

MEC 422 Thermal System Design

Instructor: Dr. Juldeh Sesay and Sotirios Mamalis

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Office Hours: Mondays and Wednesdays 11:30 – 12:30 pm

General Information's: check blackboard

Course Description

Thermal system design. Credit 3: 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.

Course Prerequisites: Mass and Heat Transfer
Fluid Mechanics
Thermodynamics

Textbook

“Design of Fluid Thermal System”, Latest Ed., William S. Janna, PWS Publishing Company, 1998

References

1. Heat Transfer: A Practical Approach by Yunus A. Cengel, 3rd Ed., McGraw-Hill
2. Analysis and design of Energy Systems, Hodge, B.K. and R.P. Taylor, 3rd Edition, Prentice Hall, 1999
3. Design of Thermal Systems, Stoecker, W., McGraw-Hill
4. Elements of Thermal-Fluid System Design, Burmeister, L. C., Prentice Hall, 1998
5. Design Optimisation of Thermal Systems, Jaluria, Y., McGraw-Hill, 1998

Class schedule

Lectures: Tuesdays and Thursdays at 08:30 am – 09:50 am; Javits Lecture Room 111
There will be one design project in the semester and each group should have at most four students. There is no lab project this semester.

Recitation: There is no recitation in this course. The recitation period is to be utilized for your design projects.

Teaching Assistants and Grader: Ruinan Yang
Saadualah Khan

Course Objective and Topics

Operating characteristics of common devices are reviewed. This course introduces the essential requirement of component matching in a system. Optimization of thermal system performance is also introduced and the students apply their knowledge to design projects.

Students are expected to review and use engineering science knowledge from thermodynamics, fluid mechanics and heat transfer, understand and be comfortable with thermal system component analysis and their synthesis in integral engineering systems and processes. Engineering design requires making decisions, data acquisition, and codes/standards compliance. Emphasis upon thermal/energy systems components such as heat exchangers, piping networks, and pumps; system modeling and introduction to the use of uncertainty in design

Grading and Class Policies

Final grade is determined based on your performance on the following areas:

Homework: 15%

Design Project: 25%

Midterm 1: 30%

Midterm 2: 30%

Extra Credit: 10%

Midterm 2 is comprehensive and a total grade of 55% is required to pass this course and attendance is not mandatory.

Course Policies:

1. Lecture notes will not be posted on the blackboard.
2. Lectures are held on Tuesdays and Thursdays from 8:30AM to 9:50AM
3. No late homework (HW), project is accepted and zero grade will be assigned. Each homework will consist of five problems. Homework, and project must be submitted in class immediately after lectures on the due dates. All procedures must be shown in homework's, projects, and tests.
4. The first homework page has to have heading; your name, identification number, course & HW number (MEC 422, HW-2, for example)
5. The design project report has to be typed (you may hand sketch and hand-write equations) and be submitted during your design project presentation .
6. Submitted homework for grading has to be your own work. You have to **show all work or give related references**. No makeup tests will be given. If you do homework with someone else, you have to understand and stand behind the submitted work on your own. If it is determined that you are not familiar with the homework you may be responsible for plagiarism and cheating, and therefore lose all credits for that homework and all other homeworks to follow.

Special Needs/Disabilities

If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, I would urge that you contact the staff in the Disabled Student Services office (DSS), ECC (Educational Communications Center) Building, Room 128,(631)632- 6748. DSS will review your concerns and determine with you what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Statement on Academic Dishonesty

“Academic dishonesty is an extremely serious offense and will not be tolerated in any form. Academic dishonesty in general is the presentation of intellectual work is not originally yours. Examples include, *but are not limited to*, copying or plagiarizing class assignments including homework, reports, design, computer programs, and other submitted materials; copying or otherwise communicating answers on exams with other students; bringing unapproved aids,

either in physical (written) or electronic form to an exam; obtaining copies of an exam prior to its administration, etc. Academic dishonesty violates both the ethical and moral standards of the Engineering profession and all infractions related to academic dishonesty will be prosecuted to the fullest via the CEAS CASA committee. For you, the honest student, academic dishonesty results in lower class curves, hence a depression in your GPA and class standing, while cheapening the degree you earn.”

Calculator Policy

“Effective Spring, 2008 only the following calculators will be permitted to be used on all midterm and final exams in the department of Mechanical Engineering. There will be no exceptions! This list of calculators is identical to that allowed for the National Council for Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) Exam that many of you will take in your senior year, as well as the professional Engineering (PE) exam that you may take several years now. The sooner you become comfortable on one of these calculators, the better.

NCEES Allowed calculators as of spring, 2008:

- ▶ Casio: All **fx-115** models. Any Casio calculator must contain fx-115 in its model name

- ▶ Hewlett Packard: The **HP 33s** and **HP 35s** models, but no others.

- ▶ Texas Instruments: All **TI-30X** and **TI-36X** models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

The NCEES policy on calculators can be found here:

[http://www.ncees.org/exams/calculators/.](http://www.ncees.org/exams/calculators/)”