



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



## Course Syllabus

<b>1. General Information:</b> Alpha-numeric codification: INME 4001 Course Title: Thermodynamics I Number of credits: 3 Contact Period: Three hours of lecture per week
<b>2. Course Description:</b> English: A study of the fundamental laws of thermodynamics as applied to closed and open systems. Properties, equations of state, processes and basic cycles. Spanish: Estudio de las leyes fundamentales de la termodinámica aplicada a sistemas cerrados y abiertos. Propiedades, ecuaciones de estado, procesos y ciclos básicos.
<b>3. Pre/Co-requisites and other requirements:</b> Pre-requisites: (QUIM 3002 or QUIM 3042 or (QUIM 3132 and QUIM 3134)) and (FISI 3174 or FISI 3164) and (FISI 3172 or FISI 3162)
<b>4. Course Objectives:</b> <ul style="list-style-type: none"><li>• Upon successful completion, students will be able to: Identify, formulate, and solve thermodynamics problems related to temperature, pressure, system, state, equilibrium, process, and thermal cycles by applying principles of engineering, science, and mathematics (1)</li><li>• Define concepts of energy, heat, work, energy conversion efficiency, and internal energy</li><li>• Describe the properties of pure substances using equations of state and property diagrams</li><li>• Explain and apply conservation of mass and the first and second laws of thermodynamics to common power systems and refrigeration cycles</li><li>• Make clear and effective technical presentations, both in terms of form as well as content, of his/her work and write clear technical reports describing his/her work. (3)</li><li>• Use of proper engineering judgment in the area of power generation guided by ethical, environmental, and professional considerations. (4)</li><li>• Find, evaluate and use resources to learn independently in the area of thermodynamics (7)</li></ul>
<b>5. Instructional Strategies:</b> <input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory  <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop  <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring  <input type="checkbox"/> research <input type="checkbox"/> other, please specify:
<b>6. Minimum or Required Resources Available:</b> None.

<b>7. Course time frame and thematic outline</b>		
<b>General Topics</b>	<b>Contact Hours</b>	
Introductory concepts and definitions	4	
First law of thermodynamics	10	
Thermodynamic properties	12	
Control volume energy analysis	6	
Second law of thermodynamics	5	
Entropy	5	
Tests	3	
<b>Total hours: (equivalent to contact period)</b>	<b>45</b>	
<b>8. Grading System</b>		
<input checked="" type="checkbox"/> Quantifiable (letters) <input type="checkbox"/> Not Quantifiable		
<b>9. Evaluation Strategies</b>		
	<b>Quantity</b>	<b>Percent*</b>
<input checked="" type="checkbox"/> Exams	<b>2-3</b>	<b>50-75</b>
<input checked="" type="checkbox"/> Final Exam **	<b>1</b>	<b>0-25</b>
<input checked="" type="checkbox"/> Short Quizzes	<b>0-3</b>	<b>0-10</b>
<input checked="" type="checkbox"/> Oral Reports	<b>0-4</b>	<b>0-25</b>
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	<b>0-1</b>	<b>0-50</b>
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	<b>0-5</b>	<b>0-25</b>
<b>TOTAL:</b>		<b>100%</b>
* All evaluation strategies will add to 100%		
** In design courses a capstone project may replace the final exam.		
<b>10. Bibliography:</b>		
<b>Textbook:</b>		
Moran, M. J., Moran, M. J., Shapiro, H. N., Boettner, D. D., & Bailey, M. B. (2018). <i>Fundamentals of engineering thermodynamics</i> . Hoboken, NJ: John Wiley & Sons.		
<b>Other references:</b>		
<ul style="list-style-type: none"> <li>• Cengel Y.A. and Boles, M.A., (2008) <i>Thermodynamics: An engineering approach</i>, 6<sup>th</sup> ed., Mc-Graw-Hill Science, Hightstown, NJ. TJ265 .C43 2008</li> </ul>		
<b>11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:</b>		
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.		
<b>12. Academic Integrity</b>		
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*