

EML 4147C – Thermal Science Design and Lab

1. **Catalog Description:** 3 Credits; Thermodynamics, fluid mechanics, and heat transfer integrated with design with an emphasis on internal combustion engines. Topics will vary from semester to semester.

2. **Pre-requisites :** *EML 3100, EML 3301C and EML 4140*

3. **Course Objective:** The objective of this course is to provide an intermediate level coverage of thermodynamic, fluid mechanic, and heat transfer topics integrated with design and laboratory experiences (when possible). This course stresses fundamental engineering science applied to thermal design and laboratory applications. Students will be exposed to open-ended thermal design topics and will be expected to communicate the design process through written communication. Students are expected to gain a deeper understanding of fundamental thermal concepts via the laboratory or applied application experience.

4. **Contribution of course to meeting the professional component:**

4A. EML4147C supports several program outcomes in the mission statement of the Department of Mechanical and Aerospace Engineering. Specific ME program outcomes supported by this course include: (1) Applying knowledge of chemistry and calculus-based physics with depth in at least one of them (**ME Program Outcome M1, AE Program Outcome A1**); (2) Applying knowledge of advanced mathematics through multivariate calculus and differential equations(**ME Program Outcome M2, AE Program Outcome A2**); (3) Possessing ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems (**ME Program Outcome M4**)

4B. Mathematics (20%), Physical Sciences (40%), Engineering Design (30%), Social Sciences and Humanities (10%)

5. **Relationship of course to program outcomes:**

This course achieves the following ABET outcomes [note that the outcome number corresponds to the respective ABET outcomes (a) through (k). Also, note that superscripts represent related ME program outcomes]:

(a) Apply knowledge of mathematics, science, and engineering^{A1,A2,A3,A5,M1,M2,M3} [**outcome (a), high coverage, 40% of the course grade; method of assessment is lab reports and one exam**]

(b) Design and conduct experiments, as well as analyze and interpret data^{A3,M3} [**outcome (b), high coverage, 25% of the course grade; method of assessment is lab reports and design project report**]

(c) Design a system, component, or process to meet desired needs^{A4,M4} [**outcome (c), high coverage, 15% of the course grade; method of assessment is oral and written reports of design project**]

(d) Function on multi-disciplinary teams [**outcome (d), low coverage, 5% of the course grade; method of assessment is lab report and oral and written reports of design project**]

(e) Identify, formulate, and solve engineering problems^{A4,M4} [**outcome (e), low coverage, 5% of the course grade; method of assessment is lab reports and one exams**]

(g) Communicate effectively [**outcome (g), low coverage, 5% of the course grade; method of assessment is lab report and oral and written reports of design project**]

(i) Recognize the need for, and engage in life long learning [**outcome (i), low coverage, 5% of the course grade; method of assessment is several critiques of research papers in the field of experiment and design**]

(k) Use the techniques, skills, and modern engineering tools necessary for engineering practice^{A4,A5,M4} [outcome (k), low coverage, 5% of the course grade; method of assessment is lab reports and one exam]

6. **Instructor:** Dr. John Abbitt

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Office hours: Zoom, see website for hours

7. **Teaching Assistants:**

See website

8. **Meeting Times:** See departmental website

9. **Class/Laboratory Schedule:** NA for Summer 2020 due to corona virus

10. **Meeting Location:** On line

11. **Material and Supply Fees:** \$238.50 normally, no fees for Summer 2020

12. **Textbooks and Software Required:**

Engineering Fundamentals of the Internal Combustion Engine, 2nd edition, by Willard W. Pulkrabek, published by Pearson Prentiss Hall, ISBN: 0-13-140570-5

13. **Course Outline:** There will two lectures per week. Typically, lectures will occur during 5th and 6th periods, but occasionally, the 2nd lecture will occur on Thursday. If the lecture is given on Thursday, it will be recorded.

15. **Topics Covered:** see the chapter titles in the book. It is planned to cover all the chapters.

16. **Attendance and Expectations:** It is the policy of the University of Florida that you attend all classes.

16. **Grading :**

Homework – 15%
Tests (3 tests total) – 70%
Design project – 15%

Homework must be submitted on time to receive full credit. If a homework is submitted late by no more than 48 hours, half credit will be granted. After 48 hours, no credit will be awarded. One minute late is the same as one day late.

17. **Grading Scale :**

94 <= A <= 100	90 <= A- < 94	(No A+)
87 <= B+ < 90	83 <= B < 87	80 <= B- < 83
77 <= C+ < 80	73 <= C < 77	70 <= C- < 73

67 <= D+ < 70
E < 60

63 <= D < 67

60 <= D- < 63

There is no rounding up or down.

19. **Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. Typical disciplinary action would be a grade of E in the course for a first offense. A second offense (which includes other courses) would likely result in a two-semester suspension. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others. The use of a pirated textbook is unauthorized and constitutes an honor violation. Any use or accessing or handling of a cell phone during an exam will result in an honor violation.

Important: In this course, all homework is considered to be individual effort. You may consult with other students or a TA, but whatever work you turn in must be your own. Use of the solutions manual is not authorized. Every assignment should contain the honor pledge “On my honor, I have neither given nor received unauthorized aid in doing this assignment,” and all students should sign each assignment acknowledging the honor pledge.

20. **Accommodation for Students with Disabilities:** Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation. For any accommodations involving a test, you should notify me by the second week of the semester so I can apply the appropriate setting in Honorlock.

21. **UF Counseling Services:** Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575,
<http://www.counsel.ufl.edu/default.asp> Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.
- Alachua County Crisis Center - (352) 264-6789.

22. **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.

23. **Class Demeanor:** Class is conducted via zoom and is started on time. Students are expected to be on time or early. Engineers are expected to be on time for meetings and you are expected to be on time for classes. Please mute your microphone. Any use, handling, or accessing of a cell phone during an exam will result in an honor violation.