

Cover Sheet: Request 11572

ECH3101 Process Thermodynamics

Info

Process	Course Modify Ugrad/Pro
Status	Pending
Submitter	Sain,Cynthia L csain@ufl.edu
Created	3/23/2017 5:13:06 PM
Updated	4/20/2017 10:24:56 AM
Description of request	Introduces fundamental principles of classical thermodynamics. Applications to modeling and analysis of physical and chemical processes undergoing change.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Chemical Engineering 011903000	Dickinson, Richard Bernhart		3/26/2017
No document changes					
College	Approved	ENG - College of Engineering	Dublin, Heidi Dickerson		4/20/2017
Added HWCOE Syllabus - ECH3101 - Fall 2018.docx					
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 11572

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Form version: 1

Responses

Current PrefixECH

Course Level3

Number 101

Lab Code None

Course Title Process Thermodynamics

Effective Term Earliest Available

Effective Year Earliest Available

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?No

Change Transcript Title?No

Change Credit Hours?No

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?No

Change Prerequisites?Yes

Current PrerequisitesCHM 4411, COT 3502 and ECH 3264.

Proposed PrerequisitesCHM 4411 or PHY 3513; COT 3502 and ECH 3264.

Change Co-requisites?No

RationaleThe Chemical Engineering faculty examined the syllabi from both classes, talked to several students, and finally decided that the two classes were equally desirable. The Physics class provides background in statistical thermodynamics that the Chemistry class does not (it is covered in P. Chem 2), and the Chemistry class covers kinetic theory that the Physics class does not. Although coverage of kinetic theory is beneficial, the topic is fully covered in the Chemical Engineering class ECH 4504: Chemical Kinetics and Reactor Design.

Process Thermodynamics

ECH 3101, Section 4696

Class Periods: Tuesdays and Thursdays, Periods 7-8, 1:55 to 3:50 PM

Location: LAR 330

Academic Term: Fall 2018

Instructor:

Office Location:

Office Phone Number:

Office Hours:

Teaching Assistant:

Please contact through the Canvas website

Course Description

An introduction to the fundamental principles of classical thermodynamics including the first and second laws of thermodynamics. Applications to modeling and analysis of physical and chemical processes undergoing change.

Course Pre-Requisites / Co-Requisites

All students should have successfully passed Thermal Physics (PHY 3513) or Physical Chemistry (CHM 4411), and Computer Model Formulation (COT 3502), and Material and Energy Balances (ECH 3023) prior to enrollment.

Course Objectives

Upon completion the student should be able to:

1. Understand the fundamental basis of the first and second laws of thermodynamics
2. Estimate thermodynamic properties of pure gases and liquids using equations of state.
3. Develop mass and energy balance equations necessary to solve reactive and non-reactive steady-state and transient systems by hand or by computer using process simulation software.
4. Use tables, charts, or software to estimate physical property data needed to solve material and energy balances.
5. Apply pertinent mathematical concepts required to develop general thermodynamic equations of change.
6. Estimate thermodynamic properties of fluid mixtures.
7. Work ethically with other students, both engaging in discussions and group reports and working independently.

Materials and Supply Fees

Not Applicable

Professional Component (ABET):

1. To instill technical competence in mathematics, science, and engineering
2. To develop problem solving skills
3. To develop an ability to apply knowledge to practice
4. To instill an ability to design a component, unit, or process that meets performance specifications
6. To instill an ability to use the techniques, skills, and modern engineering tools necessary for chemical engineering practice

Relation to Program Outcomes (ABET):

Course Objectives	Student Outcomes*											
	a	b	c	d	e	f	g	h	i	j	k	l
1	x				x				x			
2	x	x		x	x						x	x
3	x		x		x						x	
4	x		x									
5	x				x				x			
6	x				x				x		x	
7				x		x	x					

*ABET Student Outcomes

By the time Chemical Engineering students graduate, they attain:

- an ability to apply knowledge of mathematics, science, and engineering
- an ability to design and conduct experiments, as well as to analyze and interpret data
- 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
- an ability to function on multi-disciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- 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

- Chemical, Biochemical, and Engineering Thermodynamics
- Stanley I. Sandler
- Wiley & Sons, 2006, 4:th Edition
- ISBN number: 978-0-471-66174-0

Additional material will be available on the E-learning site (Canvas).

Note: Exams are open-book. Therefore, a printed copy of the book is required and use of computers and cell phones will be prohibited on the exams.

Course Schedule

Week	Topic	Corresponding Book Chapters	Quizzes and Exams
Week 1	Introduction and Definitions, Mass Balances	Chapters 1 and 2	
Week 2	Energy Balances and Thermodynamic Properties	Chapters 3.1, 3.3	
Week 3	Applications of Mass and Energy Balances	Chapters 3.2, 3.4	Quiz #1
Week 4	State Variables and Entropy	Chapters 3.4, 4.1	Quiz #2
Week 5	Heat, Work and Entropy	Chapters 4.2, 4.3	
Week 6	Review, Entropy and Thermodynamics Diagrams	Chapters 4.2-4.4	Exam 1

Week 7	Engine Efficiency, Liquefaction	Chapters 4.3, 5.1, 5.2	Quiz #3
Week 8	Power Cycles and refrigeration	Chapters 5.2 + additional material	Quiz #4
Week 9	Spring Break		
Week 10	Review		Quiz #5
Week 11	Thermodynamic Properties of Real Fluids	Chapters 6.1, 6.2, 6.4	Exam 2
Week 12	Thermodynamic Properties of Real Fluids, Departure Functions	Chapters 6.2, 6.4	
Week 13	Generalized Equations of State, Principles of Corresponding States	Chapters 6.6, 6.7	Quiz #6
Week 14	Third Law of Thermodynamics, Fugacity, Phase Equilibria	Chapters 6.8, 7.1-7.4	Quiz #7
Week 15	Review		Exam 3
Week 16			Final Assignment

Homework will be given on Tuesdays and will be due the following Tuesday. While most homework assignments are not collected, it is expected that students work through the homework problems as a quiz will be given at the beginning of the following Tuesday lecture on the topic of the homework. Solutions to homework problems will be available on Canvas.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance of lectures is highly recommended. It is the student's responsibility to obtain any notes, assignments, etc. that they may have missed during their absence. Repeated absences may lead to a lower grade in the class.

As a courtesy to the other students and to the instructor, the students should turn off the ringers for all cell phones during class and they should not answer incoming calls. If a student is expecting an emergency call, please notify the instructor prior to class.

Make-up exams will be given for excused absences and in extraordinary circumstances, such as religious holidays or emergencies. It is required that, whenever possible, the student notifies the instructor about the situation prior to the exam, preferably at least two weeks in advance. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

There will be no individual make-up quizzes. One make-up quiz will be given at the end of the semester and one quiz with the lowest score will be dropped before grades are assigned.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Exam 1	100	25%
Exam 2	100	25%
Exam 3	100	25%
Homework and Quizzes (approximately 8 in total)	100 each	25%
		100%

Grading Policy

Grades for this class are curved at the discretion of the instructor. Please note that 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:

<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>.

Approximate grade scale is as follows:

Percent	Grade	Grade Points
93 - 100	A	4.00
90 - 92	A-	3.67
87 - 89	B+	3.33
83 - 86	B	3.00
80 - 82	B-	2.67
77 - 79	C+	2.33
73 - 76	C	2.00
70 - 72	C-	1.67
67 - 69	D+	1.33
63 - 66	D	1.00
60 - 63	D-	0.67
0 - 59	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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 support, 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>.