Lecture 4.
Engineering Functional Jobs

SPRING 2016
The Path to a Professional Engineer

BS/MS
- Major
- Specialization

Functional (job) Classification

Company Levels
The Path (cont’d)

Functional (Job) Classification

BS/MS

For all Majors

Research
Experimental
Analytical
Design
Development
Testing
Production
Operations
Sales/Marketing
Manufacturing
Management
Consulting
Construction
# Engineering Functional Jobs

<table>
<thead>
<tr>
<th>Title</th>
<th>Function</th>
<th>Skill/Knowledge</th>
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</table>
| **Research Eng.** | • Solves new problems.  
• Obtains new data.  
• Devises new methods of calculation  
• Gains new knowledge | • Perceptiveness  
• Patience  
• Self-Confidence |
| **Analytical Eng.** | • Models physical problems using math to predict performance.  
• Performs failure analysis | Math, physics, engineering science, software |
| **Develop. Eng.**   | • Develops products, processes, or systems  
• Uses well-known principles and employs existing processes or machines to perform a new function  
• Concerned only with a prototype or model | • Ingenuity  
• Creativity  
• Judgment |
## Engineering Functional Jobs (cont’d)

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| **Design Eng.**     | • Converts concepts and information into detailed plans and specs from which the finished product can be Manufactured  
                      • Restricted by the state of the art                                  | • Creativity  
                      • Innovation  
                      • Knowledge of many disciplines  
                      • Understanding of economics and people                                 |
| **Production Eng.** | • Devises a schedule to efficiently coordinate materials and personnel  
                      • Orders raw materials at the optimum times  
                      • Sets up the assembly line  
                      • Handles and ships the finished product                                  | • Knowledge of design, economics, and psychology.  
                      • Ability to visualize the overall operation of a project  
                      • Knowledge of each step of the production effort                       |
## Engineering Functional Jobs (cont’d)

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<tr>
<td><strong>Test Eng.</strong></td>
<td>• Develops and conducts tests to verify that a new product meets design specs &lt;br&gt; • Products are tested for structural integrity, performance, and reliability &lt;br&gt; • Testing is performed under all expected environmental conditions</td>
<td>• Knowledge of statistics, product and process specifications. &lt;br&gt; • Measurement techniques &lt;br&gt; • Fundamental engineering &lt;br&gt; • Aspects of the design</td>
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<tr>
<td><strong>Operations or Plant Eng.</strong></td>
<td>• Selects sites for facilities &lt;br&gt; • Specifies the layout for all facets of the operation &lt;br&gt; • Selects the fixed equipment for climate control, lighting, and communication &lt;br&gt; • Responsible for maintenance and modifications</td>
<td>• Industrial engineering &lt;br&gt; • Economics and law</td>
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Engineering Career Path

There are at least seven career options for graduating engineering students:

1. Corporate ladder
2. Independent entrepreneur
3. Military or government
4. Engineering and social service aboard
5. Professor/engineer
6. Graduate work outside engineering
7. A mix of first six options
Company Levels (Publicly owned)

**Engineering**
- Fellow*
- Senior E.
- Project E.
- Advisory*
- Staff*
- Sr. Associate E.*
- Engineer
- “Entry Level”

**Management**
- Plant Mgt.
- Functional Mgt.*
- Project Mgt.
- Line Mgt.

**Corporate Management**
- COB Chair of the Board of Directors
- CEO=Chief Executive Officer
- Officer
- V.P. of ...
- Director of ...

*: Large companies
Golden Set Of Skills for a Professional Engineer

(Group A) Good Understanding of:
- Engineering science fundamentals:
  a. Physical and life sciences
  b. Information technology
  c. Math (including statistics)
- The design and manufacturing process
- Good communication skills:
  • Written
  • Verbal
  • Graphic
  • Listening

(Group B) Basic understanding of:
- The context in which engineering is practiced, including:
  • Economics/business practice
  • History
  • The environment
  • Customer and social needs
- A multidisciplinary systems perspective.
  • The importance of teamwork.
  • Ethical standards

Group C A minimum of:
- Curiosity and a lifelong desire to learn (LLL)
- Ability to think critically and creatively as well as independently and cooperatively
- Flexibility, the ability, and the self-confidence to Adopt/Adapt
Other Directions

1. Advanced Degrees-Academic Institutions (Teaching, researching, publishing, community involvement)
2. Engineering Management (MSE/MBA)
3. Law (Patent law, Corporate Law)
4. Medicine (bioengineering)
5. Government, Defense
6. Engineering Consultant
7. Your Own Business
End Notes ...

• Understand that Engineering is a Profession
• Become familiar with Code of Ethics of your Discipline
• Join Student Engineering Societies
• Join other Professional Organizations

There’s more to being an engineer than technical competence