IM111 – INDUSTRIAL RELATIONS

The Engineering Profession
What is Engineering?

• Engineering is the designing, testing, and building of machines, structures, and processes using math and science.
The Engineering Career

• Engineers:
  • Apply knowledge of math and science
  • Conduct design and analysis
  • Solve problems
  • Develop
    • devices
    • processes
    • structures
    • systems
Engineering Teams

• Engineers work in teams to solve challenging engineering problems to make life safer, easier, and more efficient.
• Engineers from many and different disciplines work together on single projects.
The Engineering Functions

• Research
• Development
• Design
• Production and Testing
• Construction
• Operations
• Sales
• Management
• Consulting
• Teaching
Research Engineer

• Seeks new findings and a way to use the discovery
• Key qualities are perceptiveness, patience, and self-confidence
• Postgraduate degrees (MSc & PhD) develop research skills
• Billions of dollars are spent each year on research
• Different fields are attracting research funds
Development Engineer

• Uses research findings
• Attempts to produce a functional device, structure, or process
• Builds and tests scale models
• Uses 3-D modelling, rapid prototyping, and virtual reality
• Key quality is the practical experience
• Research degrees are helpful
Design Engineer

- Converts the concept or model into a device, process, or structure
- Relies on education and experience
- Evaluates possible design options
- Consider cost of manufacturing, ease of production, availability of material, and performance requirements
- Key qualities are creativity, engineering knowledge, and understanding of economics
Production and Testing Engineer

• Production engineers coordinate materials and personnel scheduling
• Are responsible for ordering raw materials, setting up the production line, and handling and shipping finished products
• Key qualities are visualization of overall operation and knowledge of design, economics, and psychology
• Testing engineers evaluate devices, materials, components, and finished products
• Are responsible for quality control of the manufacturing process
• Key qualities are design, production, and statistics education
Construction Engineer

• The construction engineer in the building industry is the counterpart of the production engineer in the manufacturing industry

• Estimates material, labor, and overhead costs

• Key qualities are strong background in engineering fundamentals, on the job experience, and understanding of labor relations
Operations Engineer

• Is responsible for supplying facilities such as offices, laboratories, and production facilities

• Sometimes called a plant engineer

• Selects sites for facilities, specifies the layout, and selects fixed equipment for climate control, lighting, and communication

• Is responsible for maintenance and modifications of facilities

• Key qualities are conscious of cost, aware with new equipment developments, and knowledge of basic engineering, industrial engineering, economics, and law
Sales Engineer

• Is responsible for finding or creating a market for a product
• Is responsible for coordinating after-sales service and maintaining customer satisfaction
• Key qualities are communication and teamwork skills
Engineering Manager

• Uses company facilities to produce an economically feasible product
• Makes long-term decisions
• Key quality is a balanced education of engineering and business
Consulting Engineer

• Operates alone or in partnership to provide specialized help to clients
• Key qualities are interest in self-employment, integrity, talent in engineering judgment and experience
Engineering Teacher

• Helps others to be engineers
• Communicates principles and engineering experiences to students
• Involved in research and student advising
• Key qualities are interest in teaching, fundamental knowledge of engineering and science principles, and advanced degrees
The Engineering Disciplines

- There are over 25 specific disciplines of engineering
- Some colleges offer combination of two or more disciplines in one department
- Common combinations of engineering disciplines include
  - Industrial, management, and manufacturing
  - Civil, construction, and environmental
  - Mechanical and aerospace
  - Electrical and computer
Engineering Disciplines in AASTMT

- Architectural
- Computer
- Construction & Building
- Electrical & Control
- Electronics & Communication
- Industrial & Management
- Marine
- Mechanical
Architectural Engineering and Environmental Design

- Architectural engineers are able to design different types of buildings.
- They understand the relationship between people and buildings, and between buildings and their environment.
- [https://www.youtube.com/watch?v=H3YB9IuPo3M](https://www.youtube.com/watch?v=H3YB9IuPo3M)
- [https://www.youtube.com/watch?v=-8sucrV14_c](https://www.youtube.com/watch?v=-8sucrV14_c)
Computer Engineering

- Computer engineers are able to analyze and design systems containing hardware and software components.
- They are familiar with digital systems, processors, microcontroller-based applications, and smart platforms.
- [https://www.youtube.com/watch?v=BaLDcvkRb5c](https://www.youtube.com/watch?v=BaLDcvkRb5c)
- [https://www.youtube.com/watch?v=ILlagEEkjtg](https://www.youtube.com/watch?v=ILlagEEkjtg)
Construction and Building Engineering

• Construction and Building engineers are able to analyze and design construction processes and systems to create living and working environments.

• They can explain basic legal and ethical concepts and the importance of professional engineering licensure in the construction industry.

• [https://www.youtube.com/watch?v=u8lEDf5oOGY](https://www.youtube.com/watch?v=u8lEDf5oOGY)

• [https://www.youtube.com/watch?v=Pc40yA0eyZo](https://www.youtube.com/watch?v=Pc40yA0eyZo)
Electrical and Control Engineering

• Electrical and Control engineers are able to design and operate power systems, drives, and control systems
• They can serve in the field of automation
• https://www.youtube.com/watch?v=e5PbGQuUA4I
• https://www.youtube.com/watch?v=jvPoEgS5L5Q
Electronics and Communications Engineering

- Electronics and Communications engineers are able to analyze and design complex electronic devices and communication systems.
- They can design and operate telecommunication networks.
- [https://www.youtube.com/watch?v=lARJSVGUmLE](https://www.youtube.com/watch?v=lARJSVGUmLE)
- [https://www.youtube.com/watch?v=h00Pkgg2qBM](https://www.youtube.com/watch?v=h00Pkgg2qBM)
Industrial and Management Engineering

• Industrial and Management engineers are able to design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy

• They can understand and deal with the stochastic nature of management systems

• https://www.youtube.com/watch?v=1aZGTW3qGAE
• https://www.youtube.com/watch?v=Ww9hDlwjeF4
Marine Engineering

• Marine engineers are able to design, operate, and maintain engineering systems and equipment encountered in the shipping field
• They are familiar with energy systems and instrumentation used in the marine industry
• [https://www.youtube.com/watch?v=iDs7n6naAng](https://www.youtube.com/watch?v=iDs7n6naAng)
Mechanical Engineering

• Mechanical engineers are able to model, analyze, design, and realize physical systems, components, or processes
• They can work professionally in either thermal or mechanical systems
• https://www.youtube.com/watch?v=GwEUI5xAong
• https://www.youtube.com/watch?v=JhzjIPvWG7Y
Professional Societies

• Many societies support engineering disciplines and functions
Thank You!