Fall 2024
Course Syllabus
E-542 Hazardous Materials
O'Neil School of Public and Environmental Affairs
Tuesday and Thursday, 8:00 AM – 9:15 AM, SPEA, Room 273

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Office Hours:	Before and after class, or by appt. (please call first)

Course Description:

This course is designed to provide a general overview of the hazardous materials management including history, regulations, basic chemistry, hazardous properties, hazard classifications, hazard controls and personal protection, safe storage, handling, transportation, plus an introduction to hazardous waste, and if time permits, explosives and fireworks, or environmental sampling and remediation. Students will develop the ability to understand and analyze current and/or historical events through the lens of concepts presented in this course.

Required Text:

The Common Sense Approach to Hazardous Materials, Fire, Frank L., Fire Engineering, Penn Well Corp., 2009, ISBN 978-1-59370-194-9

Demon in the Freezer - A True Story, Richard Preston, Random House Publishing Group, 2002, ISBN 0-345-46663-2

Textbooks are available for purchase online at:

https://www.bkstr.com/indianastore/shop/textbooks-and-course-materials

If you use other online vendors, be sure to get the edition shown by the ISBN number.

Posted Readings (selected chapters):

Managing Hazardous Materials - A Definitive Text, Leonard, Jack E., Editor, Institute of Hazardous Materials Management, 2009

Prentice Hall's Environmental Technology Series, Vol. 1-6, Prentice Hall, 1996.

Course Objectives:

Students will be able to:

1. Understand appropriate laws and regulations pertaining to hazardous materials and hazardous waste.
2. Use appropriate terms common to hazardous materials management and occupational safety.
3. Understand the basic chemistry and potential hazards associated with the use and handling of hazardous materials.
4. Describe appropriate safe storage, labeling, transportation and handling techniques for selected hazardous materials.
5. Recognize and identify the hazardous properties, toxicology, chemical routes of entry and target organs.
6. Understand and implement proper hazard controls, personal protective equipment, work zones, decontamination and remediation procedures.
7. Understand basic environmental sampling of air, water, soil, and waste.
8. Understand the various types of waste and how to make an EPA hazardous waste determination.

Special Topics:

Special topics may be added, removed, or changed in the course content depending on the progress made throughout the semester.

Attendance and Participation:

Attendance and participation are required. Please arrive on time or early. Excused or emergency absences are permitted (must notify me to obtain credit). Credit will not be awarded for unexcused absences. Test questions will cover material that is not in the text. Good attendance will be beneficial to your grade. Three (3) points will be given for each class session attended. (93 points + 7 free points for Thanksgiving Break = 100 points).

Participation in class discussions is encouraged. Please make every effort to read the text and handouts, attend class and understand the presentations. Material will be presented that is **not** in the textbooks. Each week, a brief summary of a chapter in *Demon in the Freezer* will be given by a student. Students will receive five (5) points extra credit for presenting a summary.

Quizzes, Assignments, Extra Credit:

Three (3) multiple-choice/short answer quizzes will be given plus two (2) assignments (one will be an assignment to navigate a state or Federal regulation relevant to a topic under discussion and one is to find a current news article on hazardous materials and turn in a short one-page written summary). Quizzes will cover subjects discussed in the previous classes prior to the quiz. (20 points each = 100 points total).

Each student is required to turn in **one** news article about hazardous materials, for example a short newspaper, magazine, or journal article related to hazardous materials (chemical, biological, or radioactive materials), current events, hazardous waste, pollution prevention or other related subject. "Hazmat articles" can be obtained through the Internet, TV, newspapers, governmental publications, books, and other appropriate resources. The articles **MUST** include the citation and a short (1 page maximum) double-spaced written summary in your own words (No Chat GPT or cut & paste). If you are citing a webpage include the complete URL.

Up to six 5-point extra credit opportunities are available (**30 points max**). Suggested topics for extra credit include: a chapter summary from *Demon in the Freezer*, extra hazmat articles, or class contributions.

Term Paper:

A short term paper (7-10 pages double spaced) will be required from one of the following suggested categories or an instructor approved topic of your choice. A one- or two-page double-spaced term paper proposal **must** be submitted and approved by the end of September. The proposal is intended to get you started on your project so that it does not languish until the last minute and may be used in, or expanded upon, for your term paper. Submit your paper by the end of October. Points will be deducted for late papers. Papers must be in your own words (No Chat GPT or cut & paste). A short student presentation may be given if time permits.

- Historical disasters or events (chemical, biological, or radiological)
- Hazards and safety for specific chemicals, biological agents, or radioactive substances.
- Hazardous materials regulations
- Hazardous waste
- Or an instructor-approved topic of your choice

Exams:

There will be three (3) hourly exams. Exams will be multiple-choice, short answer, or fill-in-the-blank. Exams will be based on subjects covered in class from the last exam (see the Class Schedule). Interesting and fun extra credit questions from class will be included in each exam.

Note: This class does **not** have a comprehensive final given during finals week. The third hourly exam will be given on the last day of class.

Evaluation:

100 points – Attendance, class participation, extra credit (maximum 30 points extra credit).
100 points – Quizzes, Assignments, Hazmat Articles (20 points each X 5 = 100 points)
100 points – Term Paper (20 points each - proposal, subject, content, writing skill, on-time)
100 points – 1st Hourly exam (plus special 10-point extra credit question(s) for 110 points max)
100 points – 2nd Hourly exam (plus special 10-point extra credit question(s) for 110 points max)
100 points – 3rd Hourly (Final) exam (plus 10-point extra credit question(s) for 110 points max)
600 points – Total (660 points are available including extra credit)

Grades will be based on the percentage of the total points achieved. Grades of A+ can be achieved by exceeding 100%. Progress reports will be given at times during the semester.

CLASS SCHEDULE
E400, E444, E542 - HAZARDOUS MATERIALS
Fall 2024

Schedule	Topic (Classroom slides are posted after each period on Canvas)	Selected Readings* (Posted on Canvas)	Hazardous Materials Required Text	Demon in the Freezer
Week 1 (8/27-8/29)	Introduction & History of Chemical Accidents			
Week 2 (9/3-9/5)	Federal Regulations and Definitions	ETS, Vol. 2, Ch 1-2		Ch. 1
Week 3 (9/10-9/12)	Chemistry of Hazardous Materials (Physical States) Chemistry of Hazardous Materials (Bonds and Bonding)	MHM, Ch. 1, Chemical Basics	Ch. 1, 2 Ch. 3, 4, 5	Ch. 2
Week 4 (9/17-9/19)	Chemistry of Hazardous Materials (Chemical Nomenclature) Chemistry of Hazardous Materials (Reactions)			Ch. 3
Week 5 (9/24-9/26)	Properties of Hazardous Materials (Physical and Health Hazards) Properties of Hazardous Materials (Biological Hazards) or Guest Speaker (Bio)	MHM, Ch. 2, Properties MHM, Ch. 3, Bio	Ch. 6	Ch. 4
Week 6 (10/1-10/3)	Properties of Hazardous Materials (Radiation Hazards) **First Hourly Exam Thurs** (History, Regulations, Chemistry, and Properties) **E-542 Term Paper Proposal Due (Thursday 10/3)**	MHM, Ch. 29, Rad	Ch. 16	Ch. 5
Week 7 (10/8-10/10)	Chemical Hazard Classes (Corrosives) or Guest Speaker (DOT) Chemical Hazard Classes (Carcinogens, Toxins, Flammable Liquids)		Ch. 13 Ch. 7, 15	Ch. 6
Week 8 (10/15-10/17)	Chemical Hazard Classes (Flammable Solids) Chemical Hazard Classes (Oxidizers)		Ch. 9 Ch. 11	Ch. 7
Week 9 (10/22-10/24)	Chemical Hazard Classes (Unstable Materials, Water and Air Reactives) Chemical Hazard Classes (Gases, Cryogenic Liquids, Time Sensitives)		Ch.14, 18 Ch. 8, 10	Ch. 8
Week 10 (10/29-10/31)	Chemical Storage (Incompatibilities and Quantities) Chemical Storage (Flammable Liquids, Cabinets, Containers, Refrigeration)		Ch. 19	
Week 11 (11/5-11/7)	**Second Hourly Exam Tues** (Chemical Hazard Classes) **E-542 Term Paper Due (Tuesday 11/5)** Chemical Storage (Gas - Compressed, Liquefied, Cryogenic, & Dissolved Gas)			
Week 12 (11/12-11/14)	Waste (Sanitary, Regulated, & Hazardous Waste) Hazard Identification (Risk Assessment -Environmental & Occupational) and Hazard Controls (Personal Protective Equipment & Respiratory Protection)			
Week 13 (11/19-11-21)	Hazard Identification, Risk Assessment and Controls (Routes of Entry and Levels of PPE - A, B, C, & D)			
Week 14 (11/26-11/28)	**Thanksgiving Break**			
Week 15 (12/3-12/5)	Remediation (Work Zones and Decontamination) **Third Hourly Exam** (Chemical Storage - Gas, Waste, Hazard Identification, Remediation)			
Week 16 (12/10-12/12)	Free Week			
Week 17 (12/17-12/19)	Finals Week			

*** Note:** ETS = Environmental Technology Series, Vol. 2, 1996.
MHM = Managing Hazardous Materials - A Definitive Text, 2009.

The above schedule is subject to change due to extenuating circumstances and how rapidly the material is covered.

Important Academic Policies

Student Rights, Responsibilities

As a student at Indiana University, you have rights and responsibilities that are described in the *Code of Student Rights, Responsibilities, and Conduct.* It's very important for you to read and understand these rights and responsibilities. They can be found at:
https://studentcode.iu.edu/rights/index.html

Academic Dishonesty

Indiana University does not tolerate cheating, plagiarism, or any other form of academic dishonesty. Academic dishonesty includes cheating, fabrication, plagiarism, interference, violation of course rules, and facilitating academic dishonesty. Be sure to understand what these terms mean and what penalties can be issued for academic dishonesty. This important information about academic dishonesty can be found at:
https://studentcode.iu.edu/responsibilities/academic-misconduct.html

Civility

Civility and good conduct are expected both on and off University property. Civility is important in an academic community to ensure that all parties—students, staff, and faculty—are working in an environment that fosters achievement of the individual's and community's goals and objectives. Civility requires all parties to demonstrate personal integrity and conduct themselves in a manner that shows respect, courtesy and tolerance to others.

Examples of discourteous behaviors during class include reading the newspaper, listening to headphones, talking or laughing with others, chronically arriving late, and so forth. Disorderly conduct interferes with teaching, research, administration, and other university or university-authorized activities. These behaviors are distracting to the instructor and classmates and will be addressed as they arise. Maintaining and fostering civility inside and outside the classroom is especially important to SPEA, which is a professional school.

More information about civility and personal behavior on and off campus can be found at:
https://studentcode.iu.edu/responsibilities/personal-misconduct.html