1. COURSE DESCRIPTION:

This course emphasizes the specialized integration of safety skills and resources into all phases of a system’s life cycle. Accident prevention, beginning with systems engineering together with sound management, are combined in this course to enable the student to fully comprehend their vital roles in preventing accidents. The total program, from basic design concepts through testing, maintenance/systems management, and operational employment, is fully examined and evaluated.

Class Hours: 3
Laboratory Hours: 0

This Course is for the following Program(s)

<table>
<thead>
<tr>
<th>Required</th>
<th>Optional</th>
<th>ABC CSST Certificate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BCC SHEM Certificate</td>
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<tr>
<td></td>
<td></td>
<td>BC AAS Safety</td>
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<tr>
<td>X</td>
<td></td>
<td>BC BAT Safety Specialization</td>
</tr>
</tbody>
</table>

2. PREREQUISITES:

One of the following courses: OSHT 1309, OSHT 1405 or OSHT 2401 or approval of the division chair.

3. COURSE GOALS:

As you progress through this course, you will be asked to accomplish the following objectives.

1. Explain the origins and purposes of system safety by
   a. Discuss the history and evolution of system safety.
   b. Explain the role of the safety professional in all phases of systems design.

2. Review Management of system safety programs by
   a. Discuss risk assessment methodologies and apply these concepts and techniques to quantify hazards by levels of severity.
   b. Explain the MIL-STD-882 and discuss its application to the DOD System Safety program.
   c. Explain and utilize OSHA’s Process Safety Management Standard

3. Practice system safety analytical techniques by
   a. Identify and formulate life cycles, phases and operational modes for a given system in preparation for analysis.
   b. Discuss the salient features of selected accident causation models.
   c. Demonstrate a working knowledge of selected hazard analysis techniques.
   d. Discuss factors that affect human performance.

4. Prepare a research paper or project on a topic that demonstrates the applications of systems
principles and hazard analysis techniques that are applicable to process technology systems.
Assessments: Class Participation and Discussion, Mid-Term and Final Exam, and Term Projects.

**LEARNING OUTCOMES:** This course is designed to provide the graduate student a comprehensive view of system safety and how system safety is integrated into the life cycle of a system. The course is intended to provide an overview of the concepts, an exploration of the techniques, and an understanding of how civil, military, and aerospace aviation development has been affected.

<table>
<thead>
<tr>
<th>4. INSTRUCTOR INFORMATION:</th>
<th>The Instructor of Record will usually be Craig E. Litton, Dr. P.H., Associate Professor and Program Coordinator, office L-202B voice and voicemail 979-230-3507; fax 979-230-3341 <a href="mailto:craig.litton@brazosport.edu">craig.litton@brazosport.edu</a></th>
</tr>
</thead>
</table>
| 5. TEXTBOOKS AND COURSE MATERIALS | **TEXTBOOK:** 

Required course materials are available at the Brazosport College bookstore, on campus or online at http://www.brazosport.edu/bookstore. A student of this institution is not under any obligation to purchase a textbook from the college bookstore. The same textbook is/may also be available from an independent retailer, including an online retailer.

<table>
<thead>
<tr>
<th>6. LABORATORY REQUIREMENTS:</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>7. STUDENTS WITH DISABILITIES:</td>
<td>Brazosport College is committed to providing equal education opportunities to every student. Brazosport College offers services for individuals with special needs and capabilities including counseling, tutoring, equipment, and software to assist students with special needs. Please contact the Special Populations Counselor, 979.230.3236, for further information. Industry may require students in the Safety Professions are expected to be able to a. communicate clearly in writing and verbally</td>
</tr>
</tbody>
</table>
b. be able to visually observe normal workplace activity

c. be able to physically access the nominal workplace environment

8. ACADEMIC HONESTY
Brazosport College assumes that students eligible to perform on the college level are familiar with the ordinary rules governing proper conduct including academic honesty. The principle of academic honesty is that all work presented by you is yours alone. Academic dishonesty including, but not limited to, cheating, plagiarism, and collusion shall be treated appropriately. Please refer to the Brazosport College Student Guide for more information. This is available online at http://www.brazosport.edu. Click on the CATALOGS AND SCHEDULES link under STUDENTS.

Academic dishonesty violates both the policies of this course and the Student Code of Conduct. In this class, any occurrence of academic dishonesty will be referred to the Dean of Student Services for prompt adjudication, and will, at a minimum, result in appropriate grade reductions in this course. Sanctions may be imposed beyond your grade in this course by the Dean of Student Services.

9. ATTENDANCE AND WITHDRAWAL POLICIES
The Instructor may count tardiness as a partial absence. Since a significant part of the grade is based on class attendance, students are expected to be on time and attend the full class, until dismissed by the Instructor.

General Brazosport College Policies and Procedures apply to self-initiated course withdrawal and the time period within which that may occur. Please check with the current published College information for details.

Students who miss 3 or more classes in a Fall or Spring Session will usually be assumed to have abandoned the class and may be dropped. It is the Student’s responsibility to contact the Instructor and explain any and all missed class time.

Since attendance is so important a part of the learning experience it has become necessary to modify the grading system. Full Fall and Spring Semesters have typically about 15 weeks of classes depending on holidays and exams schedule. For regular classes that means about 13 weeks of educational activity aside from mid-term and finals. Someone missing 3 classes then has missed almost 25% of course content.

Partial class attendance, arriving late or leaving early can result in a % loss of that day’s attendance. For all absences after the 2nd absence each absence will count as 2 classes missed.

10. COURSE REQUIREMENTS AND GRADING POLICY
GRADING:  Midterm Exam: 20%
            Final Exam: 20%
Scoring:
- A (90 - 100%) -- Unqualified and unsurpassed mastery of the learning outcomes
- B (80 - 89.9%) -- Unqualified mastery of the learning outcomes
- C (70 - 79.9%) -- Qualified mastery of the learning outcomes
- D (60 - 69.9%) -- Mastery of the learning outcomes but with significant qualifications
- F (0 - 59.9%) -- Has not mastered the learning outcomes
- I (Incomplete). Failed to complete assigned components.

Honest and serious participation in each of the five course elements is required to pass the course. A failing grade will be assigned regardless of the overall score if the student fails to complete any one of the following items:
1. Complete the mid term exam
2. Submit a term paper,
3. Submit a presentation,
4. Complete the final exam.

11. TESTING: A Mid Term and a Final Exam are required. A variety of quizzes or assignments in place of quizzes may be presented at the discretion of the Instructor.

12. MAKE-UP POLICY: Co-Op students may be allowed to make up written exercises at the discretion of the Instructor. Missed work hours cannot be made up after the semester and only count if worked per the individual employer's rules and regulations.

A student will normally be given only one week in which to make up missed quizzes or assignments. Students who miss class delay the ability of other students to received timely feedback on their work.

It is the responsibility of each student to contact the Instructor on the day following the absence and to make time to come in before the next class to clear up the missed quiz or assignment.

The Instructor is usually expected to give a score of zero to quizzes or assignments that are two weeks or more late. If a quiz must be discussed with the class a week after it has been taken and the student has not been able to make up the quiz beforehand, and the student is absent for a second week and would delay class review of the quiz outcome, the student may receive a zero score.

13. STUDENT RESPONSIBILITIES
A. HOUSEKEEPING
  1) Keep the room ready for the next class. When you leave each evening, the room is to be returned to the condition it was in when you arrived, or better.
  2) We do not want to look like we were raised in a barn. Keep it clean and place all
trash in the proper containers before you leave.

3) Do not alter the computer or audio-visual electronics. Improper use of computer and other equipment in violation of Brazosport College policies may result in penalties according to College rules.

B. EXPECTATIONS:
1) You are largely responsible for your own success or failure as a student.
2) As a minimum, students are expected to read the assigned chapter(s) each week. Being prepared is a necessary part of your continuing education and a vital part of the construction industry.
3) We expect all assignments to be completed on time and to the best of your ability.
4) While we encourage cooperation with your fellow students, academic honesty is the standard; you are solely responsible for your own work.
5) We expect and will demand adult behavior in the classroom, both physical and online. We expect to have fun and hope you do too.
6) If there is a problem with the material call upon the instructor first for help.
7) There are no bad questions. Always ask if you are unsure.

C. STUDENT RESPONSIBILITIES:
1) This is not a self-paced course, but requires weekly interaction with the class and the instructor. Like Woody Allen said “Most of Life is about showing up”.
2) Assignments such as term papers require a great deal of self-discipline to complete, as much of what is done is at your pace (within the timelines that the instructor has established in the syllabus)
3) It is your responsibility to read the syllabus and other information provided by the instructor, and to follow the instructions contained therein.
4) If you fail to submit assignment(s) or tests on time, the instructor has the option of not accepting the late work, or accepting the late work with a downgrade penalty.
5) You should make every effort to stay on track with the assignments, as it is very difficult to “play catch-up.”
6) If for any reason you should fall behind in their work, (illness, accident, temporary duty, etc.) contact the instructor immediately.
7) You must complete exams/papers and assignments prior to the end of the scheduled term, or risk being graded zero for that work and run the risk of failure of the course.
8) At times, life situations occur where you will need to make hard choices between getting a good grade in a course (or even finishing it) and other priorities in your life, such as a job, family, etc. It is up to each student to make those choices. Occasionally, one will have to make the commendable choice that job or family must take priority and then live with the consequences that has on your studies and GPA. The College has an ethical obligation to ensure that a level playing field is provided for all students, so those who make the hard choices don’t get short changed by students who ask for extra time to get their school work done when they haven’t made those hard choices.
9) Extensions/Incompletes are NOT a right, but a VERY RARE exception that are
granted only in the most extraordinary of situations. If you feel that you will require an extension/incomplete (again, the exception, not the rule), it is your responsibility to contact the instructor **BEFORE THE END OF THE COURSE** and make this request. In most cases, written third party documentation will be required to support your request. It is at the discretion of the instructor whether an extension/incomplete will be granted and for what length of time it will be granted, with an absolute maximum extension period of 90 days.

D. STUDENT COMPUTER RESPONSIBILITIES:

1) It is a fact of life that we must use computers to complete class work, access presentations and take some tests. You should have a computer, software, and internet access at hand to do this. If you do not, at best consult with the LAC in E-201. There are numerous campus resources available to you.

2) The default software being used is Microsoft Word for text documents and Microsoft PowerPoint for presentations. At a minimum, readers for these programs are downloadable free from the [www.microsoft.com](http://www.microsoft.com) website.

3) The computer ate my homework is not an acceptable excuse. It is a fact of life that computers are not perfectly reliable, and those computers using Windows have a certain reputation. Users should learn how to survive and readily recover from crashed programs and the need to reboot. When creating your own work you should save the document after each page and learn how to recover from computer problems. If worse comes to worse, read the manuals.

4) The instructor generally cannot help you solve your computer problems. Exception – problems with our files, in which case the Instructor will help to the best of ability.

5) You are responsible for your own SPAM and viruses. No one should use personal computers, email or the Internet for these courses without possessing their own anti-virus software. If you open a strange email and get your computer infected with a virus, it is your own doing and your own responsibility. You should learn how to block unwanted email.

E. TELECOMMUNICATION DEVICES:

1) All cell phones, “Blackberry” e-mail type devices, and PDA’s MUST be turned completely off and stowed so that you cannot access them in the classroom.

2) Calculators are for sale in the BC Bookstore to support math problems, as long as they do not have stored test information they may be used.

3) Cheating via use of telecommunications devices will result in an immediate ZERO for the test involved and may result in further penalties.

### 14. PROJECTS, ASSIGNMENTS, PORTFOLIOS, SERVICE LEARNING, INTERNSHIPS, ETC.

**First:** A ten page report on a relevant topic This must be original work not a duplication of work for another class.

**The general rules for all narrative papers are**
BRAZOSPORT COLLEGE: Bachelor of Applied Technology
Safety, Health and Environmental Management Program
500 College Drive, Lake Jackson, Texas 77566
COURSE SYLLABUS TMGT 4305 System Safety Engineering

- MS Word Document format submitted both electronically and in hardcopy; if not in MS Word will be rejected; if you need to convert from MS Works, WordPerfect or other obtain help from Learning Center before due date.
- All such reports are scanned via Turnitin.com for plagiarism.
- Format must be 1” margins all around, Times Roman 12 point font, 1.5 lines spacing; use Page Setup.
- Do Not use “quotes” for emphasis (as shown here). Quoted material is to be a single spaced block, additionally indented one inch, quote marks at start and end of block.
- No more than ½ page of illustration counts to the narrative page count. Excess will not be included in page count.
- No more than ½ page of quoted material counts toward the narrative page count. Excess will not be included in page count.
- Cover and reference citation pages are required but do not count toward the narrative page count.
- Pages short will affect score to the nearest half page: e.g. -10 points for ½ page short, etc.
- Improper use may also reduce page count and or score.

Due on or before Lesson 11 end of class:
Late penalties apply:
- 10 points if received between end of class 11 and midnight before the start of class 12;
- 20 points if received between end of class 12 and midnight before the start of class 13;
- 40 points if received between end of class 13 and midnight before the start of class 14;
- 80 points if received between end of class 14 and midnight before the start of class 15; no paper accepted thereafter.

Second: A PowerPoint and oral presentation of 15 to 30 slides on a system safety topic not from the term paper.

15. OTHER STUDENT SERVICES INFORMATION

A. BC COMPUTER ACCOUNTS: Each student is expected to go to IT services and obtain a computer account, BEFORE the second class of the term. They can be reached at 979-230-3266. You may need to call for an appointment before class for evening classes. Improper use of computer accounts in violation of Brazosport College policies may result in penalties according to College rules. Be aware that ALL online activity is monitored and logged; you have NO right to privacy.

B. COLLEGE WEBSITE www.brazosport.edu You should learn to use the college website to find most student information. If you need to take computer classes to learn to use the internet or other computer programs please check with LAC in E-201.

C. CLASSROOM COPYRIGHT: An implicit copyright of original work not otherwise referenced from others exists for all class materials. Visual or audio recording of class activity is restricted to the College and Instructor. No class material or activity may be recorded or posted.
on the Internet except by approval of the Instructor.

Information about the Library is available at http://www.brazosport.edu/library or by calling 979.230.3310.

For assistance with online courses, an open computer lab, online and make-up testing, audio/visual services, and study skills, visit Learning Services next to the Library, call 979.230.3253, or visit http://www.brazosport.edu/learningservices.

For drop-in math tutoring, the writing center, supplemental instruction and other tutoring including e-tutoring, visit the Student Success Center, call 979.230.3527, or visit http://www.brazosport.edu/studentsuccesscenter.

To contact the Physical Sciences and Process Technologies Department call 979-230-3427

The Student Services provides assistance in the following:
   Counseling and Advising 979.230.3040
   Financial Aid 979.230.3294
   Student Life  979.230.3355

To reach the Information Technology Department for computer, email, or other technical assistance call the Helpdesk at 979.230.3266.

16. NOTES ON SCHEDULE:  A general sixteen-week recommended schedule follows in this document.  The instructor will adjust it to meet the details of the specific semester schedule, recognizing variances due to Brazosport College exam schedules, State and Federal Holidays and the availability of such items as a guest speaker.

Current Events:  Each student should come to class with a current events report about System Safety from a credible news source

Readings: Each student should come to class prepared to discuss the material assigned for that class.  Students will be called upon in random order.

<table>
<thead>
<tr>
<th>Litton</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Done</strong></td>
<td>Thursday</td>
</tr>
<tr>
<td>1</td>
<td>15-Jan-15 Introduction to System Safety</td>
</tr>
<tr>
<td>2</td>
<td>22-Jan-15 System Safety Applications [online]</td>
</tr>
<tr>
<td>3</td>
<td>29-Jan-15 System Safety Management</td>
</tr>
<tr>
<td>5</td>
<td>12-Feb-15 Accident Reporting, Investigation, and Analysis</td>
</tr>
<tr>
<td>6</td>
<td>19-Feb-15 Case Studies in Process Technology Accidents I</td>
</tr>
<tr>
<td>7</td>
<td>26-Feb-15 Case Studies in Process Technology Accidents II [online]</td>
</tr>
<tr>
<td>WEEK</td>
<td>Thursday</td>
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</tbody>
</table>
| 1    | 15 January 2015 Classroom | Topics: Introduction to System Safety  
- Introductions  
- Course Housekeeping  
- Fundamental Concepts and Definitions of Risk  
- Definition of Safety Engineering  
- History of Safety and Safety Engineering  
- Economics of Risk Management |
**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*

- Chapter One – Introduction
- Chapter Two – Definitions and Concepts

**Classroom Tasks:**
- Preliminary Selection of Research Papers and Presentations
- Assignment of Presentation Dates in Weeks 9, 11, 13, 14

<table>
<thead>
<tr>
<th>Week Thursday</th>
<th>Activities</th>
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</thead>
<tbody>
<tr>
<td><strong>22 January 2015</strong></td>
<td><strong>Online</strong></td>
</tr>
<tr>
<td><strong>Topics: System Safety Applications</strong></td>
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<tr>
<td>• OSHA</td>
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<tr>
<td>• Hazard Identification and Control</td>
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<tr>
<td>• DOD Concepts of System Safety Management MIL STD 882</td>
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</tbody>
</table>

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*

- Chapter Three – Safety Analysis in Engineering – How is it Used?
- Chapter Five – Hazard Analysis

**Online Tasks – Graded as Participation Due by midnight 22 January**

- Post Paper Selection in online Discussion Board
- Post PowerPoint Selection in Online Discussion Board

<table>
<thead>
<tr>
<th>Week Thursday</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>29 January 2015</strong></td>
<td><strong>Classroom</strong></td>
</tr>
<tr>
<td><strong>Topics: System Safety Management</strong></td>
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<tr>
<td>• What Managers and Management Wants</td>
<td></td>
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<tr>
<td>• NASA Concepts of System Safety Management</td>
<td></td>
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<tr>
<td>• FAA Concepts of System Safety Management</td>
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</tbody>
</table>

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*

- Chapter Four – Safety Management
### Classroom Activity: Roundtable Discussion of SSM strategies

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics: Process Safety Management</th>
</tr>
</thead>
</table>
| 4 - 5 February 2015 Online | - The OSHA Standard  
- Regulatory Trigger List  
- 4 Major Components  
- Operational Components  
- Process Safety Analysis |

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*  
- Chapter Six – Process Safety Analysis

**Online Tasks – Graded as Participation Due by midnight 5 February**  
- You will be assigned different topics to discuss in the online board – post at least a full page [not as attachment] review of your assigned topic  
- Reply intelligently to at least three other students

<table>
<thead>
<tr>
<th>Week Thursday</th>
<th>Activities</th>
</tr>
</thead>
</table>
| 5 - 12 February 2015 Classroom | Topics: Accident Reporting, Investigation, and Analysis  
- Accident Investigation  
- Employee Reporting of Accidents  
- Introduction to Hazard Analysis |

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*  
- Chapter Eleven: Accident Reporting, Investigation, and Documentation
<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
</tr>
</thead>
</table>
| 6 19 February 2015 Classroom | Classroom Activity: Roundtable Discussion of Accident Investigations  
Topics: Case Studies in Process Technology Accidents I  
And Review of Risk Management Concepts  
Classroom Activity: Each Student will be assigned a different case study from a book on Process Safety Disasters |
| 7 26 February 2015 Online | Online Tasks – Graded as Participation Due by midnight 26 February  
- You will use your assigned topics to discuss in the online board – post at least a full page [not as attachment] review of your assigned topic  
- Reply intelligently to at least three other students |
| 8 5 March 2015 Classroom | Mid Term Written Exam |
| 9 19 March 2015 Classroom | Topics: Human Factors in System Safety  
- Human Error  
- Human Information Processing Errors  
- Communication  
- Human Error in Aviation  
- Aviation Displays  
- Anthropometrics and Biomechanics  
- Chronobiology, Fatigue and Shiftwork  
Readings: Be Prepared to Discuss in Class In System Safety |
**Engineering and Risk Assessment: A Practical Approach**

- Chapter Eight – FMECA, Human Factors and Software Safety

### Student Presentations Begin

<table>
<thead>
<tr>
<th>10</th>
<th>26 March 2015</th>
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<tr>
<td></td>
<td>Online</td>
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</table>

- Topics: Selected Hazard Analyses Techniques One
  - Facility Hazard Analysis
  - Operations and Support Hazard Analysis

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*

- Chapter Twelve: Risk Assessment

**Online Tasks – Graded as Participation Due by midnight 26 March**

- You will be given individual topics to discuss in the online board – post a FSA or OSHA of a least a full page [not as attachment]
- Review of your assigned topic
- Reply intelligently to at least three other students

### Week 11 Activities

<table>
<thead>
<tr>
<th>11</th>
<th>2 April 2015</th>
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<tbody>
<tr>
<td></td>
<td>Classroom</td>
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</table>

- Topics: Selected Hazard Analyses Techniques Two
  - Fault Tree Analysis
  - Failure Mode Effects Criticality Analysis (FMECA)

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*

- Chapter Seven – Fault Tree Analysis

### Student Presentations Continue

- Classroom Activity: FTA
### Topics: Selected Hazard Analyses Techniques Three

- Root Cause Analysis
- Energy Trace Barrier Analysis
- Management Oversight and Risk Tree (MORT)

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*
- Chapter Seven – Fault Tree Analysis

**Online Tasks – Graded as Participation Due by midnight 9 April**
- Use your PowerPoint Topic. Develop one of [FTA, FMECA, RCA, ETBA] of at least a full page [not as attachment] review of your assigned topic
- Reply intelligently to at least three other students

### Week Activities

<table>
<thead>
<tr>
<th>13 April 2015 Classroom</th>
<th>Topics: Selected Hazard Analyses Techniques Four</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Software Safety</td>
</tr>
<tr>
<td></td>
<td>Sneak Circuit Analysis</td>
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<td>Dispersion Modeling</td>
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<td>Test Safety</td>
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</table>

**Readings: Be Prepared to Discuss in Class** In *System Safety Engineering and Risk Assessment: A Practical Approach*
- Chapter Nine – Other Techniques

**Student Presentations Continue**
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 April 2015</td>
<td>Topics: Quantitative Risk Analysis</td>
<td>Data Sources and Training</td>
</tr>
<tr>
<td>Classroom</td>
<td></td>
<td>Quantitative Risk Assessment and Evaluation</td>
</tr>
<tr>
<td></td>
<td><strong>Readings: Be Prepared to Discuss in Class</strong></td>
<td><em>System Safety Engineering and Risk Assessment: A Practical Approach</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter Ten: Data Sources and Training</td>
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<tr>
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<td>Chapter Thirteen: Risk Evaluation</td>
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<tr>
<td></td>
<td><strong>Student Presentations Continue</strong></td>
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</tr>
<tr>
<td>30 April 2015</td>
<td>Final Exam</td>
<td></td>
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</tbody>
</table>

Syllabus prepared by Craig E. Litton, Dr.P.H., Assistant Professor, Safety, Health and Environmental Management

Approved by Dorothy Brandt, Ph.D.

Date: ____________________________