

**Nirma University**  
**Institute of Technology**  
**School of Engineering**  
**Mechanical Engineering Department**

**M.Tech in Mechanical Engineering (Thermal Engineering)**

**3ME2102                                  Modeling of Thermal Systems                                  [3 0 0 3]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- understand and apply various quantitative techniques.
- comprehend and simulate various thermal systems.
- apply various numerical methods related to thermal systems.
- comprehend and apply concept of optimization to thermal systems.

**3ME2104                                  Exergy Analysis of Thermal Systems                                  [3 1 0 4]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- apply first law, second law and entropy principle to various thermodynamic systems.
- analyze and apply exergy, irreversibility and second law concepts to various engineering processes occurring in thermodynamics systems.
- evaluate performances of various thermal systems using exergy analysis concept.

**Course Learning Outcome:**

After successful completion of the course, student will be able to:

- apply the fundamentals of kinematics and conservation laws to fluid flow systems.
- apply the principles of high and low Reynold number flows to fluid flow systems.
- review the concepts of boundary layer and flow in transition.
- analyse and apply the fundamentals of turbulent flow to various fluid flow systems.

**3ME2108                                  Advanced Heat Transfer                                  [3 0 2 5]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- analyse steady state and transient heat conduction in thermal systems
- analyse extended surface heat transfer, phase change heat transfer and radiation heat transfer principles.
- appreciate the basic concepts of micro-scale heat transfer and numerical methods for conduction heat transfer.

**3ME2109                                  Seminar                                  [0 0 2 2]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- conduct a literature review on a topic allotted for detailed study
- apply modern search engines and internet facility for subject preparation
- develop oral and written presentation skills.

**3ME2201**

**Gas Dynamics**

**[3 1 0 4]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- apply the fundamentals of the compressible flow and rarefied gas dynamics.
- apply the fundamentals of one dimensional isentropic flow to variable area duct.
- analyse the principles of normal shock formation and its effects.
- apply the principles of compressible flow to constant area duct subjected to friction or heat transfer.
- analyse the forces acting on submerged bodies

**3ME2206**

**Design of Heat Exchanger**

**[3 0 2 5]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- analyze the basic thermal design principles for heat exchanger
- apply principles of thermal-hydraulic design in selection and rating of heat exchanger.
- apply concepts of pressure drop calculations in heat exchanger design.
- appreciate the usage of computerized methods for design and analysis of heat exchanger.

**3ME2207**

**Computational Fluid Dynamics**

**[3 0 2 5]**

**Course Learning Outcomes:**

After successful completion of the course, the student will be able to:

- develop an understanding for the major theories, approaches and methodologies used in CFD
- analyse and apply CFD analysis to solve engineering design problems involving fluid flow and heat transfer
- build up the skills in the actual implementation of CFD methods (e.g. boundary conditions, turbulence modelling etc.) in using commercial CFD codes

**3ME2208**

**Energy Economics and Management**

**[3 0 0 3]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- understand the overall energy scenario of country and the world.
- prepare energy planning
- comprehend and apply various models for resource availability predictions.
- demonstrate various energy conservation techniques for effective energy utilization.
- evaluates the viability of energy conservation options through various energy economic indices.

**3SP1204**

**Research Methodology (Supplementary Course)**

**[0 1 0 0]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- appreciate the importance of literature survey and problem identification for formulating an effective research topic
- integrate the functionality of Mathematical modeling and Statistical analysis for understanding intricacies of the research work
- prepare research plan inclusive of experimental design
- communicate effectively with peer groups and technical diaspora using technical research papers and thesis or reports



**3SP1301**

**Practical Training (Supplementary Course)**

**[0 0 0 0]**

**Course Learning Outcome:**

After successful completion of the course, student will be able to

- explore the preferred field of specialization and develop analytical / hardware / software / experimental skills
- manage the technical content and work
- prepare and present technical report

**3ME2301**

**Major Project Part I – Full Time**

**[0 0 0 15]**

**Course Learning Outcome**

The course provides an opportunity to the student to explore their knowledge in the area of their interest. Student will apply idea into application through experiments/ simulation. It will also help them to decide the project area / topic for further research work in their life. . As an outcome of the course, student will be able to develop:

- Problem formulation techniques.
- Analysis techniques of published data.
- Identification of scope and objectives of research work.
- Techniques for the design of experiments.
- Associated administration for project work.
- Development of compilation skill.
- Writing skill.
- Presentation skill.
- Technical Paper writing.
- Report preparation techniques.
- Fundamentals, information, reviews and in-depth knowledge in the desired area.

**3ME2401**

**Major Project Part II – Full Time**

**[0 0 0 15]**

**Course Learning Outcome**

The course provides an opportunity to the student to explore their knowledge in the area of their interest. Student will apply idea into application through experiments/ simulation. It will also help them to decide the project area / topic for further research work in their life. . As an outcome of the course, student will be able to develop:

- Problem formulation techniques.
- Analysis techniques of published data.
- Identification of scope and objectives of research work.
- Techniques for the design of experiments.
- Associated administration for project work.
- Development of compilation skill.
- Writing skill.
- Presentation skill.
- Technical Paper writing.
- Report preparation techniques.
- Fundamentals, information, reviews and in-depth knowledge in the desired area.