



University of Puerto Rico  
 Mayagüez Campus  
 College of Engineering  
 Department of Mechanical Engineering  
 M.S./Ph.D. in Mechanical Engineering



## Course Syllabus

<b>1. General Information:</b>	
Alpha-numeric codification: INME 6039 Course Title: Vibrations Number of credits: 3 Contact Period: Three hours of lecture per week	
<b>2. Course Description:</b>	
English: Systems with multiple degrees of freedom, principal modes and coordinates, modal analysis, influence coefficients, transfer matrix. Lagrange's equations. Continuous system, longitudinal, torsional and lateral vibrations. Simulation of vibrational problems on analog and digital computers.	
Spanish: Estudio de sistemas con grados de libertad multiples, modos principales y sus coordenadas, análisis modal, coeficientes de influencia, matriz de transferencia. Ecuaciones de Lagrange. Sistemas continuos; vibraciones longitudinales, torsionales y laterales. Simulación de problemas vibratoriales en computadoras análogas y digitales.	
<b>3. Pre/Co-requisites and other requirements:</b>	
Pre-requisite: Authorization of the Director of the Department	
<b>4. Course Objectives:</b>	
<ul style="list-style-type: none"> <li>• Creating models of mechanical system and evaluating their behavior under dynamic loading; and</li> <li>• Creating computer codes to analyze mechanical systems</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>
Review of SDOF systems	15
Study of MDOF systems	12
Vibration of continuous systems	6

Nonlinear and random vibration	9
Experimental Vibration	3
<b>Total hours: (equivalent to contact period)</b>	<b>45</b>

### 8. Grading System

Quantifiable (S/NS)  Not Quantifiable

### 9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2	40
<input checked="" type="checkbox"/> Final Exam	1	20
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	1	25
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Homework	5	15
<b>TOTAL:</b>		<b>100%</b>

### 10. Bibliography:

#### Textbook:

Rao, S.S. 2011. *Mechanical Vibrations*. New Jersey: Prentice Hall. [Available at the Circulation Collection (TA355. R37 2011), UPRM General Library]

#### **Other resources:**

1. Thomson, W.T. and Marie Dillon Dahleh. 1998. *Theory of Vibration with Applications*. New Jersey: Prentice Hall. [Available at the Circulation Collection (TA355. T47 1998), UPRM General Library] (\*\*)
2. Ferrari, V. and Paolo L. Gatti. 1999. *Applied Structural and Mechanical Vibrations*. Florida: CRC Press. <http://dx.doi.org/10.4324/9780203014554>. [Available via CIVILENGINEERING netBASE, UPRM General Library Databases] (\*\*)
3. Schmitz, Tony L., and K. Scott Smith. 2012. *Mechanical Vibrations*. New York: Springer. <http://dx.doi.org/10.1007/978-1-4614-0460-6>. [Available via Springer eBooks, UPRM General Library Databases].
4. de Silva, Clarence W. 1999. *Vibration*. Florida: CRC Press. <http://dx.doi.org/10.1201/NOE0849318085>. [Available via ENGnetBASE, UPRM General Library Databases] (\*\*)
5. Electronic resources available through the Library's website:  
<http://www.uprm.edu/library/cre/listdbsp.php?l=1&st=0&topic=77>.

\*\* These books are key classic references and remain as the top books for the subjects covered in the course and there are no up-to-date textbooks to substitute these books.

### **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*