Industrial Engineering Education in the Philippines

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Outline for Today

• IE in the Philippines: An Overview
• Bachelor’s Programs
• Masters Programs
• PhD Programs
• Certifications
Introductions: About Me

- PhD, Industrial Engineering, Arizona State University, (2013)
- MS Industrial Engineering, UP Diliman, (2009)
- BS Industrial Engineering, UP Diliman, (2007)
- Research Interests
  - Data Mining Algorithms, Supply Chain Problems, Agent-Based Simulation and Evolutionary Optimization
- Certifications
  - SAP ERP Materials Management Consultant
  - Matlab Certified Associate
Overview

• BS IE Offered in over 100 universities across the Philippines
  – 5 year program
• MS IE offered in 7 universities
  – 2 year program
• PhD IE offered in 2 universities
  – 5 year program (straight from BS)
Commission on Higher Education

- Regulates and monitors various IE programs offered by universities across the country
- Proposes strict guidelines on the content and courses of IE programs
- Defines course outcomes, specializations and applicable jobs for IE graduates
IE Professional Outcomes

- Apply knowledge of mathematics, physical and information sciences, and engineering sciences
- Design Experiments, analyze and interpret data
- Design, build, improve, and install systems or processes that are efficient, effective and robust
- Recognize, formulate, and solve engineering problems
- Ability to perform services in the form of analysis, design, preparation of plans, specifications, estimates, and implementation of IE Concepts

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Courses Overview

• Foundation Courses
  • Algebra and Trigonometry
  • Calculus
  • General Chemistry
  • Physics: Mechanics, Electricity, Magnetism, Relativity
  • Engineering Drawing
  • Statics of Rigid Bodies
  • Dynamics of Rigid Bodies
  • Mechanics of Deformable Bodies
  • Linear Algebra
  • Computer Programming

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Courses Overview

• Core Courses
  – Advanced Mathematics
  – Industrial Materials and Processes
  – Descriptive and Inferential Statistics Quality Control
  – Methods Engineering
  – Operations Research and Simulation
  – Engineering Economics
  – Information Systems, Systems and Procedures
  – Production Systems, Facilities Design
  – Systems Engineering

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Courses Overview

• Cognates and Electives
  – Supply Chain Management
  – Business Analytics and Data Mining
  – Financial Accounting
  – Managerial Accounting
  – Economics
  – Thermodynamics
  – Circuits
  – Chemical Engineering
  – Psychology
Undergraduate Project Courses

• Project courses with industry immersion
  – Methods Engineering
  – Systems Simulation
  – Ergonomics
  – Production Systems
  – Information Systems
  – Feasibility Analysis
  – Total Systems Design
Senior Design/Project

- Feasibility Analysis
- Total Systems Design
Masters Programs

• Masters of Science in IE
  – Core Courses (12 units)
  – Specialization Courses (12 units)
  – Research Seminar (1 unit)
  – Thesis (6 units)
Masters Programs

• Masters of Engineering in IE
  – Core Courses (12 units)
  – Specialization Courses (12 units)
  – Elective (3 units)
  – Research Seminar (1 unit)
  – Project (3 units)
  – Comprehensive Examination
Masters Core Courses

• Design and Analysis of Experiments
  – ANOVA, Factorial Experiments, Response Surface Methodology

• Information Systems Engineering
  – Business Intelligence, Data Warehousing, Data Mining

• Analysis of Production Systems
  – JIT, Lean Systems, Factory Physics

• Deterministic Operations Research
  – Linear Programming, Integer Programming, Complexity Analysis, Dynamic and Goal Programming
Specializations

- Production Engineering
- Organization and Decision Systems
- Ergonomics/Human Factors Engineering
- Information Systems
Specializations

• Production Engineering
  – Supply Chain Management
  – CAD/CAM
  – Lean Manufacturing
  – Total Productive Maintenance and Reliability
  – Product Design and Development
Specializations

• Organization and Decision Systems
  – Systems Simulation
  – Total Quality Management
  – Six Sigma
  – Stochastic Processes in Engineering
  – Strategic Planning
  – Multi-Criteria Decision Making
  – Project Management
Specializations

- Ergonomics/Human Factors Engineering
  - Job Evaluation and Salary and Wage
  - Administration
  - Personnel Management
  - Occupational Safety and Health
  - Cognitive Engineering
  - Risk Management
Specializations

- Information Systems
  - Business Analytics
  - Systems Analysis and Design
  - Big Data
  - Data Mining
  - Data Warehousing
5+1 Dual Degree Program

• 5 year BS Degree
• +1 year for MS Degree
PhD Program

- Core Courses (12 units)
- Qualifying Examination
- Elective Courses (12 units)
- Research (12 units)
- Research Seminar (1 unit)
- Comprehensive Examination
- Dissertation (12 units)
Core Courses

• Non Linear Optimization
  – Convex Theory, KKT Conditions, Gradient Descent

• Stochastic Optimization
  – Conditioning, Exponential and Poisson Processes, Renewal Theory

• Foundations of Business Analytics
  – Linear Algebra Theory for Data Mining, Principal Components, SVD, Applications

• Mathematical Statistics
  – Estimation, Limit Theorems, Linear Models
PhD Program Specializations

- Production Engineering
- Industrial Statistics
- Ergonomics/Human Factors Engineering
- Information Systems
PIIE Certifications

• IE Certification is a voluntary process, which validates an individual's qualifications in the field of industrial engineering (IE) professional practice.

• Sponsored by the Philippine Institute of Industrial Engineers

• It demonstrates to employers, clients, and peers the individual's knowledge and experience and signifies his or her commitment to continued excellence in IE professional practice.

• In addition, it increases visibility, builds credibility, and validates expertise with those outside the profession.
PIIE Certifications

• Levels of Certifications
  – The Certified Industrial Engineering (CIE)
  – The Professional IE (PIE)
ASEAN Integration

• Changes to undergraduate curriculum (5 years to 4 years)
• Removal of introductory algebra and trigonometry courses, and general education courses
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References

• CHED Memorandum Order, No. 15, Series of 2008
• PIIE Certification Website