University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Mechanical Engineering
Bachelor of Science in Mechanical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INME 4045
Course Title: General Thermodynamics for Engineers
Number of credits: 3
Contact Period: Three hours of lecture per week

2. Course Description:

English: Fundamental laws and principles of thermodynamics and their application in engineering. Thermodynamic and energetic concepts, properties of pure substances, heat transfer, heat engines.

Spanish: Leyes fundamentales y principios de la termodinámica y su aplicación en ingeniería. Conceptos termodinámicos y energéticos, propiedades de sustancias puras, transferencia de calor, motores térmicos.

3. Pre/Co-requisites and other requirements:

Pre-requisites: (FISI 3172 or FISI 3162 or FISI 3012) and (QUIM 3002 or QUIM 3042 or (QUIM 3132 and QUIM 3134)).

4. Course Objectives:

- Analyze the transient and steady state energy interactions for a closed system.
- Analyze the transient and steady state energy and mass interactions for a control volume.
- Perform entropy balance and entropy rate balance for a closed system and control volume respectively.
- Analyze and synthesize simple power and refrigeration cycles using the first and second laws of thermodynamics.

5. Instructional Strategies:

☒conference ☐discussion ☐computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring

☐research ☐other, please specify:

6. Minimum or Required Resources Available:

None.

7. Course time frame and thematic outline

General Topics	Contact Hours
Introductory concepts and definitions	4
First law of thermodynamics	10
Thermodynamic properties	12

Control volume energy analysis	6
Second law of thermodynamics	5
Entropy	8
Total hours: (equivalent to contact period)	**45**

8. Grading System

☒Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**2-3**	**65**
☒ **Final Exam**	**1**	**25**
☒ **Short Quizzes**	**2-3**	**10**
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☐ **Projects**		
☐ **Journals**		
☐ **Other, specify:**		
TOTAL:		**100%**

10. Bibliography:

Textbook:

- Cengel Y.A. and Boles, M.A., (2015) *Thermodynamics: An engineering approach*, 8th ed., McGraw-Hill Education, New York, NY.

Other References:

- Moran M.J., Shapiro H.N., (2000) *Fundamentals of Engineering Thermodynamics*, 4th ed., John Wiley and Sons, New York, NY. TJ265 .M66 2000

11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:
States that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information, contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

12. Academic Integrity

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.─

13. Certification 06-43 of the Academic Senate

"The academic guidelines for offering online courses," defines: Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11

or less are taught via the Internet. According to certification 06-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

14. Sexual Harassment: Certification 130-2014-2015 states:
Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

Revised: February, 2019