

# **MANUFACTURING ENGINEERING DEPARTMENT**

## **COURSE DESCRIPTIONS**

### **5011336 EXPERIMENTAL AND ANALYTICAL APPROACHES IN MACHINING (3+0) 3**

To learn of metal cutting principles and mechanics of cut. To learn the principles of experimental studies that the theoretical approaching depend on them in machining. To do some experimental studies needed in machining. To learn of analytical approaching used in machining. To learn of cutting theories used in machining. To assess of machinability.

### **5021336 TECHNETRICS (3+0) 3**

Know How to make a research. It plans dependent and independent variables. To make the statistical analysis of the research and test data for industrial experiment. Strategy of Experimentation, Some typical applications of experimental design, Basic principles, Guidelines for designing experiments, Basic statistical concepts, Sampling and sampling distributions, Hypotesis testing, Choice of sampling size, Confidence intervals, Basic statistical concepts, Sampling and sampling distributions, Hypotesis testing, Choice of sampling size, Confidence intervals, Introduction, Basic principles of statistics (variance, Standard deviation, Standard error, Normal population, T-test). Experiments width a single factor: The analysis of variance, Analysis of fixed effects model. Randomized complete block design, Statistical analysis of RCBD, Model adequacy checking, Estimating model parameters Factorials designs, The two factor factorial design, Statistical analysis of the fixed effect model, 2k faktorial design, Blocking a replicated 2k factorial design, Confounding the 2k factorial design, Partial confounding. Factor analysis, Correlation matrix, Reproduced correlation matrix, Residual correlation matrix.

### **5031336 DESIGN OF INJECTION MOULD AND PLASTIC PRODUCTS (3+0) 3**

At the end of this course the students will be able to: \* recognize the forming methods for plastics implement the computer aided systematic design steps of the moulds for plastics, design the molds for plastics using a computer aided design package, carry out the filling analysis of moulds on computer, troubleshoot the problems of a plastic product moulded.

### **5041336 PROGRAMMING TECHNIQUES IN MANUFACTURING AND DESIGN (3+0) 3**

To be able to write programs using an algorithmic programming language. To be able to use If-Then, For-Next, While-Wend commands in Visual Basic. To be able to draw parts and graphics using drawing commands. To be able to use and program Label, Command Button, Text Box objects and events connected these objects. To be able to design screen and write programs. To be able to use sub programs and functions in programs. To be able to design menus and add to the program. To be able to open files and write necessary information. To be able to write program for equations. To be able to write programs which can solve the problems regarding manufacturing and design which are suitable for solving on a computer.

### **5061336 SYSTEM ANALYSIS (3+0) 3**

At the end of this course the students will be able to: 2-D visual solutions, graphs, 2-D graphs, 3-D graphs, 3-D surface graphs, 3-D plots of complex functions, Curve fitting, Fourier transform, Differential equations of physical systems, Nonlinear systems, Transfer functioni, State-variable modelling in Matlab, Solution of the state equation, Numerical solution of the state equation.

### **5071336 APPLIED CAD/CAM (3+0) 3**

Having sufficient information about Computer Aided Manufacturing (CAM) and being able to perform manufacture with a current CAD/CAM package. At the end of this course the students will be able to: CAD/CAM steps, Modeling techniques in CAD systems, Wire frame modeling applications, Surface modeling applications, Solid modeling applications, CAD applications, Modeling and data conversion applications, Basic principles of CNC part programming in CAD/CAM systems, Post processors and the general structure of CLDATA, Derivation of the CNC part program in CAD/CAM systems, Derivation of the CNC part program applications in CAD/CAM systems, Computer Aided Manufacturing Applications.

### **5081336 APPLIED FINITE ELEMENT ANALYSIS (3+0) 3**

Inform the main concepts of finite element method (FEM) and applications on the main engineering problems. Learning the general-purpose FE software to solve engineering problems. FEA, Structural analyses, contact problems, Harmonic response analysis and transient dynamic analysis, Buckling analysis and fracture mechanics, Fatigue analysis, with ANSYS.

### **5091336 NUMERICAL MODELING ON DESIGN (3+0) 3**

the aim of this course; To be make the program in the DELPHI 7.0, To be solve the problems in the Computer, To be explain the basic elements used in the Computer Aided Design, To be draw in the Delphi mechanical drawing drawn in the DXF, To be make transformation, move, copy, array, etc, used Computer Aided Design, To be learn transformation Matrix, To be Express the matrix in the Computer, To apply as a mathematical that drawing perpendicular to a line, To apply as a mathematical that drawing paralell to a line, To apply as a mathematical that finding the intersection of two lines.

### **5101336 POWDER INJECTION MOLDING (3+0) 3**

At the end of this course the students will be acquire: Powder metallurgy recognition, Powder injection molding parts recognition of the steps required to produce, Powder injection molding process, Powder injection molding of properties powders, Powder injection molding of properties binder, Powder- binder mixture of properties, Powder injection molding and equipment, Debinding binding principles, Sintering.

### **5111336 CNC SYSTEMS AND INDUSTRIAL APPLICATIONS (3+0) 3**

CNC systems used in industry, differences between CNC systems. Preparation methods of NC code, preparation NC program for systems using the ISO coding system. Programming of CNC Lathes, G- Preparatory functions codes, M- Utility functions codes. Coordinate systems, Incremental and Absolute programming, and their examples. Turning Cycles- G71, G72, G73, G70. Simulation made for sample NC programming. Implementation of NC programs on CNC machines. Programming of CNC Milling Machines. NC code to obtain using CAD/CAM software. Transferring NC codes to CNC machines. DNC systems and structure. NC code transferring methods to CNC machines by DNC systems. Implementation in CNC machines by DNC systems.

### **5131336 FINITE ELEMENT METHOD USE IN CUTTING TOOL (3+0) 3**

Introduction To Finite Element Method. Solution Of Finite Element Equations. General Procedure Of Finite Element Method. Higher Order And Isoparametric Element Formulations. Comparative Study Of Elements, Isoparametric Elements, Numerical Integration. Solid And Structural Mechanics. Finite Element Fluid Mechanics. Additional Applications And Generalization Of Finite Element Method. Transient Field Problems, Space Time Finite Elements. Solution Of Poisson Equation For The Torsion Problem. Finite Element Programs. The Stresses In Tool Holders Analysis Of Them With Finite Element Method. Stresses Analysis Occurring In Tool Holders Of Turning Machine Has Examined With ANSYS Finite Elements Program.

### **5191336 TEST METHODS FOR PLASTICS (3+0) 3**

BASIC CONCEPTS AND ADVANCEMENTS IN TESTING TECHNOLOGY • Basic concepts • Specification and standards • Purpose of specifications.

MECHANICAL PROPERTIES • Tensile tests • Compressive properties • Flexural properties • Shear strength • Creep prope • Impact properties • Abrasion • Fatigue resistance • Hardness tests.

THERMAL PROPERTIES • Tests for high temperature performance • Thermal conductivity • Thermal expansion • Brittleness temper

WEATHERING PROPERTIES • Accelerated weathering tests • Outdoor weathering of plastics • Resistance of plastic materials to fungi

OPTICAL PROPERTIES • Refractive index • Luminous transmittance and haze • Photoelastic properties • Color • Specula

MATERIAL CHARACTERIZATION TESTS • Melt flow index test • Rheology• Determination of the viscosity• Thermal analysisi techniques • Spectroscopy • Material characterization test for thermosets

FLAMMABILITY • Flammability test • Ignition properties of plastics • Oxygen index test • Smoke generation test

### **5201336 DESIGN OF INDUSTRIAL MECHANISMS (3+0) 3**

At the end of this course the students will be able to: \* recognize the basic mechanisms used in the industrial applications, implement the analytical and the geometrical the computer aided systematic design steps of basic mechanisms, design the industrial mechanisms on the computer via by a computer aided design package, compute the analysis of the placement and the velocity and the acceleration of a mechanism, obtain the computer aided dynamics analysis of the industrial mechanisms under the actual loads.