



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



Course Syllabus

1. General Information:	
Alpha-numeric codification: INME 6009 Course Title: Advanced Manufacturing Processes Number of credits: 3 Contact Period: Three hours of lecture per week	
2. Course Description:	
English: Developments in the removal and deforming processes of materials. Applications of these processes to hard, brittle, conducting and non-conducting materials. Use of the computer in the analysis of these processes.	
Spanish: Desarrollo en los procesos de remoción y deformación de materiales. Aplicaciones de estos procesos a materiales duros, quebradizos, conductores y no conductores. Uso de la computadora en el análisis de estos procesos.	
3. Pre/Co-requisites and other requirements:	
Prerequisites: Authorization of the Director of the Department.	
4. Course Objectives:	
<ul style="list-style-type: none"> • Explaining recent developments for machining and deformation processes. • Explaining the relationship between the properties of the material and the selection of a suitable process to make a product. • Analyzing non-traditional material removal processes, such as abrasive water jet and laser machining. • Designing non-traditional material removal processes by choosing appropriate parameters. • Analyzing the rolling, forging, extrusion, and drawing deformation processes through mathematical models and finite element analysis computer software. 	
5. Instructional Strategies:	
<input checked="" type="checkbox"/> conference <input checked="" type="checkbox"/> discussion <input checked="" 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:	
6. Minimum or Required Resources Available:	
Classroom with computer data display. Computing facilities.	
7. Course time frame and thematic outline	
General Topics	Contact Hours
Introduction and overview of advanced manufacturing processes	2

Types of materials and properties that make them suitable to specific manufacturing processes	4
Abrasive water jet machining	3
Thermal energy machining processes	4
Electro-chemical machining processes	4
Methods for analysis of metal deformation processes	6
Rolling	3
Forging	3
Extrusion and deep drawing	3
Applications of finite elements to analyze advanced manufacturing processes	10
Exams	3
Total hours: (equivalent to contact period)	45

8. Grading System

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	3	50-75
<input checked="" type="checkbox"/> Final Exam	1	25
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input type="checkbox"/> Projects		
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Quizzes, Homework	0-8	0-25
TOTAL:		100%

10. Bibliography:

Textbook:

Hu, Ping, Ma, Ning, Liu, Li-zhong, and Yi-guo Zhu. 2013. *Theories, Methods and Numerical Technology of Sheet Metal Cold and Hot Forming: Analysis, Simulation and Engineering Applications*. New York: Springer.

Other resources:

1. Advani, Suresh G., and E. Murat Sozer. 2002. *Process Modeling in Composites Manufacturing*. Florida: CRC Press. <http://dx.doi.org/10.1201/9780203910061>. [Available via MechanicalENGINEERING netBASE, UPRM General Library Databases] (**)
2. Halmos, George T. 2005. *Roll Forming Handbook*. Florida: CRC Press. <http://dx.doi.org/10.1201/9781420030693>. [Available via MechanicalENGINEERING netBASE, UPRM General Library Databases] (*)
3. Society of Manufacturing Engineers. 1983-1998. *Tool and Manufacturing Engineers Handbook: A Reference Book for Manufacturing Engineers, Managers, and Technicians (Vols 1-9)*. Michigan: SME Press. [Available at the Reference Collection (TS176. T63 1983), UPRM General Library] (*)

4. Walsh, Ronald A. 1999. *McGraw-Hill Machining and Metalworking Handbook*. New York: McGraw-Hill. [Available at the Reference Collection (TJ1185. W35 1999), UPRM General Library] (*)

5. Electronic resources available through the Library's website:
<http://www.uprm.edu/library/cre/listdbsp.php?l=1&st=0&topic=77>.

* These are classical handbooks

** 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