Semester:	6			
Course Code:	MI3810			
Course Name:	Manufacturing Engineering			
Credit Value:	3 (Notional hours:150)			
Pre-requisites:	None			
Core/ Optional:	Optional			
Hourly Breakdown	**Lecture hrs**	**Tutorial hrs**	**Practical class hrs**	**Independent Learning & Assessment hrs**
	30	04	20	96

Course Aim: To expose mechanical engineering undergraduates on manufacturing processes, metrology, quality and other aspects of Manufacturing engineering so that they can effectively work in the industry.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- **Apply** knowledge on principles of metal cutting to practical applications through multiple labs using lathe and milling machines following workshop safety procedures
- **Analyse** forming process parameters (Dies, tooling, and presses), procedures to manufacture a given product considering functional and geometric features.
- **Describe** the metal solidification process (casting) to enhance the quality of cast products.
- **Select** the most suitable welding methods and techniques for a given application by analysing the weld parameters and composition, machine settings, and selection of electrodes.
- **Apply** advanced metrology aspects in quality engineering.
- **Apply** quality tools and techniques to understand product and process variation.

Course Content:

Introduction to Manufacturing Engineering

Manufacturing systems and processes

Materials and process selection

Subtractive Manufacturing Processes – Machining

Metal cutting Technology

Mechanics of Metal cutting
Cutting Tools
Cutting Forces and power
Thermal Aspects, Tool life and Surface Integrity in Metal Cutting
Machining Operations
Lathe operations
Milling Operations

Formative Manufacturing Processes

Metal Forming Processes
Explanation of processes, material flow and control
Metal forming processes, sheet and bulk forming methods
Die and geometries and industrial significance
Process parameters and mathematical analysis of metal forming processes.
Forming of Non Metallic Materials
Ceramics, Glass, Rubber, Plastics
Casting
Permanent and reusable moulds, die casting, mould design
Solidification mechanism, inspection and defects

Additive Manufacturing Processes

3D printing (Materials, Basic Principles of AM, Classification of AM processes, Benefits, Applications)

Joining Processes – Welding

Welding Processes, specifications and techniques

Engineering Metrology

Engineering metrology for assessing quality and conformance of products, International standards of limits, fits and tolerances, Interchangeability, modern measuring instruments, introduction to Coordinate Measuring Machine (CMM)

Quality Control

Introduction to quality control
Statistical Quality Control–Statistical Process Control (SPC) Charts and Acceptance Sampling
Introduction to Total Quality Management
International quality standards

Teaching/ Learning Methods:

Classroom lectures, tutorial discussions, practical classes, in-class assignments, project-based learning, formative assessments, small group discussion classes

Assessment Strategy:			
Continuous Assessment 50%	**Final Assessment** 50%		
Details: Assignments/Quizzes - 30% Mid Semester Examination - 0% Other Laboratory work) – 20%	Theory (%) 50	Practical (%) ……..	Other (%) (specify) ……

Recommended Reading:

- Krar, S., Gill, A., & Smid, P. (2011). Technology of Machine Tools (7 ed.). NY: McGraw-Hill.
- Groover, M. P. (2019). Fundamentals of Modern Manufacturing: Materials, Processes, and Systems (8 ed.): Wiley.
- Kalpakjian, S., & Schmid, S. (2022). Manufacturing Engineering & Technology (8 ed.): Pearson. 4. Welding Engineering- an introduction by Philipps
- Marciniak, Z., Duncan, J. L., & Hu, S. J. (2002). Mechanics of Sheet Metal Forming (2 ed.). MA: Butterworth-Heinemann.
- Montgomery, D. C. (2009). Introduction to statistical quality control (6 ed.). Hoboken, NJ: John Wiley & Sons.