



GE105

Introduction to Engineering Design

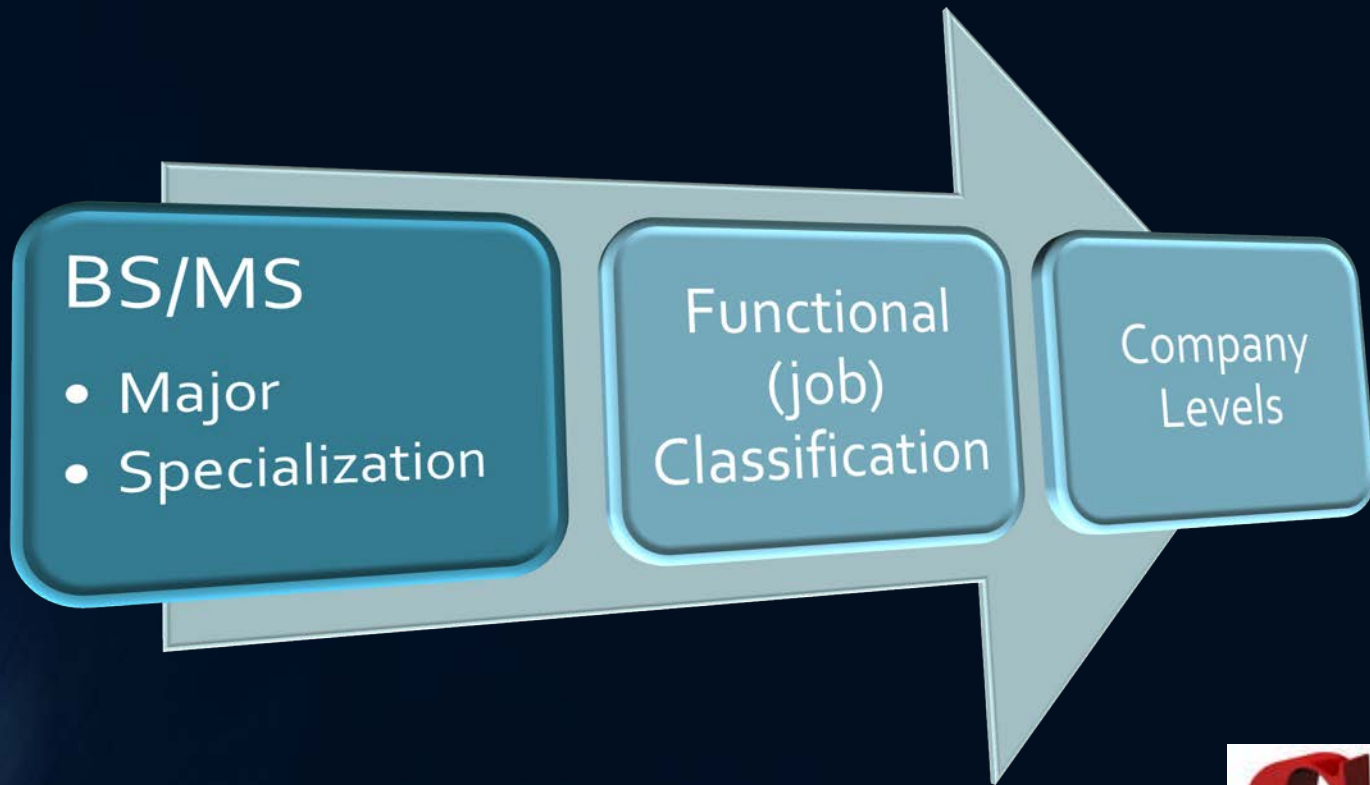
College of Engineering

King Saud University

Lecture 4. *Engineering Functional Jobs*

SPRING 2016

The Path to a Professional Engineer



The Path (contn'd)

BS/MS

**Functional (Job)
Classification**



For all Majors

- Research
- Experimental
- Analytical
- Design
- Development
- Testing
- Production
- Operations
- Sales/Marketing
- Manufacturing
- Management
- Consulting
- Construction

Engineering Functional Jobs

Title	Function	Skill/Knowledge
<i>Research Eng.</i>	<ul style="list-style-type: none">• Solves new problems.• Obtains new data.• Devises new methods of calculation• Gains new knowledge	<ul style="list-style-type: none">• Perceptiveness• Patience• Self-Confidence
<i>Analytical Eng.</i>	<ul style="list-style-type: none">• Models physical problems using math to predict performance.• Performs failure analysis	Math, physics, engineering science, software
<i>Develop. Eng.</i>	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Ingenuity• Creativity• Judgment

Engineering Functional Jobs (contn'd)

Title	Function	Skill/Knowledge
<i>Design Eng.</i>	<ul style="list-style-type: none">• Converts concepts and information into detailed plans and specs from which the finished product can be Manufactured• Restricted by the state of the art	<ul style="list-style-type: none">• Creativity• Innovation• Knowledge of many disciplines• Understanding of economics and people
<i>Production Eng.</i>	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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 (contn'd)

Title	Function	SKILLS/Knowledge
<i>Test Eng.</i>	<ul style="list-style-type: none"> • Develops and conducts tests to verify that a new product meets design specs • Products are tested for structural integrity, performance, and reliability • Testing is performed under all expected environmental conditions 	<ul style="list-style-type: none"> • Knowledge of statistics, product and process specifications. • Measurement techniques • Fundamental engineering • Aspects of the design
<i>Operations or Plant Eng.</i>	<ul style="list-style-type: none"> • Selects sites for facilities • Specifies the layout for all facets of the operation • Selects the fixed equipment for climate control, lighting, and communication • Responsible for maintenance and modifications 	<ul style="list-style-type: none"> • Industrial engineering • Economics and law

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

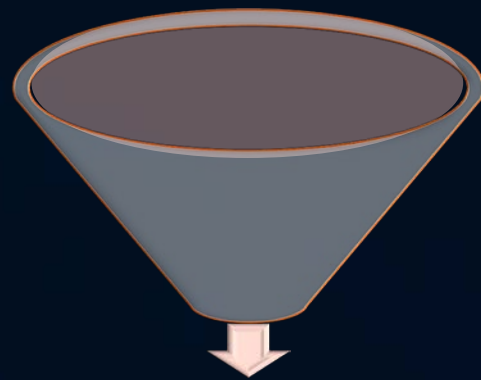
Other Directions

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*