

IENG 461 – System Safety I  
Fall 2014  
Wednesday 5:30-8:20pm, Room MRB 105

**Instructor:** James R. Harris, Ph.D., P.E., Adjunct Assistant Professor in Industrial and Management Systems Engineering, Email: [JHarris@mix.wvu.edu](mailto:JHarris@mix.wvu.edu)

**Office hours:** Immediately following class or by appointment.

**Course Objectives:** Upon completion of this course, students will be able to:

- Conduct hazard identification
- Calculate and estimate risk
- Prioritize risk reduction actions
- Document the complete risk assessment process

**Textbook:** No required textbook. Information will be presented from several resources. Some recommended resources are listed below:

- Ericson, Clifton A., *Hazard Analysis Techniques for System Safety*, Wiley, 2005.
- Hammer, W., *Product Safety Management and Engineering*, American Society of Safety Engineers, 1993.
- Hammer, W., and Price, D., *Occupational Safety Management and Engineering*, Prentice Hall, 2001.
- Jensen, Roger C., *Risk-reduction Methods for Occupational Safety and Health*, Wiley, 2012.
- Marshall, Gilbert, *Safety Engineering*, American Society of Safety Engineers, 2000.
- Roland, H.E., and Moriarty, B., *System Safety Engineering and Management*, Wiley Interscience, 1990.

**Topics:**

- 1) August 20 - System Safety Practice --- History and Significance
- 2) August 27 - Product Liability (Assign Homework 1)
- 3) September 3 - System Safety Regulations and Standards
- 4) September 10 - System Life Cycle (Assign Homework 2)
- 5) September 17 - Risk Assessment Techniques
- 6) **September 24 – Exam 1** and Project Discussion
- 7) October 1 - Preliminary Hazard Analysis (PHA) (Assign Homework 3 [turn in short description of project topic for approval])
- 8) October 8 - Fault Tree Analysis (FTA)
- 9) October 15 - Failure Modes and Effects Analysis (FMEA) (Assign Homework 4)
- 10) October 22 - Hazard Operability Analysis (HAZOP)
- 11) **October 29 – Exam 2** and Project Discussion
- 12) November 5 - Management Oversight and Risk Tree (MORT) analysis (Assign Homework 5)
- 13) November 12 – Bow Tie Analysis
- 14) November 19 – Applications of System Safety Techniques (Assign Homework 6)

15) December 3 – (Project due)

16) December 10 - Final Exam

**Grading:**

100-90 = A; 89-80 = B; 79-70 = C; 69-60 = D; <60 = F

Exam 1 = 20% of final grade

Exam 2 = 20%

Final exam = 20%

Homework = 25%

Project = 15%

Homework: Assignments will be graded on a 0-10 scale and will typically be due 2 weeks from the date assigned. If homework is to be submitted electronically, it is due before 5:30pm on the day it is to be turned in. If a hard copy of the homework assignment is required, it is due at the beginning of class (5:30pm). Late submissions will have points deducted.

Project: Students will use the system safety techniques taught in this course to perform a risk assessment of a current product or process and develop a written report. The risk assessment will include identification of hazards and recommendations for risk reduction. Hazards should be documented through photos or other graphics. Each student will complete an individual report. The report will include a separate title page that lists the course (i.e. IENG 461 System Safety I), student's name, and report title. The remainder of the report (not including the title page) will be at least 4 pages and 1200 words in length. Each student should organize his/her paper in 4 sections (Due date is **December 3, 2014** and should be submitted electronically to JHarris@mix.wvu.edu):

- Introduction – Should answer why the student chose to analyze this product or process.
- Methods – Should answer how the student analyzed this product or process (i.e. what system safety techniques were used and how).
- Results/Conclusions – Should explain how the product or process could be improved from a safety perspective.
- References – List any references (including websites) necessary for the analysis (e.g. standards, regulations, journal articles).

**Statement on Attendance:**

Student attendance is mandatory unless excused by the instructor. The basis for an excused absence will follow University and IMSE policy. Students who are absent from class for any reason are responsible for all missed work. Students who miss a quiz or an exam will not be allowed to make it up, except in the case of a family or other legitimate emergency. Any exception will be allowed at the discretion of the instructor.

**Statement on Social Justice:**

West Virginia University is committed to social justice. I concur with that commitment. I will foster a nurturing learning environment that is based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as

to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, you must make appropriate arrangements through Disability Services (293-6700). They will identify the nature of the accommodation your disability requires.