دسته بندي حوزه های تخصصي مهندسی صنایع (Major)

010- Communications & Networking
020- Computational Intelligence
030- Engineering Design
040- Engineering Economics
050- Enterprise Management
060- Environmental Issues
070- Ergonomics/Human Factors
080- Facilities Planning & Material Handling
085- Health care systems
090- IE Education & Training
100- Information Technology (IT)
110- Information Theory & System Control
120- Logistics & Inventory Systems
130- Manufacturing Processes
140- Manufacturing Systems

(Minor) و (Major)

150-Operation Research: Deterministic Models
160- Operation Research: Probabilistic Models
170-Planning & Scheduling
180- Service Applications
190- Software Engineering
200- Statistics, Quality, Reliability & Maintenance
210- Transportation & Distribution
220- Project Engineering and Management
230-Enterprie Engineering & Management

دسته بنیا حوزه‌های تخصصی مهندسی صنایع

(Minor)

حوزه‌های فرعی

10- Communications & networking
10.015: Collaboration and coordination protocols
10.020: Internet-Based Systems
10.030: Web-Based Systems
10.040: E-Business
10.050: E-Work
10.055: E-Services
10.060: Telecommunication
10.065: Group communication and collaboration
10.070: Other Communications

20- Computational Intelligence

20.010: Artificial intelligence
20.020: Case-based reasoning
20.030: Intelligent agents
20.040: Expert systems
20.050: Genetic algorithms
20.060: Neural networks

20.070: Simulated annealing
20.080: Tabu search
20.090: Fuzzy logic
20.100: Petri nets
20.110: Chaos theory
20.120: Voice-pattern recognition
20.130: Image-pattern recognition
20.140: Video-pattern recognition
20.150: Knowledge representation
20.160: Distributed learning
20.170: Machine learning
20.160: Other computation
20.170: Algorithms - Algorithm design
20.180: Algorithms - Analysis of algorithms
20.190: Algorithms - Computational complexity
20.210: Algorithms - Other algorithms

30-Engineering Design

30.010: Design Methodology - Concurrent engineering
30.020: Design Methodology - Design for manufacture
30.030: Design Methodology - Design for assembly
30.040: Design Methodology - Design for maintenance
30.050: Design Methodology - Reverse engineering
30.060: Design Methodology - Computer-aided design (CAD)
30.070: Design Methodology - Robust design
30.080: Design Methodology - Value analysis/value engineering
30.090: Design Techniques - Rapid prototyping
30.100: Design Techniques - Dimensioning & tolerance
30.110: Design Techniques - Solid modeling
30.120: Design Techniques - Spatial modeling
30.130: Design Techniques - Tool design
30.140: Design Techniques - Mechatronics
30.150: Design Techniques - Tribology
30.160: Design Techniques - Finite element analysis (FEA)
30.170: Design Techniques - Other design

40-Engineering Economics

40.010: Estimation - Cost estimation
40.020: Estimation - Activity-based costing
40.030: Estimation - Other estimation
40.040: Engineering Economic Analysis - Time-money relationship
40.050: Engineering Economic Analysis - Depreciation, taxes and inflation
40.060: Engineering Economic Analysis - Capital budgeting
40.070: Engineering Economic Analysis - Analysis of alternatives
40.080: Engineering Economic Analysis - Replacement decisions
40.090: Engineering Economic Analysis - Cost-benefit analysis
40.100: Engineering Economic Analysis - Other engineering

50-Enterprise Management

50.010: Strategic Management
50.020: Technology Management
50.030: Technology Assessment
50.040: Globalization
50.050: Engineering Management
50.060: Business Process Re-Engineering (BPR)
50.070: System Architecting
50.080: Organizational Issues
50.090: New Product/Service Planning
50.100: Theory of Constraints
50.110: Competitive Forces
50.120: Other Enterprise Management

60- Environmental Issues

60.010: Environmentally Conscious Manufacturing (ECM) - Algorithms and heuristics of ECM
60.020: Environmentally Conscious Manufacturing (ECM) - Economic aspects of ECM
60.030: Environmentally Conscious Manufacturing (ECM) - Life cycle assessment of ECM
60.040: Environmentally Conscious Manufacturing (ECM) - Logistic aspects of ECM

### (Minor) ٍ(Major)

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>60.050</td>
<td>Environmentally Conscious Manufacturing (ECM) - <em>Case studies of ECM</em></td>
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<tr>
<td>60.060</td>
<td>Design Issues - <em>Design for environment</em></td>
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<tr>
<td>60.070</td>
<td>Design Issues - <em>Design for remanufacturing</em></td>
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<tr>
<td>60.080</td>
<td>Design Issues - <em>Design for disassembly</em></td>
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<tr>
<td>60.090</td>
<td>Design Issues - <em>Design for recycling</em></td>
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<tr>
<td>60.100</td>
<td>Design Issues - <em>Design for waste avoidance</em></td>
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<tr>
<td>60.110</td>
<td>Remanufacturing Management - <em>Remanufacturing process planning</em></td>
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<td>60.120</td>
<td>Remanufacturing Management - <em>Remanufacturing scheduling</em></td>
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<tr>
<td>60.130</td>
<td>Disassembly Management - <em>Disassembly process planning</em></td>
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<tr>
<td>60.140</td>
<td>Disassembly Management - <em>Disassembly scheduling</em></td>
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<tr>
<td>60.150</td>
<td>Disassembly Management - <em>Integrated disassembly line</em></td>
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<tr>
<td>60.160</td>
<td>Recycling and Reuse Management - <em>Recycling process planning</em></td>
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<tr>
<td>60.170</td>
<td>Recycling and Reuse Management - <em>Recycling scheduling</em></td>
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<tr>
<td>60.180</td>
<td>Recycling and Reuse Management - <em>Product reuse</em></td>
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<tr>
<td>60.190</td>
<td>Recycling and Reuse Management - <em>End of life recovery</em></td>
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<tr>
<td>60.210</td>
<td>Waste management in manufacturing - <em>Hazardous waste disposal</em></td>
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<tr>
<td>60.220</td>
<td>Waste management in manufacturing - <em>Disposition</em></td>
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<td>60.230</td>
<td>Environmentally benign packaging</td>
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<tr>
<td>60.240</td>
<td>Other Environmental Issues</td>
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#### 70- Ergonomics/Human Factors

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>70.010</td>
<td>Physical (Occupational) - <em>Orthopedic biomechanics</em></td>
</tr>
<tr>
<td>70.020</td>
<td>Physical (Occupational) - <em>Work physiology</em></td>
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<td>70.030</td>
<td>Physical (Occupational) - <em>Biomedical engineering</em></td>
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<td>70.040</td>
<td>Physical (Occupational) - <em>Occupational injuries</em></td>
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<td>70.050</td>
<td>Physical (Occupational) - <em>Rehabilitation engineering</em></td>
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<td>70.060</td>
<td>Physical (Occupational) - <em>Other physical ergonomics</em></td>
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<tr>
<td>70.070</td>
<td>Psychological (Cognitive) - <em>Human-computer interface (HCI)</em></td>
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<td>70.080</td>
<td>Psychological (Cognitive) - <em>Sensing, perception &amp; information processing</em></td>
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<td>70.090</td>
<td>Psychological (Cognitive) - <em>Mental workload</em></td>
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<tr>
<td>70.100</td>
<td>Psychological (Cognitive) - <em>Decision processes</em></td>
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<tr>
<td>70.110</td>
<td>Psychological (Cognitive) - <em>Other cognitive processes</em></td>
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<tr>
<td>70.120</td>
<td>Motion &amp; time study - <em>Work design</em></td>
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<tr>
<td>70.130</td>
<td>Motion &amp; time study - <em>Work measurement</em></td>
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<tr>
<td>70.140</td>
<td>Motion &amp; Time Study - <em>Other motion &amp; time study</em></td>
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<tr>
<td>70.150</td>
<td>Safety engineering</td>
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<tr>
<td>70.160</td>
<td>Other ergonomics topics</td>
</tr>
</tbody>
</table>

80- Facilities Planning & Material Handling

80.080: Other Facilities
80.070: Materials Handling - Robotics
80.060: Materials Handling - Storage facilities
80.050: Materials Handling - Material handling equipment
80.040: Facilities Planning and Design - Warehousing
80.030: Facilities Planning and Design - Material flow analysis
80.020: Facilities Planning and Design - Layout planning
80.010: Facilities Planning and Design - Location analysis

85-Health care systems

85.010: Health care delivery systems
85.015: Logistics, workflow, and scheduling
85.020: Operations management
85.025: Process quality and statistical models
85.030: Human factors and patient safety
85.035: Clinical process improvement
85.040: Medical decision making
85.045: Public health and policy analysis

90- IE Education & Training

90.010: Computers in Education
90.020: Web-based Instruction
90.030: Other IE Education

100- Information Technology (IT)

100.010: Information System Design
100.020: Management information systems (MIS)
100.030: Decision support systems (DSS)
100.040: Databases - Database design
100.050: Databases - Data structure

100.060: Databases - Data mining
100.070: Databases - Data fusion
100.080: Other Information Technology

110-Information Theory & System Control

110.010: Information Theory
110.020: System Control - Feedback control
110.040: System Control - Hierarchical control
110.030: System Control - Adaptive control
110.050: System Control - Distributed control
110.060: System Control - Stochastic control
110.070: System Control - Real-time control
110.080: System Control - Integrated control
110.090: System Control - Other control

120-Logistics & Inventory Systems

120.010: Deterministic inventory models
120.020: Probabilistic inventory models
120.030: Just-in-time (JIT) systems
120.040: Lot sizing
120.050: Supply chain management
120.060: Other inventory models

130- Manufacturing Processes

130.010: Manufacturing Tools - Processing equipment
130.030: Manufacturing Tools - Jigs and fixtures
130.020: Manufacturing Tools - Tools and dies
130.040: Manufacturing Tools - Other tools
130.050: Manufacturing Materials - Ferrous metals
130.060: Manufacturing Materials - Non-ferrous metals
130.070: Manufacturing Materials - Plastics
130.080: Manufacturing Materials - Powder metallurgy
130.090: Manufacturing Materials - Other material
130.100: Manufacturing Processes - Material removal
130.110: Manufacturing Processes - Forming
130.120: Manufacturing Processes - Casting
130.130: Manufacturing Processes - Finishing
130.140: Manufacturing Processes - Joining
130.150: Manufacturing Processes - Assembly
130.160: Manufacturing Processes - Plastics processing
130.170: Manufacturing Processes - Other conventional processes
130.200: Manufacturing Processes - Precision manufacturing
130.190: Manufacturing Processes - Nano-technology
130.180: Manufacturing Processes - Non-conventional processes
130.210: Manufacturing Processes - Electronics manufacturing
130.220: Manufacturing Processes - Contact inspection
130.230: Manufacturing Processes - Non-contact inspection
130.240: Manufacturing Processes - Automated inspection
130.250: Manufacturing Processes - Other processes

140- Manufacturing Systems

140.010: Manufacturing System Modeling
140.020: Transfer lines
140.030: Flexible manufacturing systems (FMS)
140.040: Cellular manufacturing
140.050: Group technology
140.060: Agile manufacturing

140.070: Computers in Manufacturing
140.080: Automation
140.090: Computer-aided manufacturing (CAM)
140.100: Computer-integrated manufacturing (CIM)
140.110: Computer-aided process planning (CAPP)
140.120: Other Manufacturing Systems

150-Operation Research: Deterministic Models

150.010: Deterministic Optimization - Mathematical programming
150.020: Deterministic Optimization - Discrete optimization
150.030: Deterministic Optimization - Combinatorial optimization
150.040: Deterministic Optimization - Large-scale optimization
150.050: Deterministic Optimization - Multi-stage optimization
150.060: Deterministic Optimization - Search methods
150.070: Deterministic Optimization - Global optimization
150.080: Deterministic Optimization - Polyhedral theory
150.090: Deterministic Optimization - Other deterministic
150.100: Network Models - Network flows
150.110: Network Models - Distance networks
150.120: Network Models - Traveling salesman problem (TSP)
150.130: Network Models - Vehicle routing problem (VRP)
150.140: Network Models - Other network
150.150: Deterministic Decision Analysis - Deterministic decision models
150.160: Deterministic Decision Analysis - Multi-criteria decision making (MCDM)
150.170: Deterministic Decision Analysis - Analytical hierarchy process (AHP)
150.180: Deterministic Decision Analysis - Interactive decision making
150.190: Deterministic Decision Analysis - Other deterministic decision analysis
150.200: Competitive Models - Game theory
150.210: Competitive Models - Bidding models
150.220: Competitive Models - Other competitive
160- Operation Research: Probabilistic Models

160.010: Stochastic Processes - Queuing theory
160.020: Stochastic Processes - Markovian processes
160.030: Stochastic Processes - Time series analysis
160.040: Stochastic Processes - Forecasting-General
160.050: Stochastic Processes - Forecasting-Technological
160.060: Stochastic Processes - Other stochastic processes
160.070: Simulation Modeling - Discrete simulation
160.080: Simulation Modeling - Continuous simulation
160.090: Simulation Modeling - Combined simulation
160.100: Simulation Modeling - Object-oriented simulation
160.110: Simulation Modeling - Other simulation
160.120: Probabilistic Decision Analysis - Probabilistic decision analysis models
160.130: Probabilistic Decision Analysis - Statistical decision theory
160.140: Probabilistic Decision Analysis - Risk analysis
160.150: Probabilistic Decision Analysis - Utility & Value theory
160.160: Probabilistic Decision Analysis - Other probabilistic decision analysis
160.170: Reliability Optimization – Reliability allocation
160.180: Reliability Optimization – Redundancy allocation
160.190: Tolerance Optimization – Tolerance design
160.200: Tolerance Optimization – Tolerance allocation

170-Planning & Scheduling

170.010: Productivity analysis & measurement
170.020: Production planning - Line balancing
170.030: Production planning - Aggregate planning
170.040: Production planning - Material requirements planning (MRP)
170.050: Production planning - Manufacturing resource planning (MRP II)
170.060: Production planning - Enterprise resource planning (ERP)
170.070: Production planning - Integrated planning
170.080: Production planning - Other production planning
170.090: Scheduling - Master scheduling
170.100: Scheduling - Single machine
170.110: Scheduling - Parallel machines
170.120: Scheduling - Flow shops
170.130: Scheduling - Hybrid shops

170.140: **Scheduling - Job shops**
170.150: **Scheduling - Batch scheduling**
170.160: **Scheduling - Periodic scheduling**
170.170: **Scheduling - Cyclic scheduling**
170.180: **Scheduling - Personnel scheduling**
170.190: **Scheduling - Shift scheduling**
170.200: **Scheduling - Project scheduling**
170.210: **Scheduling - Project cost-duration analysis**
170.220: **Scheduling - Resource-constrained scheduling**
170.230: **Scheduling - Other scheduling**

180- **Service Applications**

180.020: **Utilities**
180.010: **Health Care**
180.030: **Retail**
180.040: **Office Automation**
180.050: **Health Care Systems**
180.060: **Social Systems**
180.070: **Urban Systems**
180.080: **Military Systems**
180.090: **Financial Systems**
180.100: **Supply Chain Systems**
180.110: **Other IE Applications**

190- **Software Engineering**

190.010: **Software Development**
190.020: **Software Testing**
190.030: **Software Reliability**
190.040: **Information Security**
190.050: **Computer Graphics**
190.060: **Multi-Media Presentation**
190.070: **Visual Reality**
190.080: **Other Software Engineering**

200- Quality and Reliability Engineering

200.010: **Statistical Methods - Statistical modeling and analysis**
200.020: **Statistical Methods - Design of experiments**
200.030: **Statistical Methods - Non-parametric statistics**
200.040: **Statistical Methods - Time series**
200.050: **Statistical Methods - Bayesian statistics**
200.060: **Statistical Methods - Other statistical methods**
200.070: **Quality Management - Total quality management (TQM)**
200.080: **Quality Management - Total quality control (TQC)**
200.090: **Quality Management - Quality function deployment (QFD)**
200.100: **Quality Management - Benchmarking**
200.110: **Quality Management - Quality audit**
200.120: **Quality Management - Other quality management**
200.130: **Statistical Quality Control (SQC) - Statistical process control (SPC)**
200.140: **Statistical Quality Control (SQC) - Profile processing based control chart**
200.150: **Statistical Quality Control (SQC) - Image processing based control chart**
200.160: **Statistical Quality Control (SQC) - Voice processing based control chart**
200.170: **Statistical Quality Control (SQC) - Video processing based control chart**
200.180: **Statistical Quality Control (SQC) - Statistical process control (SPC)**
200.190: **Statistical Quality Control (SQC) - Process capability analysis**
200.200: **Statistical Quality Control (SQC) - Multi-variate control charts**
200.210: **Statistical Quality Control (SQC) - Acceptance sampling**
200.220: **Statistical Quality Control (SQC) - Six Sigma and other SQC**
200.230: **Reliability & Life Testing - Testing**
200.240: **Reliability & Life Testing - Fault diagnosis**
200.250: **Reliability & Life Testing - Failure analysis**
200.260: **Reliability & Life Testing - Other reliability**
200.270: **Maintenance Planning**
200.280: **Other reliability methods**
200.290: **Other maintenance methods**
### 210- Transportation & Distribution

- **210.010**: Airlines
- **210.020**: Bus routing
- **210.030**: Railroads
- **210.040**: Hybrid systems
- **210.050**: Trucking & rail
- **210.060**: Ports & shipping
- **210.070**: Logistics
- **210.080**: Traffic analysis
- **210.090**: Other Transportation & Distribution

### 220- Project Engineering and Management

- **220.010**: Project screening, evaluation and selection
- **220.020**: Project bidding
- **220.030**: Project portfolio management
- **220.040**: Hierarchical planning for project-based organizations
- **220.050**: Project structuring and engineering
- **220.060**: Risk management
- **220.070**: Technological and quality management
- **220.080**: Single- and multi-project scheduling
- **220.090**: Resource management (leveling, scheduling under resource constraints, time/cost/resource trade-off problems, multi-mode scheduling)
- **220.100**: Project budgeting, cost estimation and cash flow management
- **220.110**: Project scheduling under uncertainty, stochastic network scheduling
- **220.120**: Robust and proactive/reactive project scheduling
- **220.130**: Design of the computer support system

### 230-Enterprixe Engineering & Management

- **230.010**: Enterprise Engineering: methods and tools
- **230.020**: Enterprise Transformation processes
- **230.030**: Enterprise Modeling
- **230.040**: Enterprise Networking & Integration / Systems interoperability
- **230.050**: Collaborative Networked Organization / Collaborative network management
- **230.060**: Collaborative business processes / Service composition
- **230.070**: Trust modeling and management
- **230.080**: Risk and uncertainty management
- **230.090**: Performance measurement and management
- **230.100**: Governance models for collaborative networked organizations