MEC 422: Thermal System Design

Fall 2019 (SBU)

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Class Time and Location: Tu-Th: 8:30 – 9:50 AM, OLD ENGINEERING 143

Instructor: Professor Foluso Ladeinde Office Location: HE 224

Preferred E-mail Address: foluso.ladeinde@stonybrook.edu

Instructor Office Hours (Tentative): Tu, Th: 11:00 AM – 12:30 PM

TA: Oh HyeJin

TA Office Hours: TBD

Credits: 3

Pre-requisites: MEC 305.

Textbook: 1. Design of Fluid Thermal Systems by William S. Janna, Cengage Learning, Fourth Edition, 2015, ISBN-13:978-1-285-85965-1, ISBN-10:1-285-85965-0.

Course Description:

Device design and system design. Quantitative data for system design including operating characteristics of compressors, turbines, heat exchangers, piping systems, internal combustion engines, and other component equipment. Component matching and system simulation. Optimization including thermo-economic evaluation and energy analysis. Case studies: refrigeration and air conditioning systems; combined cycles; steam-injected gas turbines.

Week 1.	Introduction, Basic Equations	8/26-8/30
Week 2.	Basic Equations	9/2-9/6
Week 3.	Piping System I	9/9-9/13
Week 4.	Piping system II	9/16-9/20
Week 5	Selected Topics in Fluid Mechanics	9/23-9/27
	(Midterm I: 9/26; Thursday)	
Week 6.	Pumps and Piping Systems	9/30 - 10/4
Week 7	Some Heat Transfer Fundamentals	10/7 - 10/11
Week 8.	Double Pipe Heat Exchanger	10/14 – 10/18; No Class
		on 10/15
Week 9.	Shell and Tubes Heat Exchangers	10/21-10/25
Week 10.	Shell and Tubes Heat Exchangers	10/28-11/1
Week 11.	Shell and Tubes Heat Exchangers	11/4-11/8

	(Midterm II: 11/05; Tuesday)				
Week 12.	Plate-Fin/Plate-Frame Heat Exchangers	11/11-11/15			
Week 13.	Plate-Fin/Plate-Frame Heat Exchangers	11/18-11/22			
Week 14.	Thermal System Simulation	11/25-11/29; No Class on			
		11/28			
Week 15.	Optimization: Constrained and	12/2-12/5			
	Unconstrained; Lagrange Multipliers, Search				
	Methods, Linear Programming				
Weeks 16.	Project Presentation and Evaluation	12/9-12/10			
	Finals	12/11 - 12/19			
	Commencement	12/20, 1:30 PM			

Homework:	Approximately two homework assignment every three weeks Homework will be due one week after it is assigned. Late homework will receive half credit before the solutions are posted and will <u>not</u> be accepted after that.					
Exams:	2 Midterms with Competency Questions 1 Final Exam with Competency Questions 1 Project All exams will be scheduled in class, unless otherwise stated No makeup exam unless arranged prior to the exam.					
Grading Scale	Will grade on a curve					

Grading:

Midterm I: 25% Midterm II: 25% Final: 25% (Comprehensive) Homework: 10% Project: 15%

Homework is to be done individually. Homework must be neat and orderly so that your work can be followed clearly. Solutions which are not clearly written and easy to follow (based on the judgment of the instructor) will not be graded.

Attendance: More than three unexcused absences from class will lead to a final grade of F.

COURSE LEARNING OBJECTIVES	PIs	ASSESSMENT TOOLS
1. Analyze and optimize pumping systems.	a4, e1, e2	Exams
2. Analyze and optimize heat exchangers.	a4, e1, e2	Exams

3. Analyze and optimize pumps and compressors.						a4, e e2	21,	Exams				
4. Synthesize design and analysis principles in representative real- world engineering problem.						a4, c c3, e	:2, :3	Rubrics for Project Report				
COGNITIVE	а	b	с	d	e	f	g	1	h	i	j	k
DEVELOPMEN	3		3		3							
Т	1 – Knowledge/Comprehension 2 – Application/Analysis, 3 – Synthesis/Evaluation											

Student Accessibility Support Center Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following

website:<u>http://www.stonybrook.edu/ehs/fire/disabilities</u>

Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website athttp://www.stonybrook.edu/commcms/academic integrity/index.html

Critical Incident Management

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.