Cover Sheet: Request 11428

ECH 4714

Info

Process	Course|Modify|Ugrad/Pro
Status	Pending
Submitter	Sain,Cynthia L csain@ufl.edu
Created	1/26/2017 3:53:47 PM
Updated	4/20/2017 10:24:45 AM
Description of request	Laboratory and process safety analysis with emphasis on prevention and mitigation. Application of chemical engineering principles to assessing hazards and risk. Integrated with ECH 4224L.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Chemical Engineering 011903000	Dickinson, Richard Bernhart		1/31/2017
No document changes					
College	Approved	ENG - College of Engineering	Dublin, Heidi Dickerson		4/20/2017
Added HWCOE Syllabus - ECH 4714 - F18.docx					3/29/2017
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			4/20/2017
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|Modify for request 11428

Info

Request: ECH 4714
Description of request: Laboratory and process safety analysis with emphasis on prevention and mitigation. Application of chemical engineering principles to assessing hazards and risk. Integrated with ECH 4224L.
Submitter: Sain,Cynthia L csain@ufl.edu
Created: 4/6/2017 1:02:21 PM
Form version: 5

Responses

Current PrefixECH
Course Level4
Number 714
Lab Code L
Course Title ECH 4714L Chemical Process Safety
Effective Term Fall
Effective Year 2017
Requested Action Other (selecting this option opens additional form fields below)
Change Course Prefix?No

Change Course Level?No

Change Course Number?No

Change Lab Code?No

Change Course Title?Yes
Current Course Title Safety and Experimental Evaluation
Proposed Course Title Chemical Process Safety
Change Transcript Title?Yes

Proposed Transcript Title (21 char. max) Chem Process Safety
Change Credit Hours?Yes
Current Credit Hours2
Proposed Credit Hours3
Change Variable Credit?No

Change S/U Only?No

Change Contact Type?No

Change Rotating Topic Designation?No

Change Repeatable Credit?No

Change Course Description?Yes

Current Course Description Laboratory and process safety analysis with emphasis on prevention and mitigation. Experiment design, evaluation and presentation of results. Integrated with ECH 4224L.
Proposed Course Description (50 words max) Laboratory and process safety analysis with emphasis on prevention and mitigation. Application of chemical engineering principles to assessing hazards and risk. Integrated with ECH 4224L.

Change Prerequisites?Yes
Current Prerequisites Prereq: ENC 3254; Coreq: ECH 4224L and STA 3032.
Proposed Prerequisites Prereq: ENC 3246; Coreq: ECH 4224L and STA 3032.
Change Co-requisites?No

RationaleThe present course teaches students how to use chemical engineering science to assess hazards in the chemical process industry and research laboratories. The increased lecture time will allow application of these concepts to hazard analysis and coverage of chemical reactivity and risk assessment that was not possible within the 2 credit hours.

The "L" designation dates from the previous version of the class that was closely connected to the unit ops lab. The change reflects the lack of a formal lab component in the new course.

The proposed name more properly reflects the current content of the course.

Chemical Process Safety

ECH 4714 Section XXXX

Class Periods: (three hours of lecture, 1 hour of discussion)
Location:
Academic Term:

Instructor

Teaching Assistant

Course Description
3 credit hours. Laboratory and process safety analysis with emphasis on prevention and mitigation. Application of chemical engineering principles to assessing hazards and risk. Integrated with ECH 4224L.

Course Pre-Requisites / Co-Requisites
Prerequisites: ENC 3246; Co-requisites: ECH 4224L and STA 3032.

Course Objectives
Upon completion of this course, a student should be able to:

1. Work safely in a laboratory setting.
2. Be familiar with proper methods for disposing of chemical waste.
3. Be familiar with personal protection equipment and the reasons for use.
4. Be familiar with known hazards such as dust and vapor explosions.
5. Understand the fire triangle and the methods used to avoid explosions.
6. Be aware of methods used for incident investigation.
7. Be aware of the factors that can lead to an accident.
8. Be aware of societal issues concerning technology and the impact of the practice of chemical engineering on the surrounding and larger community.
9. Be aware of ethical issues and principles in chemical engineering practice.
10. Understand risk assessment.
11. Understand Process Safety Management (PSM).

Specific topics covered will include:

- Lab safety, gas cylinder safety, personal protection equipment.
- Hazardous materials, waste disposal
- Factors leading to major accidents
- Dust explosions
- Lifting hazards
- Current topics: recent incidents
- Incident investigation
- Engineering ethics, examples of significant disasters
- Inherent safety, accident and loss statistics, acceptable risk, the nature of the accident process
- Toxicology, TLV, dose response curves
- Industrial hygiene. Government regulations (OSHA: PSM; EPA: RMP; DHS)
- Ventilation calculations, control of worker exposure
- Source models (liquids, vapors, liquid pools, realistic and worst case releases
- Toxic release and dispersion models, Pasquill-Gifford model, dense gas dispersions
- Fires and explosions, fire triangle, flammability diagram, characteristics of explosions
- Designs to prevent fires and explosions, relief sizing, static electricity
- Risk assessment, revealed and unrevealed faults, event trees, QRA, LOPA
- Hazard identification
- Chemical reactivity, reactive hazard index

Materials and Supply Fees
None.

Relation to Program Outcomes (ABET)

5. *Relationship of Course Objectives to B.S. Program Objectives:*

Student Outcomes → ↓ Course Objectives	a	b	c	d	e	f	g	h	i	j	k	l
1		X									X	X
2		X									X	X
3		X									X	X
4			X								X	X
5	X		X	X							X	X
6	X			X							X	X
7	X		X	X							X	X
8					X	X		X	X	X	X	X
9					X	X		X			X	X
10					X	X		X			X	X
11			X		X	X		X			X	X

Student Outcomes

By the time Chemical Engineering students graduate, they attain:

a) an ability to apply knowledge of mathematics, science, and engineering
b) an ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) an ability to function on multi-disciplinary teams
e) an ability to identify, formulate, and solve engineering problems
f) an understanding of professional and ethical responsibility
g) an ability to communicate effectively
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) a recognition of the need for, and an ability to engage in life-long learning
j) a knowledge of contemporary issues
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
l) a recognition of industrial health and safety issues, and an ability to engage in fostering and exercising health and safety rules and regulations

Required Textbooks and Software
Daniel A. Crowl and Joseph F. Louvar, Chemical Process Safety: Fundamentals with Applications, 3rd edition, Prentice-Hall, Upper Saddle River, NJ, 2011.
Note: Exams will be open-book, and use of computers and phones will be prohibited. Thus, a paper copy of the book will be required.
Other materials will be made available on the course website.

Recommended Materials
As the course represents the synthesis of chemical engineering courses taken to date, e.g., material and energy balances, transport phenomena, fluid and solids operations, and thermodynamics, students are advised to refer to textbooks used in those classes as needed.

Course Schedule

The tentative schedule for exams and materials covered is attached.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is required. Attendance records will be used to guide determination of final grades. Cell phones and other distractions may not be used in class. Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades

Grades are based on exams, completion of homework assignments, attendance, and participation in the class.

Homework and quizzes	10%
Hazard Assessment Project	5%
2 mid-term exams	50%
Final exam	35%

Extra credit is given for completion of SACHE certification.

1-2 certificates	1/3 letter grade
3-4 certificates	2/3 letter grade
5 or more certificate	1 letter grade

Maximum extra credit for completion of SACHE certificates is one letter grade. To be eligible for extra credit, the student must have achieved a C or better through homework, quizzes, and exams.

Grading Policy

Grades for this class are curved at the discretion of the instructor. Attendance and class participation will be considered.

Please note: A score of C or better required before continuing in the Chemical Engineering program. By University of Florida policy, a C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Relevant Aspects of the Chemical Engineering Policy on Exams

a) All exams will include the honor pledge and students must sign their name by the pledge.
b) All students must leave backpacks, bags, etc., in the front of the classroom as they enter.
c) Students are asked not to bring cell phones in the exam. In case they do, they have to place the cell phones in the front of the classroom. The department and proctors have no responsibility in case of theft (cell phones should not be brought). A cell phone discovered on a student's person may result in a zero grade for the exam. If a student is expecting an important call, he or she must discuss this with the proctors before starting the exam.
d) Students are required to remove their hats during the exam and place them in the front of the classroom.
e) In open book exams no printed material other than the textbook is allowed. A solution manual or printouts from solution manuals will result in a zero grade for the exam and additional harsher penalties.
f) Any talking between students is strictly prohibited and will result in a zero grade for the exam.
g) Students may not leave the room before turning in the exam.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.

Tentative Schedule

Date	Topics Covered*
Week 1	Introduction. Explosion at T2. Expectations. (Chapter 1) Inherent safety, accident and loss statistics, acceptable risk, public perceptions, the nature of the accident process. Laboratory Safety.
Week 2	(Chapter 2) Toxicology, TLV. (Chapter 3) Industrial hygiene, Government regulations (OSHA: PSM; EPA: RMP).
Week 3	(Chapter 3). TLV calculations, ventilation, ventilation calculations, control of worker exposure.
Week 4	(Chapter 4) Source models, liquids, liquid pool evaporation, realistic and worst case releases.
Week 5	(Chapter 4) Release of gases, choked flow.
Week 6	Review, Exam 1. (Chapter 5) Toxic release and dispersion models, Pasquill-Gifford model.
Week 7	(Chapter 5) Dense gas dispersions.
Week 8	(Chapter 6) Fires and explosions, flammability diagrams, characteristics of explosions, static electricity.
Week 9	(Chapter 7) Methods to prevent fires and explosions.
Week 10	(Chapters 9, 10) Pressure reliefs and sizing.
Week 11	Review, Exam 2. (Chapter 8) Chemical reactivity.
Week 12	(Chapter 12) Risk assessment, revealed and unrevealed faults, Event trees, QRA, LOPA.
Week 13	(Chapter 11) Hazard identification.
Week 14	Hazard Assessment Term Project.
Week 15/16	Review, Final Exam.

*Video presentations covering major accidents will be incorporated in the assignments and class periods, e.g., Piper-Alpha (1988), Texas City (2005), T2 Laboratories (2007), Imperial Sugar (2008), Macondo Oil Well (2010), and West Fertilizer (2013).