



MSc in Mechanical Eng. Energy Conversion



DANESHPAJOOHAN PISHRO HIGHER EDUCATION INSTITUTE

- **COURSE CHART**
- **SYLLABUS**
- **SEMESTER CHART**

MSc. Mechanical Engineering – Energy Conversion Course Chart

Energy Conversion Courses						
Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041011	Advanced Mathematics	3	3	0	-----	-----
3041012	Continuum Mechanics	3	3	0	-----	-----
3041013	Advanced Numerical Methods	3	3	0	-----	-----
3041014	Advanced Heat Transfer (Convection)	3	3	0	-----	-----
3041015	Advanced Fluid Mechanics	3	3	0	-----	-----
3041016	Seminar	2	2	0	-----	-----
3041018	Thesis	6	0	6	-----	-----
Total Credits		20				

Elective Courses (not complete)						
Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041040	Advanced Thermodynamics	3	3	0	-----	-----
3041041	Statistical Thermodynamics	3	3	0	-----	-----
3041042	Advanced Heat Transfer (Conduction)	3	3	0	-----	-----
3041044	Boundary Layers	3	3	0	-----	-----
Total Credits		-	Note: students have to pass 9 credits from elective courses.			

Advanced Mathematics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041011	Advanced Mathematics	3	3	0	-----	-----

Vectorspaces, linear transformations. Canonical forms. Operators and inner product spaces. Functions of matrices. Linear difference equations. Analytic functions and Calculus of residues.

Continuum Mechanics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041012	Continuum Mechanics	3	3	0	-----	-----

Cartesian tensors. Index notation. kinematics of a continuum. Stress tensor. Field equations. Motion and deformations. Conservation laws. Linear constitutive equations. Elasto-static and elasto-dynamic problems.

Advanced Numerical Methods

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041013	Advanced Numerical Methods	3	3	0	-----	-----

Interpolation. Integration. Solutions of algebraic equations. Least square curve-fitting and functional approximations. ODE's and PDE's.

Advanced Heat Transfer (Convection)

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041014	Advanced Heat Transfer (Convection)	3	3	0	-----	-----

Differential and integral formulation of convective heat transfer. Laminar and turbulent flows. Convection in tubes and boundary layers. Free convection. Variable properties. High velocities.

Advanced Fluid Mechanics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041015	Advanced Fluid Mechanics	3	3	0	-----	-----

Integral form of conservative laws. Vorticity transport equation. Inviscid flow. Vortex motion. Unsteady potential flow. Steady-state potential flow.

Seminar

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041016	Seminar	2	2	0	-----	-----

In this course students, with the help and supervision of their instructor, will choose a topic (usually the same as their thesis), and study and investigate all the previous and modern researches and facts about it. Subsequently they have to prepare and present their results and conclusions for the whole class, in the form of a seminar.

Thesis

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041018	Thesis	6	0	6	-----	-----

In this project students will choose and study a specific subject or problem and find its answer or solution, through practical analyzing, experiencing, and experimenting. Eventually, students will compile their theses and present them as their final project.

Advanced Thermodynamics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041040	Advanced Thermodynamics	3	3	0	-----	-----

Equilibrium. Constant chemical composition, ideal gas mixtures of constant composition, and gas mixtures with variable composition. Elastic systems, systems with surface tension, fuel cell, and reversible cell.

Statistical Thermodynamics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041041	Statistical Thermodynamics	3	3	0	-----	-----

Statistical mathematics. Classical mechanics. Quantum mechanics. Energy storage. Degrees of freedom. Statistical mechanics and thermodynamics.

Advanced Heat Transfer (Conduction)

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041042	Advanced Heat Transfer (Conduction)	3	3	0	-----	-----

Formulation of heat conduction problems. Lumped, integral, and differential methods. Steady and unsteady, one- and multi-dimensional conduction. Melting and freezing.

Boundary Layers

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3041044	Boundary Layers	3	3	0	-----	-----

Fundamental equations of viscous flows. Solution of Newtonian viscous flow equations. Laminar boundary layers. Stability of laminar flows. Turbulent boundary layers.

Total	Guide		Master of Science in Mechanical Engineering (Major: Energy Conversion) Syllabus														Semester
	Energy Conv.	EC															
12							Continuum Mechanics		Advanced Thermodynamics		Advanced Fluid Mechanics		Advanced Mathematics		Course title		1
							3	EC	3	E	3	EC	3	EC	Credits	Course type	
12									Elective Course-II		Elective Course-I		Advanced Heat Transfer (Convection)		Advanced Numerical Analysis		2
									3	E	3	E	3	EC	3	EC	
8													Thesis		Seminar		3
													6	EC	2	EC	
0															Thesis		4
32																	