

	<b>National University of Sciences and Technology</b>	
	<b>Course Description</b>	
<b>Course Title</b> Rapid Prototyping, Tooling and Manufacturing	<b>Course Code</b> ME 821	<b>Credit Hours</b> 3 – 0

**Textbook:**

- “Rapid Prototyping: Principles and Applications” by Rafiq I. Noorani
- “Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development” (2007) by Frank W. Liou

**Reference Books:**

- “Additive Manufacturing of Metals: The Technology, Materials, Design and Production” by Francisco Medina, Soeren Wiener, Brian Baughman, Keng Hsu, Yang Li, Donald G. Godfrey, Mamballykalathil Menon, 2017
- “Rapid Prototyping Principles and Applications” by CHUA C.K., LEONG K. F. and LIM C. S
- “Rapid Prototyping Technology” by Kenneth G. Cooper

**Course Objective:**

- To understand the operating principles and characteristics of current commercialized rapid prototyping systems. Also, able to choose a rapid method based on the requirements of the model or testing.

**Course Outline:**

- Introduction, World of RP, History of RP, Development of RP Systems, Applications in Education and Industry, Case Study: Fabricating a Prototype Using 3D Printing. Principles of Rapid Prototyping, Liquid-Based RP Systems, Solid-Based RP Systems, Powder-Based RP Systems, Materials for Rapid Prototyping: Introduction, Types of Materials, Liquid-Based Materials, Solid-Based Materials, Powder-Based Materials, Case Study. Reverse Engineering, Rapid Tooling: Introduction, Indirect Methods of RT, Direct Methods of RT, Case Study: Sheet-Metal Forming by RT. Medical Applications in Rapid Prototyping: Introduction, Medical Applications of RP, Types of Medical Imaging, Software for Making Medical Models, Medical Materials, Other Applications. Industry Perspectives: Guidelines for Implementation, Operating Issues, Managing Issues, Service Bureaus, Rapid Prototyping Consortia, Present and Future Trends. Research and Development: Improvement of FDM Process Using Design of Experiment, Improvement of Part Accuracy, Effects of Cryogenic Processing on RP Materials, New Technologies.

**ASSESSMENTS**

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester Exam	40-50%