unacademy

Post Graduate Program in Mechanical Engineering

Upskilling for the 21st Century

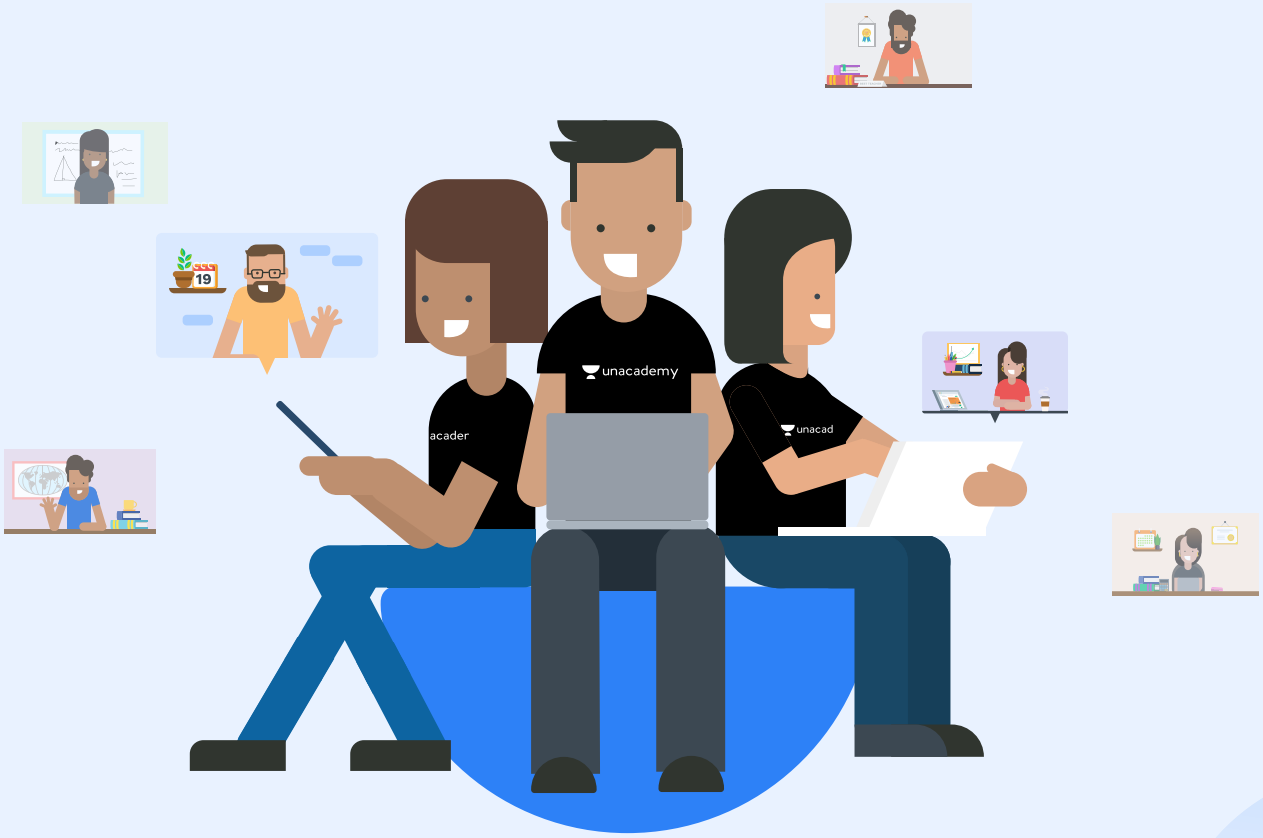


Table of Contents

About Unacademy

Classroom education in India has stifled many brilliant minds. With Unacademy, India's largest education platform, we are changing that. In a span of 6 years, **62+ million Learners have benefited** from live online lessons and specialized resources from the **best Educators** in the country.

With over **5 million** monthly active users from 10k+ cities in India, we are impacting the lives of people in the farthest corners of the country. We have on board 50k+ Educators teaching in **14 languages** to help our Learners crack various competitive examinations.

Our success stories include thousands of students who have cracked the toughest of examinations, improved their ability to speak and write better and expand their knowledge.

Our vision is to partner with the brightest minds and have courses on every possible topic in multiple languages so the whole world can benefit from these courses. **India is home to 19% of the world's youth** and we are empowering them to take on the world in a manner that classrooms will never do.

Why Become a Mechanical Engineer

Electric Vehicles. Solar & Wind Energy. Drone Technology. Satellites & Space Exploration. Decarbonization. Military Defense. Internet of Things.

Everywhere you look, **India is pushing the boundaries of innovation and emerging as a world-respected manufacturer of equipment.** This decade is going to be all about building our manufacturing base and becoming a global hub for the highest quality products and businesses. Our **Make in India initiative**, designed to make us Atmanirbhar, will **generate millions of new jobs for skilled mechanical engineers.**

However, there is a **large gap between what industries expect from new recruits and the skillsets aspiring engineers possess** after completing a bachelor's degree in engineering. This gap has widened in the last two years and restricted opportunities to coveted core engineering jobs based on one's college, specialization, or their connections in the industry.

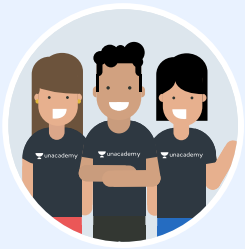
We believe that Learners need **a bridge course that will enable them to develop industry-ready skills** and secure jobs in top core engineering roles. The future of India's growth will be built on the base of the world's largest youth population under the age of 35. We have an incredible opportunity to become part of the next Industrial revolution and **contribute to making our nation a global superpower.**

Why Unacademy Core Engineering?

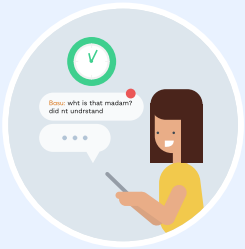
Unacademy offers a complete value offering to help you crack your dream core engineering role.

Plus Benefits

300+ hours of recorded content



Best-in-class Educators with deep industry expertise



Weekly Doubt-Solving classes

Industry-relevant projects

Masterclasses with Industry Veterans

15+ Hours of Content on Cracking Engineering Interviews

Community of like-minded professionals

Certificate of Completion

Iconic Benefits

Internship Assistance

Placement Assistance

1:1 Mentorship

1:1 Doubt Solving

Is This For You?

Unacademy's core engineering program is relevant for the following audience: -

- A **third-year or final-year Learner** aiming to crack a technical role in a core engineering company.
- A **fresh graduate (no experience)** aiming for a career in the core engineering field.
- A **recent graduate (1-3 years of experience)** looking to switch roles within the core engineering domain.
- An **experienced graduate (4-6 years of experience)** looking to upskill in specific fields.
- A **third-year or final-year Learner** looking to build a live project portfolio to apply to universities abroad.

Weekly Class Schedule

With Unacademy, you can attend classes at any time during the week based on your availability. It's completely up to you!

Our recommendations for Learners are below: -

- **Monday** - Core sessions
- **Tuesday** - Core sessions
- **Wednesday** - Core sessions
- **Thursday** - Core sessions
- **Friday** - Project Work
- **Saturday** - Masterclass/Special Event + Project Work
- **Sunday** - Project Work + Doubt-solving sessions

Classes By Experts

Mustafa Bhotvawala

R&D Software Engineer - Ansys

Lakshay Malhota

Senior Process Engineer - Force Motors

Rahul Katyal

Manager - Greenko Group

Mohit Kapoor

Manager - Vodafone Intelligent Solutions

Tushar Joshi

Mechanical Design Engineer - Siemens

Learn From Industry Leaders

Shank Kulkarni

Computational Scientist - Pacific Northwest National Laboratory

Ranjit Kumar TA

Senior Project Manager - Bosch

Stueti Gupta

Co-Founder and Director - BlueKei Solutions

Girish Sambrani

Lead Engineer - Marmon Holdings

Amit Nirmal

Head - Shirsh Technosolutions

ME 101

Strengthen Your Core

15 HOURS

101.1 Fundamentals of Mechanical Engineering

Introduction to Mechanical Engineering, Applications of Modern Day Mechanical Engineers, Opportunities in India, Skills Required for Mechanical Engineers

101.2 Introduction to Materials

Introduction To Materials, Atomic Properties Of Underlying Elements, Physical Properties Of Materials, Metals And Alloys, Advanced Materials

101.3 Mechanical Design

Design Considerations and Steps in Design Process

101.4 Design Cycle

Design Evolutions and Tasks in Design Cycle

101.5 Design Approach and Design Analysis

Different Design Approaches and Types of Design Analysis

101.6 Production Aspects and Planning

Introduction to Production Engineering, Manufacturing Design and Steps involved in Manufacturing

101.7 Application of ME in different Sub-Fields

Introduction and Application of Design Concepts, Fluid and Thermal Concepts, Manufacturing and Industrial Concepts

ME 201

Specializations

FEA and Structural Analysis

16 HOURS

201.1 Concepts of Engineering Mechanics

Principles of equilibrium, virtual work

201.2 Concepts of Mechanics of Solids

Stress and Strain Relation, Energy-Based Method and Buckling Analysis

201.3 Concepts of Vibrations

Basic Terminologies, Free Vibrations, Eigen Value, Eigen Vectors, and Mode Shape

201.4 Theories of Failure

Failure, Ductile, Brittle, Transition, Different Theories Of Failure and Fatigue Life Models

201.5 FEA and Its History

History and evolution of Finite Element Analysis

201.6 Structural Analysis

Types of Structural Analysis - Theory

201.7 Software Packages

Different Software used for Finite Element Analysis

ME 201

Specializations

FEA and Structural Analysis

16 HOURS

201.8 **FEA Basics, Importance And Comparisons**

FEA Basics, Its Importance And Comparisons With Other Methods

201.9 **Introduction To The Mathematical Framework Of FEM**

Integral Formulations And Variational Methods and Interpolation

ME 202

Specializations

CFD

22 HOURS

202.1 **Fundamentals of CFD**

Definitions, History and Background of CFD and Applications of CFD

202.2 **Essential Mathematics and Fluid Dynamics**

Governing Equations, Conservation Laws, Navier Strokes, Finite Element Method and Finite Volume Method

202.3 **Numerical Simulation Of A Physical Problem**

Discretization Techniques and Choosing Suitable Solution Techniques

202.4 **Introduction to OpenFOAM**

Introduction, Details and History

202.5 **Using OpenFOAM for Internal and External Flow**

Basics of Internal and External Flow and Problem-Solving in Internal and External Flow

202.6 **Using OpenFOAM for Multiphase Flow**

Basics of Multiphase Flow and Problem-Solving in Multiphase Flow

202.7 **Heat Transfer**

Basic Theories of Heat Transfer and Problem-Solving using OpenFOAM

202.8 **Compressible Flow**

Basic Theories of Compressible Flow and Problem-Solving using OpenFOAM

ME 203

Specializations

Manufacturing and Industrial Operations

30 HOURS

203.1 Policy/Strategy Deployment

Starting With Vision And Mission Statements Of The Company, Develop Strategy/Policy Of The Company, Execution Plan & Review

203.2 Production Systems

Type Of Production Systems & Their Deployment, Matrix Of Production System & Value Chain and Workflow Management

203.3 Operational Excellence Frameworks

Just In Time, Lean Mfg, TPM, TQM and PPC

203.4 Industry 4.0

Evolution and Understanding of 4.0, IOT and IOT Advancements

203.5 Industrial Engineering

Importance and Techniques of Industrial Engineering

203.6 Quality Control

Importance of QC and QA 6 Sigma

203.7 Pressed Parts, Die-Casting & Plastic Molds

Types, Benefits and Uses of Different Types, Latest Trends

ME 203

Specializations

Manufacturing and Industrial Operations

30 HOURS

203.8 Welding

Types of Welding, Benefits and Uses of Different Types, Latest Trends

203.9 Painting

Introduction to Painting, Types of Painting and Paint Layers on Automobiles

203.10 3D Printing

3D Printing, Latest Trends and Technologies, Types of 3D Printing

203.11 CNC Programming

CNC MAchines, Co-ordinate Systems, CAM, Libraries, Tool Sheet

ME 301

Software and Tools

Solidworks

25 HOURS

301.1 Introduction To User Interface/ Basics Of Solidworks

Introduction To Solidworks, Introduction to User Interface and Introduction to Solidworks Toolbars

301.2 2D Sketching

Sketching Overview, Sketch Planes, Basics of Sketch and Dimensioning

301.3 3D Part Modelling

Introduction to 3D Modelling and Features

301.4 Symmetry and Drafts

Introduction and Exercises on Symmetry and Drafts

301.5 Using Patterns

Creating an assembly, Inserting mates, Inserting fasteners using the Toolbox, Explode view, Assembly drawings

301.6 Revolve/ Ribs & Shell

Introduction To Shells And Ribs, Draft Analysis, Shelling and Ribs

301.7 Finding Problems: Repairs, Changes in designs

Introduction to Part Editing, Finding Problems and Rectifying Sketch Issues

ME 301

Software and Tools

Solidworks

25 HOURS

301.8 Using Configurations

Introduction to Configuration Terminology, Using Configurations, Modelling Strategies and Design Library

301.9 Advanced 2D Drafting

Introduction to Drafting, Understanding and creating views and Annotations

301.10 Advanced Assembly Modelling (Bottom-Up / Top Down)

Introduction to Assembly, Bottom-Up Assembly and Top-Down Assembly

301.11 Advanced Multibody Part Modelling

Introduction to Multibody Part Modelling and Creating Multibody Parts

301.12 Advanced Modelling using Sweep and Loft

Introduction to Sweep and Loft, Process of Sweeping and Process of Lofting

301.13 Advanced Surface Modelling

Introduction to Surfacing, Basic Surfacing and Hybrid Modelling

ME 301

Software and Tools

Solidworks

25 HOURS

301.14 Advanced Sheet Metal Modelling

Introduction to Sheet Metal, Features of Sheet Metal and Convert Sheet Metal

301.15 Advanced Modelling Using Weldments

Introduction to Weldments, Weldment Features and Creating Parts using Weldments

301.16 Advanced Repairing and Editing Imported Geometry

Exercises for Advanced Repairing and Editing Imported Geometry

301.17 Motion Analysis and Animation

Introduction to Motion Analysis

301.18 Automation Using Solidworks

Automating Workflow using Solidworks

301.19 File Referencing and Templates

How to avoid referencing issues

ME 302

Software and Tools

AutoCAD

25 HOURS

302.1 Introduction & Basic Tools

Part I - Introduction, File Management, Units, Limits, Grid(Limits) and Zoom(All)
Part II - Line Command, Coordinate system, Selection Window & Cross, Erase
Part III - Object Snap, Function Keys, Point Picking Tools, Ortho Mode, Undo, Redo, Osnap Tracking and Snap.

302.2 Basic Drawing & Modify Commands

Part I - Circle, Rectangle, Donut, Join(Unite), Polygon, Copy, Move, Rotate, Offset and Explode
Part II - Fillet, Chamfer, Spline & Spline Edit

302.3 Modify Commands

Trim, Scale, Mirror, Extend, Ray and Region

302.4 Modify, Advance Drawing Commands & Properties

Rev cloud, Zoom, Exit, Stretch, Polyline, Ellipse, and Elliptical Arc

302.5 Layers, Plot & Layout

Annotative object, Layout, Plot, Plot style Page setup manager and Layers (Layer creation, Apply Layers),

ME 302

Software and Tools

AutoCAD

25 HOURS

302.6 Dimension & Text

Dimension, Dimension Style Manager andText
(Single line text, Mtext)

302.7 Block, Attributes, Parametric & Constraints Features

Block, Dynamic Block, Wblock, Title block Insert, Design center, Tool Palette and Constraints

302.8 Important Miscellaneous Commands

External references, X clip, OLE object(Editing OLE links, OLE scale), Hyperlink, drafting settings, Isometric snap, Grid & snap

302.9 Introduction To Autocad 3D & Solid Modelling

Introduction to AutoCAD 3D Workspace, 3D Basics workspace, 3D Modelling workspace, 3D Co-ordinate system(UCS), Basics Geometry Tools, 3Dosnap and 3D line

302.10 Autocad 3D Solid Editing Features

Revolve, Loft, Sweep, All Solid editing features & tools inside the solid ribbon bar of 3D modelling workspace, Slice, Gizmo, 3D Move, 3D Copy, 3D Mirror, 3D Rotate, 3D Scale and 3D Align

302.11 Surface Modelling

Network, Planar, Loft, Extrude, Revolve, Sweep, Blend, Patch, Offset, surface associativity, Fillet, Trim and Untrim

ME 303

Software and Tools

Ansys Workbench (Mechanical)

26 HOURS

303.1 **Introduction to FEA, Ansys Workbench**

Methods to Solve Engineering Problems, FEM and Ansys Mechanical Basics

303.2 **Steps In FEA,Cad Modelling for FEA /Spaceclaim**

Element Basic and Types, SCDM(Core Skills and Geometric Modelling) and SCDM(FEA Modelling)

303.3 **Meshing Techniques and Introduction to Contact**

Contact Basic Concepts And Types, Demonstration Of Meshing Methods In Ansys Mechanical and Contact Behaviours And Demonstration Using Examples

303.4 **Static Structural analysis, Results and Post - Processing, Non-linear analysis**

Basics of Linear static analysis, Geometry, Material properties, Nonlinear Analysis + examples, Non-Linear behaviour

303.5 **Buckling Analysis, Heat Transfer analysis**

Linear buckling, Non-linear Buckling, Heat Transfer Analysis, Conduction, Convection, Radiation and Thermo-structural

ME 303

Software and Tools

Ansys Workbench (Mechanical)

26 HOURS

303.6 **Dynamic Analysis + Introduction to Explicit**

Basic Concept & Terminology and Types of Dynamic analysis, Spectrum Analysis, Harmonic Analysis, Random Vibration and Transient

303.7 **Fatigue Analysis**

Fatigue Basics and Methods

ME 304

Software and Tools

Ansys Fluent

25 HOURS

304.1 Introduction To CFD

What is CFD, Objectives of CFD, Steps Involved in CFD Stimulation

304.2 Modeling Of Geometry In Spaceclaim

Spaceclaim Interface, Volume Extraction, Enclosure and Modeling Tools

304.3 Understanding The Fluent Meshing Workflow

Fluent Meshing Characteristics and Watertight Geometry Workflow

304.4 Understanding Fluent Interface

Understanding Fluent Solution Mode(Interface) and Learning Different Tabs Of Fluent Interface

304.5 Internal And External Flow Simulation In Fluent

What Are Internal And External Flows and Applications Of Internal And External Flow

304.6 Different Viscous Models In Ansys Fluent

Laminar Model, Turbulence Model and Different Types Of Turbulence Model

ME 304

Software and Tools

Ansys Fluent

25 HOURS

304.7 **Multi Phase Model**

Steps For Using Multiphase Model, Volume Of Fluid Model, Mixture Model and Eulerian Model

304.8 **Discrete Phase Model**

Steps For Using Discrete Phase Model, Types Of Injection and Particles And Discrete Phase Boundary

304.9 **Modeling Compressible Flow In Fluent**

When To Use Compresible Flow Model, Modeling Inputs For Compressible Flow and Solution Strategies for Compressible Flow

304.10 **Modeling Flow Through Porous Media**

Assumptions In Porous Media Model and Determination Of Porous Media Co-Efficients

304.11 **Heat Transfer In Fluent**

Different Modes Of Heat Transfer In CFD Simulation and Solution Strategies For Heat Transfer Modeling

304.12 **Moving Reference Frame (MRF) And Sliding Mesh**

Requirements Of Mrf And Sliding Mesh, Flow In Single Moving Reference Frame and Creating Mesh Interface

ME 304

Software and Tools

Ansys Fluent

25 HOURS

304.13

Dynamic Mesh

Setting Dynamic Mesh Parameters, Smoothing, Layering And Remeshing

304.14

Setting Dynamic Mesh Parameters, Smoothing, Layering And Remeshing

Different Types of Radiation Heat Transfer, Setting Up The DTRM Model, Setting Up Discrete Ordinate (Do) Model, Post-Processing Of Radiation Quantities

ME 401

Next-Gen Electives

Hybrid EV

20 HOURS

401.1 Introduction To Hybrid and Electric Vehicles

Introduction to Automobile Engineering, Vehicle Categorization based on load capacity, Motivations for Hybrid and Electric Vehicle and Govt Regulation, Norms & Schemes

401.2 HEV Overview

Vehicle Categorization, Classification, Hybrid Modes and Kinematics and Impact of Hybridization

401.3 Conventional ICE Powertrain

Vehicle Conventionalization and Types of Conventional ICE Powertrain

401.4 Electric Powertrain - Battery and BMS

Electric Powertrain - Battery and Electric Powertrain BMS

401.5 Electric Powertrain - DC-DC Converter

DCDC Converters in xEV, Classification of DC-DC Converters, Isolated and Non-Isolated DC-DC Converters

401.6 Electric Powertrain - EV Charging and OBC

EV charging Infrastructure, EV Charging Standards, On Board Chargers(OBC), Wireless Charging, Pantograph Charging

ME 401

Next-Gen Electives

Hybrid EV

20 HOURS

401.8 **Powertrain Sizing**

Powertrain Sizing and Vehicle Dynamics

401.9 **eDrive system- Motors, Inverters and Controllers**

Motors, Inverters and Controllers

401.10 **Thermal Management**

Cooling Systems, Modes of Heat Transfer, Pump Characteristics, Motor

401.11 **Drive Cycle and Certifications**

Basics of Drive Cycles, Standard Drive Cycles, Global Drive Cycles, Fuel Economy and Hybridization

401.12 **xEV Benchmarking**

Automative Benchmarking - Global and Domestic, Mild and Strong Hybrid, Battery and Electric Vehicle - Passenger and Commercial Segment

401.13 **Fuel Cell Technology**

Basics, Fundamentals of FCEV, History of Fuel Cell Technology and Major Components

401.14 **Next-Gen Mobility**

Auto-Industry - 4 converging trends, Connected Cars, Autonomous Cars, SAFE levels of Automation, Current R&D in Autonomous Vehicles, EV & The Digital Ecosystem – Big Data Analytics, IOT, AI/ML and Charging Technology

ME 402

Next-Gen electives

Data Sciecne and Machine Learning

30 HOURS

402.1 Installing, Saving And Loading Notebook

Installation Of Anaconda, Detailed Understanding Of Jupyter Notebook Environment and How To Change Directory And Environment

402.2 Variables And Data Types

Variable Assignment, Calculation With Variables and Types And Type Conversion

402.3 Lists

Selecting List Elements, List Operations and List Methods

402.4 Strings

String Operation and Methods

402.5 NumPy

Creating Arrays, Initial Placeholders, Saving And Loading Text Files, Data Types, Inspecting Array, Mathematics Operation In Numpy, Comparison, Array Manipulation

402.6 Pandas

List, Dictionary, Sets, Series, Data Frame, Indexing And Data Slicing, Functions, Apply And Lambda Function

ME 402

Next-Gen electives

Data Sciecne and Machine Learning

30 HOURS

402.7 **Chart and Plot**

Installation Of Matplotlib And Seaborn Library, Scatter Plot, Box Plot, Line Chart, Histogram

402.8 **Installation Of Library For Machine Learning**

402.9 **Introduction to Machine Learning**

What is Machine Learning and Basics

402.10 **Statistic And Data Manipulations**

Understanding Different Distributions, Handling Missing Values, Data Transformation Techniques, Outlier Detection

402.11 **Supervise Machine Learning**

Linear Regression, Lasso Regression, Ridge Regression, Logistic Regression and Decision Tree

402.12 **Unsupervised Machine Learning**

K Mean Clustering, Mean Shift Clustering and Agglomerative Clustering

ME 402

Next-Gen electives

Data Sciecne and Machine Learning

30 HOURS

402.13 **Dimensionality Reduction Methods**

PCA and LDA

402.14 **Hyper Parameter Tuning**

402.15 **Evaluation Metrics**

MSE, R2, Adjusted R2, Accuracy, Precision, Recall and F1 Score

ME 403

Next-Gen Electives

Renewable and Clean Energy

25 HOURS

403.1 Introduction To Renewables and Clean energy

Overview, Global Scenario, Energy Sources, India Energy Mix and Green Hydrogen

403.2 World Energy Scenario & Comparison with India

Sources of Energy - Primary & Secondary, Calculation of Input Energy consumption, Energy Mix of Economies, Indian Energy Scenario and Per Capita Energy Emissions

403.3 International Conventions and Climate change

UNFCCC, Kyoto Protocol, India's National Action Plan on Climate Change, International Solar Alliance and Carbon Credits

403.4 Solar Photo Voltaic Plant

Types of Solar PV systems, System Design, PV Technology, Factors affecting performance and PV installations and applications

403.5 Solar Thermal Systems

Classification of collector, Flat Plate & Evacuateed Tube Collector, Parabolic Trough Collector, Central Tower Collector, Solar Dryer and Solar Pond

403.6 Wind Power

Introduction and Basics , Wind characteristics and Indian standards, Wind turbine & its types, Aerodynamics and Computational Fluid Dynamics, India's Installations and WInd Solar Hybrid System in India

ME 403

Next-Gen Electives

Renewable and Clean Energy

25 HOURS

403.7 **Hydro Power**

Introduction to Hydro Energy, India and World Hydro Potential, Types of Turbines and selection, Impulse & Reaction Turbine and Wave, Tidal & Ocean Thermal Power Resource

403.8 **Biomass**

Biomass and Bioenergy basics, Global Biomass scenario, Classification of Biomass, Ethanol & Biodiesel and Indian Scenario

403.9 **Geothermal Energy**

Origin of Geothermal Energy, Geothermal Potential in India, Sites classification, Geothermal Power Plants and Advantages & Disadvantages of Geothermal

403.10 **Green Hydrogen**

Colours of Hydrogen, Advantages of Green Hydrogen, Electrolyser Technologies, Application of Green Hydrogen and India's Green Hydrogen Mission

403.11 **Indian Power Sector**

Power Sector Overview, Transmission and Distribution, Operation of Indian Grid and Indian Energy Exchange (IEX)

403.12 **RE Specific Concpets in India**

Structure of Power Sector, Understanding Electricity Bill, Open Access and Energy Banking

ME 403

Next-Gen Electives

Renewable and Clean Energy

25 HOURS

403.13 **RE Intermittency & Energy Storage**

Intermittent nature of RE, Round the clock RE, Energy Storage, BESS (Batttery Energy Storage Systems), Pumped Storage Project, Gravity Storage and Comparison of various storage technologies

403.14 **Challenges in RE sector**

Growth of RE in sector, Initiatives of Govt of India and Challenges of Sector

unacademy

Specializations

Upskilling for the 21st Century

PGP in Automobile Engineering

PGP Specialization 1

225 HOURS

- 101 Strengthen Your Core
- 201 Finite Element Analysis
- 202 Computational Fluid Dynamics
- 203 Manufacturing & Industrial Operations
- 301 Design & Analysis using SOLIDWORKS
- 302 Drafting & Design using AutoCAD
- 303 Finite Element Analysis using Ansys Workbench
- 304 Computational Fluid Dynamics using Ansys Fluent
- 401 Hybrid Electrical Vehicle
- 402 Data Science & Machine Learning

PGP in Manufacturing Design (CAD/CAE)

PGP Specialization 2

195 HOURS

- 101 Strengthen Your Core
- 201 Finite Element Analysis
- 202 Computational Fluid Dynamics
- 203 Manufacturing & Industrial Operations
- 301 Design & Analysis using SOLIDWORKS
- 302 Drafting & Design using AutoCAD
- 303 Finite Element Analysis using Ansys Workbench
- 304 Computational Fluid Dynamics using Ansys Fluent
- 401 Hybrid Electrical Vehicle

Capstone Projects

Unacademy will provide opportunities for Learners to solve real business problems faced by major engineering companies.

Capstone Sample Projects

Stress And Strain Analysis Of Simply Supported Beam

Fatigue Failure Analysis Of A Crankshaft

Transient Structural Analysis Of Connecting Rod Of An Engine

2D Four Bar Truss Problem Using Finite Element Method

Course Details

Duration of the Course	12 MONTHS
Commitment Required	15-20 HOURS A WEEK

What are you waiting for?

Enroll Now