3D Printing

Course Modules & Topics

🖨️ Module 1: Introduction to 3D Printing

- History and Evolution of 3D Printing
- Additive vs Subtractive Manufacturing
- Applications: Prototyping, Engineering, Medicine, Fashion
- Types of 3D Printers (FDM, SLA, SLS, etc.)

□ Module 2: 3D Printer Hardware & Components

- Anatomy of a 3D Printer
- Print Bed, Extruder, Nozzle, Stepper Motors
- Types of Materials (PLA, ABS, PETG, Resin)
- Safety Measures

📄 Module 3: 3D Design Basics

- Introduction to CAD (Computer-Aided Design)
- Tinkercad, Fusion 360, and FreeCAD Overview
- Creating Basic 3D Shapes
- Exporting Files (.STL, .OBJ)

□ Module 4: Slicing Software

- What is Slicing?
- Using Cura, PrusaSlicer, or ideaMaker
- Print Settings: Layer Height, Infill, Supports
- Generating G-code

□🔧 Module 5: Operating the 3D Printer

- Loading Filament
- Bed Leveling
- Starting and Monitoring a Print Job
- Troubleshooting Print Failures

🛠️ Module 6: Post-Processing Techniques

- Removing Supports
- Sanding, Priming, and Painting
- Polishing Resin Prints
- Assembling Multi-Part Prints

🚀 Module 7: Design for 3D Printing (DfAM)

- Design Constraints for Additive Manufacturing
- Overhangs, Bridging, Wall Thickness
- Optimizing Models for Printing
- Print Orientation and Efficiency

Module 8: Real-World Applications & Innovations

- 3D Printing in Medicine, Aerospace, and Construction
- Sustainability in 3D Printing
- Customization & Mass Personalization
- Industry Trends

Module 9: Capstone Project

- Design, Slice, Print, and Post-process a Unique 3D Model
- Project Report and Presentation
- Peer Review and Feedback