UNDERGRADUATE COURSE DESCRIPTIONS

Department of Industrial Engineering:

1310250 Operations Research I (3 Cr): Modeling, linear programming, sensitive analysis, duality, networks, integer programming.

1310252 General Economics I (2 C): Consumption theory, production theory, market theory.

1310335 General Economics II (**2 Cr):** National accounts, consumption, investment, government expenditures, labor market, money, inflation, comprehensive models of macroeconomics.

1310425 Management Information Systems (3 Cr): Management & information, information organization, computer technology, system analysis, normal forms, computer programming in data bases.

1312429 Computer Application For Industrial Engineering (2 Cr): Algorithms, data structure, divide & conqure, greedy techniques, dynamic programming, networks, backtracking, branch & bound.

1310230 Manufacturing Process I (3 Cr): Transmission drives in machine, tools, belt and gear drives (stepped and stepless), fundamentals for belt and gear calculations, type of machine, tools, gear, cutting machines, machine and equipment for erosion, machining

1310360 Statistical Quality Control (3 Cr): Growth of quality, quality of design, quality of conformance: process monitoring and acceptance sampling, and quality of performance: reliability, management of quality

1312354 Management Principles and Organization Theory (2 Cr): Definition and objectives of management, the historical development of management, the main responsibility of managers (planning, organization, motivation, coordination and control), planning concept, different kinds of planning and models. The organizational concept, different organizations, departmentalization of organization, management and human factors (motivations, communications, coordination and leadership) the control concept, the control process and usual procedure of control, knowing the management work in different departments.

1310430 Computer Simulation (3 Cr): Introduction to simulation, simulation examples, random number generation, verification and validation of simulation models, output analysis for a single model, comparison and evaluation of alternative system designs, introduction to simulation in GPSS .

1310424 Accounting Principles & Cost Accounting (3 Cr): General introduction to financial statement accounts, assets, debts, capital, income and expenditures, how to record the capital items, buying and paying for them, selling and receipt, depreciation and how to organize the accounting profit and loss statement, balance sheet statement. How to calculate the cost of finished goods in producing company, how to provide the cash flow statement, how to recognize the time value of income and expenditure and classification of different expenditures - the pricing procedures of store stocks, including the methods of fifo and lifo etc., how to record the buying and selling operations (discounts, returns, doubtful income accounts) different methods of machine depreciation and fixed assets. Application of expenditure accounts in evaluation and control of operations and different miscellaneous discussion.

1310332 Motion & Time Study (3 Cr): Motion and time study is the systematic study of work systems with the purposes of (1) developing the preferred system and method, usually the one with the lowest cost (2) determining the time required by a qualified and properly trained person working at a normal pace to do a specific task.

1312434 Small Scale Industries (3 Cr): This course involves a certain number of stages during which its various elements are prepared and examined in order to reach decisions. It comprises market analysis, technical analysis, and financial analysis.

1312429 Human Factors Engineering (3 Cr): Ergonomics, definition, history, work physiology, man, machine system, human performance, ergonomics at work, anthropometry, human error, work capacity & human

randomizing, display and controls design, lighting, noise, radiation, works related diseases, manual lifting & Low Back Pain (LBP), control methods of environment of hazards.

1310314 Operations Research II (3 Cr): Review of operation research I in matrix form. Integer programming: modeling and solution methods, including branch and bound, cutting and implicit enumeration. Dynamic programming: definitions of stage, state forward and backward inductions, and their related recursive relations. Deterministic and nondeterministic problems and their solution. Stochastic models in decision theory and queuing theory.

1310361 Project Management & Control (3 Cr): Principles of PPC. Introduction to network planning. Construction of networks. CPM, PERT, and GERT networks and computational procedures. Time computation, time-cost trade-off. Resources allocation and resources leveling , cost control. Implementation of Project Planning and Control Systems (PPCS) in organizations.

1312463 Production & Inventory Control II (3 Cr): Introduction. Construction of cost models. Computation of economic order quantities. National rules and regulations and their effects on forecasting and production planning. Special models and techniques of forecasting. Materials Requirement Planning (MRP). Capacity balancing , sequencing, purchasing process, sales process. Man-power planning. Information system design for production planning and control.

1310331 Manufacturing Processes II (3 Cr): Introduction to all casting processes in both expendable and multiple - use molds - shaping processes, both hot and cold deformation. Introduction to powder metallurgy. Consolidation processes including welding, brazing, soldering, adhesive bonding and mechanical joining.

1312481 Industrial Maintenance Planning (3 Cr): Introduction. Maintenance planning & control, including repairs, work order & work specifications. Interrelation with operations. Lubrication procedures. Overhauls. breakdown analysis,. Maintenance budget allocation. Personnel management in maintenance. Personnel training. Parts replacement models. Machine replacement decision models. Partial repairing and total overhauling decision models. Preventive Maintenance (PM) models.

1310373 Engineering Economy (3 Cr): Introduction, equivalence and interest rate nominal and effective interest rate evaluation techniques, present worth, equivalent uniform annual cost, rate of return, benefit and cost - ratio. The above 4 techniques are also used for comparison of multiple alternatives. Depreciation, income tax sensitivity analysis and break, even replacement analysis and inflation.

1312472 Production Planning (3 Cr): Production and inventory management environments including : types of inventory, types of manufacturing strategies, types of planning production systems and types of inventory costs. Control basic forecasting techniques. Quantity- based models for inventory systems including : deterministic, probabilistic and time - based models. Master Scheduling (MS), Material Requirements Planning (MRP), Rough Cut Capacity Planning (RCCP) Capacity Requirements Planning (CRP), input/output control, application of simulation in materials planning.

1310365 Plant Layout (3Cr): Overview of design process, overview of Systematic Layout Planning (SLP), factors which can affect layout planning, types of arrangements, types of layout planning techniques. Flow analysis and activity analysis, material handling system design and equipment choices. Determining space requirements, block plan design, visualizing the layout, computer aided layout planning, location of new facilities, site location to be able to apply layout planning techniques and as part of this course, the students within a team must work on a plant layout project.

1310062 Automation (3Cr): Introduction to automation. Computer-aided manufacturing (CAM), group technology, flexible manufacturing systems, cellular manufacturing system, storage system, and production systems for manufacturing support. Applications of these concepts using FMS laboratory.

1912298 Engineering Statistics (3Cr): Applications of data analysis to engineering. Elementary properties of data, displaying data, exploratory data analysis, fitting data to distributions using both nonparametric and parametric methods, comparing means and variability, simple regression, and design of experiments

1912996 Engineering Probability (3Cr): Introduction to probability theory. Topics include: Random variables, Expectation and means of random variables, Variance and expectation of general function, Binomial distribution, Normal distribution, Joint discrete probability distribution, Joint continuous probability distribution, Covariance of random variables, and Conditional probability and conditional expectation. Application of probability in engineering.

1314579 Safety and Health (3 Cr): Safety and health definition, accidents and accident prevention, safety and human error, industrial hygiene, safety at work, fine protection, safety at: forging, welding, metal forming; safety at: mine, textile, and chemical industries. Safety, health and occupational diseases, Personal Protection Equipment (PPE), water and wastewater treatment of industries and work laws.

1314387 Heat Treatment and Lab. (2 Cr): Physical metallurgy and the heat treatment of steel, normalizing, annealing, quenching, tempering, case hardening of steel, hardenability, austempering, martempering and precipitation hardening.

1314440 Jig & Fixture Design (2 Cr): Definitions and applications, design principals, jig & fixture design procedure, elements of jigs and fixtures, materials used in jigs fixtures, principals of locating and positioning, design and machines of clamping devices, drill jigs, drill bushes, plate jigs, box & tumble jigs, turn over jigs, jigs for multiple, hole drilling, lathe fixtures, milling fixtures, turning fixtures, welding and assembly fixtures and flexible fixturing

1314420 Die Design (3 Cr): Process analysis, metal movements, materials, and die designs for sheet - metal pressworking including: cutting dies; bending dies, forming dies, drawing dies; rubber - pad and hydraulic - action dies. Die sets and components & press data. Stamping material.

1314478 Numerical Control (3 Cr): Specifications of numerical control, part programming: manual and computer- aided, interpolations and control loops.

1314453 Mechanical Assembly (3 Cr): Terms and definitions, development of assembly technology, methods of assembly, types and stages of assembly process, design for assembly, joining processes and equipment, transfer systems - transfer mechanisms, indexing mechanisms, vibratory bowl feeders, reciprocating hopper feeders, rotary feeders, belt feeders, orientation devices, feed tracks, escapements, placing mechanisms, design of assembly systems, single station assembly, assembly lines.

1314422 Manufacturing (2 Cr): Bench mechanics craft (tools, devices and measurement) metal cutting processes I drilling and boring, turning and related operations, shaping, milling, broaching, abrasive machining, and nontraditional machining processes.

1314477 Production Planning (Industrial Technology) (3 Cr): Production planning, static models : process selection problems, blending problems, simultaneous production of multiple products by a single activity, multistage planning, production planning, dynamic models. Models with linear costs, dynamic programming and network models. Operation scheduling : n jobs- one machine, n jobs - two machines, n jobs - three machines, n jobs - m machines.

1314403 Machine Tools I (3 Cr): Transmission drives in machine, tools, belt and gear drives (stepped and stepless), fundamentals for belt and gear calculations, type of machine, tools, gear, cutting machines, machine and equipment for erosion, machining

1310362 Production and Inventory control I (3Cr): Production and inventory management environments including : types of inventory, types of manufacturing strategies, types of planning production systems and types of inventory costs. Control basic forecasting techniques. Quantity- based models for inventory systems including : deterministic, probabilistic and time - based models. Master Scheduling (MS), Material Requirements Planning (MRP), Rough Cut Capacity Planning (RCCP) Capacity Requirements Planning (CRP), input/output control, application of simulation in materials planning.

1310406 Entrepreneurship (2Cr): Students learn how to prepare business plan.

1310409 Measurement and Quality Control Lab. (2Cr): Measurement tools and method of applying them in industry and for special part with specific geometric shape, introduction for different kind of tolerances and symbolizations***Please note that one hour dedicates to each credit.**