

## INEN 4316 – Industrial and Product Safety – BSIE and BSIT Required Course Course Syllabus (Spring 2009)

**Catalog Information (2008 – 2010):** INEN 4316 (Industrial and Product Safety). Credit 3. Loss control engineering. Mandatory and voluntary standards. Product liability.

**Textbook:** Marshall, Gilbert, 2000, *Safety Engineering*, 3<sup>rd</sup> Edition, American Society of Safety Engineers Press, Des Plaines, IL.

**References:** Hammer, W., 1993, *Product Safety Management and Engineering*, 2<sup>nd</sup> Edition, American Society of Safety Engineers Press, Des Plaines, IL.  
Goetsch, D., 1998, *Implementing Total Safety Management*, 1<sup>st</sup> Edition, Prentice Hall, Upper Saddle River, NJ.  
Brauer, R., 2006. *Safety and health for Engineers*, 2<sup>nd</sup> Edition, John Wiley and Sons, Hoboken, NJ..  
Goetsch, D. L., 1996, *Occupational Safety and Health*, 2<sup>nd</sup> Edition, Prentice-Hall, Englewood Cliffs, NJ.  
Geller, S., *The Psychology of Safety*, 1<sup>st</sup> Edition, Chilton Book Company, Radnor, PA  
Hammer, W. and Price, D., 2001, *Occupational Safety Management and Engineering*, 5<sup>th</sup> Edition, Prentice-Hall, Englewood Cliffs, NJ.  
Petersen, *The OSHA Compliance Manual*, McGraw-Hill, Latest Edition.  
Krieger, G. and Montgomery, J., (Eds), 1997, *Accident Prevention Manual for Business and Industry (Engineering and Technology)*, 11<sup>th</sup> Edition, National Safety Council, Itasca, IL  
Krieger, G. and Montgomery, J., (Eds), 1997, *Accident Prevention Manual for Business and Industry (Administration and Programs)*, 11<sup>th</sup> Edition, National Safety Council, Itasca, IL  
LaDou, J., *Occupational Health and Safety*, 2<sup>nd</sup> Edition, National Safety Council, Itasca, IL  
National Safety Council, *Supervisors' Safety Manual*, 9<sup>th</sup> Edition, Itasca, IL  
Bahr, N., 1997, *System Safety Engineering and Risk Assessment: A Practical Approach*, Taylor and Francis, Washington, DC  
Bhattacharya, A and McGlothlin, 1996, *Occupational Ergonomics: Theory and Applications*, Marcel Dekker, Inc., New York, NY  
Hutingson, R., 1981, *New Horizons for Human Factors in Design*, McGraw-Hill, New York, NY  
Rodgers, S., 1983, *Ergonomic Design for People at Work*, Volume 1, Van Nostrand Reinhold, New York, NY  
Rodgers, S., 1986, *Ergonomic Design for People at Work*, Volume 2, Van Nostrand Reinhold, New York, NY  
29 CFR 1910.  
29 CFR 1926.  
*ASTM Book of Standards*, (Latest Ed.), ASTM, Philadelphia, PA.  
*NFPA Standards*, (Latest Ed.), National Fire Protection Assn., Quincy, MA.  
Lamar IE Homepage: <http://dept.lamar.edu/industrial/>

**Objectives:** To provide the student with an appreciation of the social and economic impact of industrial accidents. To provide the student with general rules and checklists to help design and maintain a safe work environment. To define the role of the design engineer in industrial and product safety. To introduce the role of governmental and voluntary standards in process and product design safety.

**Prerequisites by Topic:** INEN 3380 – Work Design

- Topics:**
- Approaches to Safety (0.5 week)
  - Standards and Legislation (0.5 week)
  - Texas Department of Insurance, Division of Workers' Compensation (0.5 week)
  - Recognition and Control of Hazards (0.5 week)
  - Work Systems, Ergonomics, and Work Related MSDs (0.5 week)
  - Personal Protective Equipment (0.5 week)
  - Walking and Standing Surfaces and Egress and Life Safety (0.5 week)
  - Fire Prevention and Suppression (0.5 week)
  - Noise and Noise Control (0.5 week)
  - Hazardous Materials and Environmental Controls (0.5 week)
  - Personnel and Promoting Safe Work Practices (0.5 week)
  - Appraising Plant Safety and Accident Investigations (1 week)
  - Hazards (Mechanical, Mobile Equipment, Electrical, Tools and Machine Controls, Fall Prevention, and Machine Safeguarding) (2.5 weeks)
  - Oral Presentations) (2.0 weeks)

**Computer Usage:** MS Word, MS Excel, MS PowerPoint, Internet, other.

**Engineering Design Experience:** Students are required to design/redesign workplaces and jobs with respect to noise, fire prevention/protection, as well as re-designing workplaces and jobs based on fault tree analysis.

**Probability and Statistics:** A common approach of appraising plant/job safety is through the use of probability and severity matrices. From analyses of the probability of occurrence and severity, prioritized facility "fix-it" lists are developed.

ABET category content as estimated by the faculty member who prepared this course description:  
Professional Component: 3 Credits of Engineering Topics

**Outcomes Achieved:** 1 (N), 3 (N), 4 (P), 5 (N), 6 (P), 7 (P), 8 (P), 9 (P), 10 (P), 11 (N), 12 (N)

OUTCOME 1: An ability to apply knowledge of mathematics, science, and engineering.  
OUTCOME 3: An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.  
OUTCOME 4: Function on multidisciplinary teams  
OUTCOME 5: Identify, formulate, and solve Engineering Problems  
OUTCOME 6: Professional and ethical responsibility  
OUTCOME 7: An ability to communicate effectively.  
OUTCOME 8: Impact of engineering solutions.  
OUTCOME 9: Lifelong learning.  
OUTCOME 10: Contemporary issues  
OUTCOME 11: Techniques, Skills, and modern engineering tools necessary for engineering practice  
OUTCOME 12: Design, develop, implement and improve systems that include people, materials, information, equipment, and energy

**Coordinator:** Brian N. Craig, PhD, PE, CPE, Associate Professor, Department of Industrial Engineering.

**Last Updated:** 12 January 2009

Program Outcome	Method to Obtain Results	Subject Material	P or N
OU1. An ability to apply knowledge of mathematics, science, and engineering.	Calculate injury and severity rates. Analyze probability and severity to establish level of risk	Lecture, homework, and exams	N
OU3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and	Jobs and tasks are improved and design for increased levels safety	Lecture, homework, and exams	N
OU4. Function on multidisciplinary teams	Formal written and oral reports are conducted and presented in teams	Projects	P
OU5. Identify, formulate, and solve Engineering Problems	FMEA, FTA, probability/severity matrices, Pareto Charts, and fishbone diagrams, etc., are used to analyze risk. From these analyses, corrective actions are taken.	Lecture, homework, and exams	N
OU6. Professional and ethical responsibility	Ethical and professionalism issues are discussed and practiced with respect to providing for a safe workplace	Lecture, homework, and exams	P
OU7. An ability to communicate effectively.	Written and oral reports are required.	Projects	P
OU8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	Discuss current companies in the news, as well as regulation and standard changes and updates, and safety with respect to politics (OSHA, ANSI, Texas Workers Compensation, recent events (e.g. BP Explosion) etc.).	Essay	P
OU9. A recognition of the need for, and an ability to engage in life-long learning.	Discuss current companies in the news, as well as regulation and standard changes and updates, and safety with respect to politics (OSHA, ANSI, Texas Workers Compensation, recent events (e.g. BP Explosion) etc.).	Essay	P
OU10. A knowledge of contemporary issues.	Discuss current companies in the news, as well as regulation and standard changes and updates, and safety with respect to politics (OSHA, ANSI, Texas Workers Compensation, recent events (e.g. BP Explosion) etc.).	Essay	P
OU11. Techniques, Skills, and modern engineering tools necessary for engineering practice	Utilization of traditional and modern safety management techniques such as MSD/CTD management, effect of human stress, BBS, and modern, industry based health and safety management systems.	Lecture, homework, and exams	N
OU12. Design, develop, implement and improve systems that include people, materials, information, equipment, and energy	Systems including people, equipment, machine, and building, etc. are designed/re-designed utilizing systems safety principles, fire protection principles, and equipment/tool design principles.	Lecture, homework, and exams	N

**Semester:** Spring 2009  
**Location:** ~~Cherry C 2629~~ (Moved to ED 111)  
**Lecture:** M W 7:00 PM – 8:15 PM

**Office:** 2208 Cherry Engineering Building

**Phone:** 880-8520 (office), 782-6989 (cell), 842-5377 (home)

**Email:** [brian.craig@lamar.edu](mailto:brian.craig@lamar.edu)

**Office Hours:** Tuesday, Wednesday 2:00 PM – 3:00 PM, or by appointment

**Attendance Policy:** Attendance is required at every class. Attendance will not be checked, however pop quizzes will be administered periodically. I encourage you to participate in class discussions and attend class regularly. The more you participate on a regular basis, the more you will gain from this course. Effective participation requires good preparation therefore I absolutely encourage you to read the material before class.

**Make up Homework/Exams:** Missed homework/exams will graded a 'zero'. ONLY if the missed /homework/exam is approved by the professor/instructor (e.g. the homework/exam was missed for an Approved Excuse), will there be an exception. This exception is defined by the final exam grade replacing the missed exam grade, or in the case of homework the homework will be accepted.

**Grading:** Exam 1 – 20%  
**Undergrad:** Exam 2 – 20%  
Final Exam – 20%  
Group Projects – 20%  
Pop Quizzes/Study Questions/Special Assignments – 20%

**Grading:** Exam 1 – 20%  
**Grad:** Exam 2 – 20%  
Final Exam – 20%  
Group Projects – 15%  
Lecture – 15%  
Pop Quizzes/Study Questions/Special Assignments – 10%

**Required Reading:** Read assigned chapters and additional materials (if any) before attending class

**Study Questions:** Study questions to supplement the required reading will be assigned and *shall be completed and turned in by the beginning of class on the date they are due.*

**Pop Quizzes:** We will have quizzes throughout the semester based on the required reading.

**Computer Usage:** MS Word, MS Excel, MS PowerPoint, Internet, other.

**EMAIL:** *Much of the communications will be performed via email.*

**Class Notes:** MOST (NOT all) class notes will be made available through the Lamar server. I will email the class a link that you just need to click on to download the notes off the server. *Due to limited server space, the notes will be available for a limited time on the server. If you do not download the notes, it is YOUR responsibility to get them from a class mate or my teaching assistant.*  
**\*\*\*There will NOT be any exceptions\*\*\***

Students are expected to take notes during class even if notes for a particular chapter are provided, since course discussions will extend beyond the contents of the notes provided.

**Special Assignment:** Obtain copies (PDF format or order your own copy) of the following materials from the OSHA and NIOSH Publication web sites (this work is NOT for extra credit and each publication values a full quiz/question grade):

From <http://www.osha.gov/> order:

1. NEW OSHA WORKPLACE POSTER - Publication 3165
2. OSHA 300 (Log of Work-Related Injuries and Illnesses) and 300A (Summary of Work-Related Injuries and Illnesses) forms
3. HOW TO PREPARE FOR WORKPLACE EMERGENCIES – Publication 3088

From <http://www.cdc.gov/niosh/homepage.html> order:

1. 97-141: Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work- Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back
2. 97-117: ELEMENTS OF ERGONOMICS PROGRAMS: A PRIMER BASED ON WORKPLACE EVALUATIONS OF MUSCULOSKELETAL DISORDERS

THESE PUBLICATIONS MUST BE SHOWN TO ME BY THE END OF MARCH 2009

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**Oral Group Project (ALL):** Each group (2 – 3 students) will provide me with a formal topic proposal, will research the topic, present the topic to the class (15 – 20 minutes), and create a formal write up on the topic (approved by me) related to industrial safety, product safety, and/or ergonomics. I am generally looking for program development, product design improvement, or case studies. The topics may include:

- What is total safety management?
- Respiratory fit testing protocol
- What is behavioral based safety?
- Examples of good/poor industrial/product safety design
- Etc.....

***EACH GROUP MEMBER IS EXPECTED BE ACCESSIBLE TO THE OTHER GROUP MEMBER(S) AND TO PERFORM AN EQUAL AMOUNT OF WORK IN ALL ASPECTS OF THIS PROJECT***

***EACH GROUP MEMBER WILL EVALUATE EACH MEMBER OF THE GROUP (INCLUDING YOURSELF)***

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**Written Group Project (ALL):** Outcome H, I, J Essay

Topic: BP Texas City Refinery Explosion (March 2005)

Assignment:

1. To be completed in groups of 2 – 3 (to be assigned)
2. Read related materials from an online literature search
3. Write an essay that:
  - a) Identifies issues for the company, employees, governmental agencies, safety profession, legal profession, and customers, etc. Demonstrate your understanding of the issues.
  - b) Identifies strategies to prevent, overcome, and deal with the issues including the impact of these strategies in global, economic, environmental, and societal contexts.
  - c) Describes how life-long learning would assist involved persons in creating and executing specified strategies. (Life-long learning may include graduate school, continuing education, licensing, certifications, attending conferences, becoming members of professional societies and other learning opportunities.)

***EACH GROUP MEMBER IS EXPECTED BE ACCESSIBLE TO THE OTHER GROUP MEMBER(S) AND TO PERFORM AN EQUAL AMOUNT OF WORK IN ALL ASPECTS OF THIS PROJECT***

***EACH GROUP MEMBER WILL EVALUATE EACH MEMBER OF THE GROUP (INCLUDING YOURSELF)***

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**Lectures:  
(Grad ONLY)**

A group of 2 – 3 graduate students will prepare a full class lecture covering an approved (by me) topic off the syllabus. Each group will present the material to the class and provide all handouts (hardcopy, diskette, and/or email) to the class. Each student must present and provide me with all notes and lecture materials preferably in electronic format.

***EACH GROUP MEMBER IS EXPECTED BE ACCESSIBLE TO THE OTHER GROUP MEMBER(S) AND TO PERFORM AN EQUAL AMOUNT OF WORK IN ALL ASPECTS OF THIS PROJECT***

***EACH GROUP MEMBER WILL EVALUATE EACH MEMBER OF THE GROUP (INCLUDING YOURSELF)***

**Web Site Search:  
CREDIT)**

To improve your pop quiz/study question/special assignment (**EXTRA** score. Locate web sites related to industrial safety, product safety, system safety, and/or ergonomics. If all five unique sites are submitted by the due date, I will add one more full credit quiz grade to your quiz/study question/special assignment average (meaning , in theory, you could make over 100% for this group of grades) Each site can only be submitted ONCE, so if it has already been submitted, you will not get credit. Email the sites to me for credit.

THESE WEBSITES MUST BE SHOWN TO ME BY THE END OF MARCH 2009

**EXAMS:**

There will be three exams (including the final exam). All exams will be 75 minutes in length. Students will spread out in the classroom as much as possible. The professor/instructor reserves the right to make multiple versions of each exam. *There will be No sharing of information, materials (paper, pens, etc.), or calculators, etc. BRING YOUR OWN!*

**\*\*\*\*\*ALL ASSIGNMENTS ARE DUE AT THE  
BEGINNING OF CLASS\*\*\*\*\***

***LATE WORK WILL NOT BE ACCEPTED***

***PLEASE TURN OFF ALL CELL  
PHONES AND PAGERS PRIOR TO  
ENTERING CLASS***

## Detailed Syllabus

Class #	Day	Date	Planned Topic
1	M	12-Jan	Introductions and Syllabus
2	W	14-Jan	Approaches to Safety
3	M	19-Jan	<b>NO Class - Holiday</b>
4	W	21-Jan	Standards and Legislation (Handout on Proposal Preparation, Handout on Formal Write-ups, Handout on Oral Reports/Lectures, Assign Group Project Members, Assign Lecture Team Members)
5	M	26-Jan	Recognition and Control of Hazards
6	W	28-Jan	Work Systems, Ergonomics, and Work-Related MSDSs
7	M	2-Feb	Walking and Standing Surfaces
8	W	4-Feb	Personal Protective Equipment
9	M	9-Feb	Fire prevention and Suppression - Grad Students
10	W	11-Feb	Texas Department of Insurance - Division of Workers Compensation - <b>Ms. Carly Phillips</b> (date tentative)
11	M	16-Feb	Egress and Life Safety - Grad Students, <b>Group Presentation Proposals DUE</b>
12	W	18-Feb	Hazardous Materials - Grad Students
13	M	23-Feb	<b>EXAM 1</b> (Dr. Craig in San Diego?)
14	W	25-Feb	Environmental Controls - Grad Students
15	M	2-Mar	Noise and Noise Control
16	W	4-Mar	BBS, Mobile Equipment, Fall, and Respiratory videos (Jeff Dunham)
17	M	9-Mar	<b>Spring Break</b>
18	W	11-Mar	<b>Spring Break</b>
19	M	16-Mar	Personnel and Promoting Safe Work Practices
20	W	18-Mar	Appraising Plant Safety
21	M	23-Mar	Accident Investigations (Dr. Craig in Boston?)
22	W	25-Mar	<b>Exam 2</b> (Dr. Craig in Boston?)
23	M	30-Mar	Mechanical Hazards
24	W	1-Apr	Mobile Equipment
25	M	6-Apr	Electrical Hazards
26	W	8-Apr	Tools and Machine Controls
27	M	13-Apr	Principles of Risk and Machine Safeguarding
28	W	15-Apr	Group Presentations
29	M	20-Apr	Group Presentations
30	W	22-Apr	Group Presentations
31	M	27-Apr	Group Presentations ( <b>BP Explosion Review Due</b> )
32	W	29-Apr	TBD
33	M	4-May	TBD
34	W	6-May	Review Day - No Class
35	M	12-May	<b>Final Exam (8:00 PM - 10:30 PM (8:00 - 9:15))</b>

## Academic Calendar

Click on an event name for more details about the event, such as time, location, description and contact information.

### 2009 Spring

1/8/09	<a href="#">Spring 2009 classes dropped for non-payment after 5 p.m.</a>
1/9/09	<a href="#">Spring 2009 Registration without fee</a>
1/12/09	<a href="#">First class day (45 MWF, 30 TTH)</a>
1/12/09 - 1/13/09	<a href="#">Late registration/schedule revisions with fee</a>
1/14/09	<a href="#">Last day for late registration/schedule revisions with fee</a>
1/15/09	<a href="#">Application for May 2009 graduation begins</a>
1/19/09	<a href="#">Martin Luther King Jr. Holiday</a>
1/28/09	<a href="#">12th class day; Classes dropped for non-payment after 5 p.m.</a>
2/9/09	<a href="#">20th class day; Final day Fall classes dropped for non-payment, after 5 p.m.</a>
2/16/09	<a href="#">Last day to drop or withdraw without academic penalty; Last day to petition for "No Grade"</a>
3/4/09	<a href="#">Last day for graduate students to apply and pay for May graduation</a>
3/9/09 - 3/13/09	<a href="#">Spring Break</a>
3/27/09	<a href="#">Summer/Fall 2009 class schedules available</a>
3/30/09	<a href="#">Last day to drop or withdraw with academic penalty; Advisement for Summer/Fall 2009 begins</a>
3/31/09	<a href="#">Last day for undergraduates to apply and pay for May graduation</a>
4/10/09	<a href="#">Good Friday – No Classes</a>
4/13/09	<a href="#">Summer/Fall 2009 registration for special populations begins</a>
4/20/09	<a href="#">Open registration for Summer/Fall 2009 begins</a>
5/5/09	<a href="#">Last TTH class day; Spring Semester Final Exam Review Day (No exams or assignments)</a>
5/6/09	<a href="#">Last MWF class day; Spring Semester Final Exam Review Day (No exams or assignments); Finals begin at 5 p.m.</a>
5/7/09	<a href="#">Final Exams begin</a>
5/14/09	<a href="#">Grades for graduating seniors due by 8:30 a.m.; Grades for all other students due by 4 p.m.</a>
5/16/09	<a href="#">Commencement at 9:30 a.m. at the Montagne Center</a>

## **UNIVERSITY POLICIES**

### **ATTENDANCE AND DROP POLICY:**

Students are required to read and be prepared to discuss the assigned textbook chapters workbook exercises before attending the class session in which they will be discussed.

Class attendance and lateness policies will be discussed during the first week of class. Those policies include by reference all provision for grade adjustment or drop policies included in the applicable Graduate or Undergraduate Catalog in effect at the start of the semester.

### **NO STUDENT WILL BE DROPPED FROM THE CLASS ROLLS**

#### **FOR NEVER ATTENDING OR EXCESSIVE ABSENCES.**

A student dropping a course after the Census Date but on or before the appropriate final drop date will receive a grade of "W" *only* if at the time of dropping, the student is passing the course (has a grade of A, B, C, or D); otherwise an F will be received.

### **Absences Based on Religious Beliefs:**

A student who misses an examination, work assignment, or other project due to the observance of a religious holy day will be given the opportunity to complete the work missed within 15 days following the due date of the assignment, test, or other project missed. To be eligible for such a make-up, the student must notify me in writing of classes scheduled on dates he or she will be absent to observe a religious holy day. Notification must be made within the first 15 (fifteen) class days through either a written correspondence, personal delivered, acknowledged and dated by me or written correspondence sent certified mail, return receipt requested to me. Failure to follow the rules provided above within the time frames listed will result in the absence being considered unexcused.

### **AMERICANS WITH DISABILITIES ACT (ADA):**

Lamar University is on record as being committed to both the spirit and letter of the ADA to make reasonable adjustments in the classroom necessary to eliminate discrimination on the basis of disability. Students should meet with the Instructor during the first week of class to discuss their special needs and advise the instructor of any special needs, abilities or limitations and to discuss the instructor's expectations in class participation, performance and work standards. Any disclosure by the students of their need for accommodations is recognized to be extremely sensitive and all conversations and other communications will be kept protected and confidential and disclosed on a need-to-know basis only.

Students are responsible for contacting and consulting with the University's Office for Students with Disabilities prior to contacting the instructor about any disabilities. The student should provide the instructor with some form of written documentation of the disability from an acceptable, external sources (such as a doctor, psychiatrist, etc.) and from the Office for Students with Disabilities.

**ACADEMIC DISHONESTY:**

All students are expected to pursue their scholastic careers with honesty and integrity.

It is the philosophy of this Department, this instructor, and Lamar University that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission of credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, or any act designed to give unfair advantage to a student or the attempt to commit such acts."

**MAKE UP EXAMS:** If you miss an exam, it counts as a ZERO. Only in the case of an APPROVED EXCUSE will the final exam grade replace the missed exam grade.

**ATTENDANCE & PARTICIPATION:**

I encourage you to participate in class discussions and attend class regularly. The more you participate on a regular basis, the more you will gain from this course. Effective participation requires good preparation therefore I absolutely encourage you to read the material before class.