Assignments	1	14	
Paper	3	42	
Total Hours	7	98	1

* Please note that these times are only estimates based on the Department of Education's definition of a credit hour and do not guarantee a specific grade in the course. Students may find that they require more or less time to succeed in the course.

COURSE OUTLINE

	<u>Topic</u>
Lecture 1	Nature and Scope of Chemical Hazards and Toxicity Responsibility for safety Basic types of hazards Sources of information on chemical hazards Types of accidents
Lecture 2	Regulations Federal and state agencies Specific regulatory references Requirements and enforcement
Lecture 3 - 4	Material Safety Data Sheets (MSDS) Federal requirements Definition of terms Interpretation
Lecture 5	Chemical Labeling Regulatory requirements Types of labels
Lecture 6 - 8	Safe Handling of Chemicals Personal Protective Equipment (PPE) Laboratory Safety Equipment Flammability Hazards/Extinguishers Proper chemical storage Ventilation First Aid Emergency Response Proper Waste Disposal
Lecture 9	Mid-Term Exam
Lecture 10 - 14	Chemical Reactions Incompatibilities Factors affecting rates of reaction Pyrophorics Water-reactives Acids Oxidizers Explosives Peroxides

REQUIRED TEXT(S)

None – Handouts are used.

COURSE REQUIREMENTS:

Attendance: Regular and prompt attendance is expected.

Accommodating Students with Disabilities: If any student has a particular disability-related need in order to participate in this course, such as, special seating, note-taking assistance, use of tape recorders, or modified examination conditions, please let me know as soon as possible so that appropriate accommodations can be made.

Inclement Weather: When inclement weather threatens, call the university's WeatherChek voice mail message line (203-392-SNOW) to hear the latest official information on possible delayed openings, class cancellations, or the closing of the university.

Some Final Thoughts: Unfortunately, the question of academic honesty occasionally becomes an issue between an instructor and a student. The best way to avoid this is to be sure that no suspicions arise. **Cheating on exams or any phase of this course will not be tolerated. The student handbook outlines the various prerogatives of the instructor in cases of academic dishonesty.**

EVALUATION CRITERIA

Homework	10%
Written Paper	30%
Mid-Term Exam	30%
Final Exam	30%

The following final grade schedule will be used:

A = 93 - 100%

A- = 90 - 92%

B+ = 87 - 89%

B = 83 - 86%

B- = 80 - 82%

C+ = 77 - 79%

C = 73 - 76%

C- = 70 - 72%

D+ = 67 - 69%

D = 63 - 66%

D- = 60 - 62%

STANDARDS GUIDELINES

INTASC STANDARDS

[Interstate New Teachers' Assessment & Support Consortium]

S

1. Knowledge of subject matter
2. Knowledge of human development & learning
3. Instruction adapted to meet diverse learners
4. Use of multiple instructional strategies & resources

A

5. Effective learning environment created
6. Effective communication
7. Lesson planning

I

9. Reflection and professional development

L

8. Assessment of student learning to improve teaching

S

10. Partnership with school and community

PROFESSIONAL STANDARDS

National Science Teacher's Association

1. Content – Structure and interpret the concepts, ideas and relationships in science.
2. Nature of Science – Define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community.
3. Inquiry – Formulating solvable problems, constructing knowledge from data, exchanging information for seeking solutions, developing relationships from empirical data.
4. Context of Science – Relate science to daily life: technological, personal, social and cultural values.
5. Skills of Teaching – Science teaching actions, strategies and methodologies, interaction with students, effective organization and use of technology.
6. Curriculum – Extended framework of goals, plans, materials and resources for instruction.
7. Social Context – Social and community support network, relationship of science to needs and values of the community, involvement of people in the teaching of science.
8. Assessment – Alignment of goals, instruction and outcomes, evaluation of student learning.
9. Environment for Learning – Physical spaces for learning, psychological and social environment, safety in science instruction.
10. Professional Practice – Knowledge and participation in the professional community, ethical behavior, high quality of science instruction, working with new colleagues as they enter the profession.

TENTATIVE COURSE CALENDAR:

See Course Outline above.

BIBLIOGRAPHY