

**Study Plan for The Master Degree  
In Industrial Engineering / Design and Manufacturing**

(Thesis Track)

Plan no.			2005	T
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**A. GENERAL RULES AND CONDITIONS:**

1. This plan conforms with the regulations of the general framework set by The Faculty of Graduate Studies.
2. Specialties allowed to enroll in this plan are according to the following admission priorities:
  - Holders of the Bachelor's in Industrial Engineering.
  - Holders of the Bachelor's in Mechanical Engineering.

**B. SPECIAL CONDITIONS: N/A**

**C. The study plan consists of (33) credit hours as follows:**

**1. Obligatory Courses: (18) credit hours as follows:**

<i>Course no.</i>	<i>Course title</i>	<i>Cr. Hrs.</i>	<i>Pre-requisite</i>
0906701	Operations Research	3	
0906704	Production Planning and Control	3	906701
0906714	Material Selection for Design and Manufacturing	3	-
0906715	Manufacturing Process Planning and Design	3	-
0906716	Nontraditional Manufacturing Processes	3	-
0906719	Computer-Aided Design and Manufacturing	3	-

**2. Elective courses: (6) credit hours to be chosen from the following:**

<i>Course no.</i>	<i>Course Title</i>	<i>Cr. Hrs.</i>	<i>Pre-req.</i>
0906703	Industrial Quality Control	3	
0906722	Die Design	3	-
0906728	Industrial Health and Safety Engineering	3	-
0906730	Modeling of Materials Behavior	3	-
0906731	Modern Materials Technology	3	-
0906733	Corrosion	3	-
0906734	Methods of Materials Testing	3	-
0906735	Composites and Polymer Engineering	3	-
0906736	Special Topics in Design and Manufacturing	3	-

**3. Master Thesis (9) credit hours (0906799).**

**Study Plan for The Master Degree  
In Industrial Engineering / Design and Manufacturing**

(Non-Thesis Track)

Plan no.			2005	C
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**D. GENERAL RULES AND CONDITIONS:**

1. This plan conforms with the regulations of the general framework set by The Faculty of Graduate Studies.
2. Specialties allowed to enroll in this plan are according to the following admission priorities:
  - Holders of the Bachelor's in Industrial Engineering.
  - Holders of the Bachelor's in Mechanical Engineering.

**E. SPECIAL CONDITIONS: N/A**

**F. The study plan consists of (33) credit hours as follows:**

**1. Obligatory Courses: (24) credit hours as follows:**

<i>Course no.</i>	<i>Course title</i>	<i>Cr. Hrs.</i>	<i>Pre-requisite</i>
0906701	Operations Research	3	
0906704	Production Planning and Control	3	906701
0906714	Material Selection for Design and Manufacturing	3	-
0906715	Manufacturing Process Planning and Design	3	-
0906716	Nontraditional Manufacturing Processes	3	-
0906719	Computer-Aided Design and Manufacturing	3	-
0906730	Modeling of Materials Behavior	3	-
0906731	Modern Materials Technology	3	-

**2. Elective courses: (9) credit hours to be chosen from the following:**

<i>Course no.</i>	<i>Course Title</i>	<i>Cr. Hrs.</i>	<i>Pre-req.</i>
0906703	Industrial Quality Control	3	
0906721	Analysis and Design of Production Systems	3	-
0906722	Die Design	3	-
0906728	Industrial Health and Safety Engineering	3	-
0906732	Biomaterials	3	-
0906733	Corrosion	3	-
0906734	Methods of Materials Testing	3	-
0906735	Composites and Polymer Engineering	3	-
0906736	Special Topics in Design and Manufacturing	3	-

**3. Passing Comprehensive Exam (0906798).**

## **COURSE DESCRIPTION**

### **(0906701) OPERATIONS RESEARCH**

**(3 Credit Hours)**

Operations research methodology with emphasis on application to large-scale systems. Algebraic and Numerical techniques for computational error reduction. Advanced topics in linear programming, non-linear programming, and sensitivity analysis. Practical case studies and applications.

### **(0906703) INDUSTRIAL QUALITY CONTROL**

**(3 Credit Hours)**

Total Quality Management. Acceptance sampling and control charting by both attributes and variables. Statistically and economically-based treatments of sampling plans and control chart design, analysis & design of sampling under inspection and measurement errors. Experimental design and analysis of variance in quality control.

### **(0906704) PRODUCTION PLANNING AND CONTROL**

**(3 Credit Hours)**

Application of scheduling theory in the production system. Analytical models in decision making, Aggregate production planning, Master production scheduling, MRPI, MRPII, JIT. Probabilistic inventory models.

### **(0906714) MATERIALS SELECTION FOR DESIGN AND MANUFACTURING (3 Credit Hours)**

Introduction to Material Science, Material Systems, Metallic Polymers, Ceramic, Composite, Materials, Classification, Manufacturing & Properties. Analysis of material selection. Economics of Materials, Materials Selection Process, Qualitative Evaluation Methods of Materials Selection. Case Studies.

### **(0906715) MANUFACTURING PROCESS PLANNING AND DESIGN (3 Credit Hours)**

This course is designed to enable students to develop multi-disciplinary knowledge, skills and competence required in the design, development, installation, commissioning of advanced manufacturing system. Manufacturing Operations and Machines. Calculation of Time, Power, Force, and Process Parameters for Each Operation. Design of a Manufacturing Process Plan for a Product from Raw Material to Final product. Solving the Layout Problem Based on the Developed Process Plan. Economics of Manufacturing Process Selection. Case Studies.

### **(0906716) NON-TRADITIONAL MANUFACTURING PROCESSES (3 Credit Hours)**

The Course is Intended to Introduce Students to Non-Traditional Manufacturing Processes. Topic Include: Ultrasonic Processes, Chemical Processes, Electric Discharge Processes, Laser Cutting, Water-Jet cutting, etc.

### **(0906719) COMPUTER – AIDED DESIGN & MANUFACTURING (3 Credit Hours)**

CAD/CAM integration, design modeling and analysis in 1D, 2D and 3D. CNC machines and their programming. The course also covers available CAD/CAM programs used in the industry with practical case studies.

- (0906721) ANALYSIS & DESIGN OF PRODUCTION SYSTEMS (3 Credit Hours)**  
 A course to integrate Industrial Engineering and Operations Research knowledge in Designing and Evaluating Manufacturing System. Topics include: Design of Facilities, Production lines, and Material Handling System. Selection of Equipment. Performance Measurement and evaluation .
- (0906722) DIE DESIGN (3 Credit Hours)**  
 Classification of forming dies, main parameters to be considered in die design, sheet metal forming dies: blanking, deep drawing and bending dies. Materials used in dies, Manufacturing of dies and its heat treatment.
- (0906728) INDUSTRIAL HEALTH AND SAFETY ENGINEERING (3 Credit Hours)**  
 Concepts and Definitions. Industrial Hazards, Hazard Classification Schemes, Hazard Control, Hazard Analysis. Developing Hazard Control Programs.
- (0906730) MODELING OF MATERIALS BEHAVIOR (3 Credit Hours)**  
 Physical Modeling, Mathematical Modeling, Numerical Methods. Networks and Genetic Algorithms Models. Case Studies.
- (0906731) MODERN MATERIALS TECHNOLOGY (3 Credit Hours)**  
 Nano-Technology, Surface Technology, Powder Technology.
- (0906732) BIOMATERIALS (3 Credit Hours)**  
 Biomaterials Science. Examples of Biomaterials Applications. Toxicology and Biocompatibility. Classes of Materials Used in Medicine and Their Properties. Biomaterials Testing. New Products and Standards.
- (0906733) CORROSION (3 Credit Hours)**  
 Fundamentals of Corrosion. Corrosion Testing. Corrosion Control Methods. Corrosion Monitoring and Inspection. Decion Making in Corrosion. Case Studies.
- (0906734) MATERIALS TESTING METHODS (3 Credit Hours)**  
 Preparation of Specimens for Inspection. Optical Microscopy. Electron Microscopy. Inspection by Radiation. Ultrasonic Inspection.
- (0906735) COMPOSITES AND POLYMER ENGINEERING (3 Credit Hours)**  
 The idea of a composite. The limitation of conventional Engineering materials. Classification, properties and Manufacturing Processes for Ceramics Polymeric and Composite Materials. Service stability: Corrosion, Heat & radiation economics of Materials, Manorial selection process based on Technical & economical escapers of materials. Quantitative methods for Composite, Ceramics, and Polymer materials selection.
- (0906736) SPECIAL TOPICS IN DESIGN AND MANUFACTURING (3 Credit Hours)**  
 Offered in a specialized topic in Design & manufacturing.
- (0906976) COMPREHENSIVE EXAM**
- (0906797) MASTER THESIS (9 Credit Hours)**