



GE106

Introduction to Engineering Design

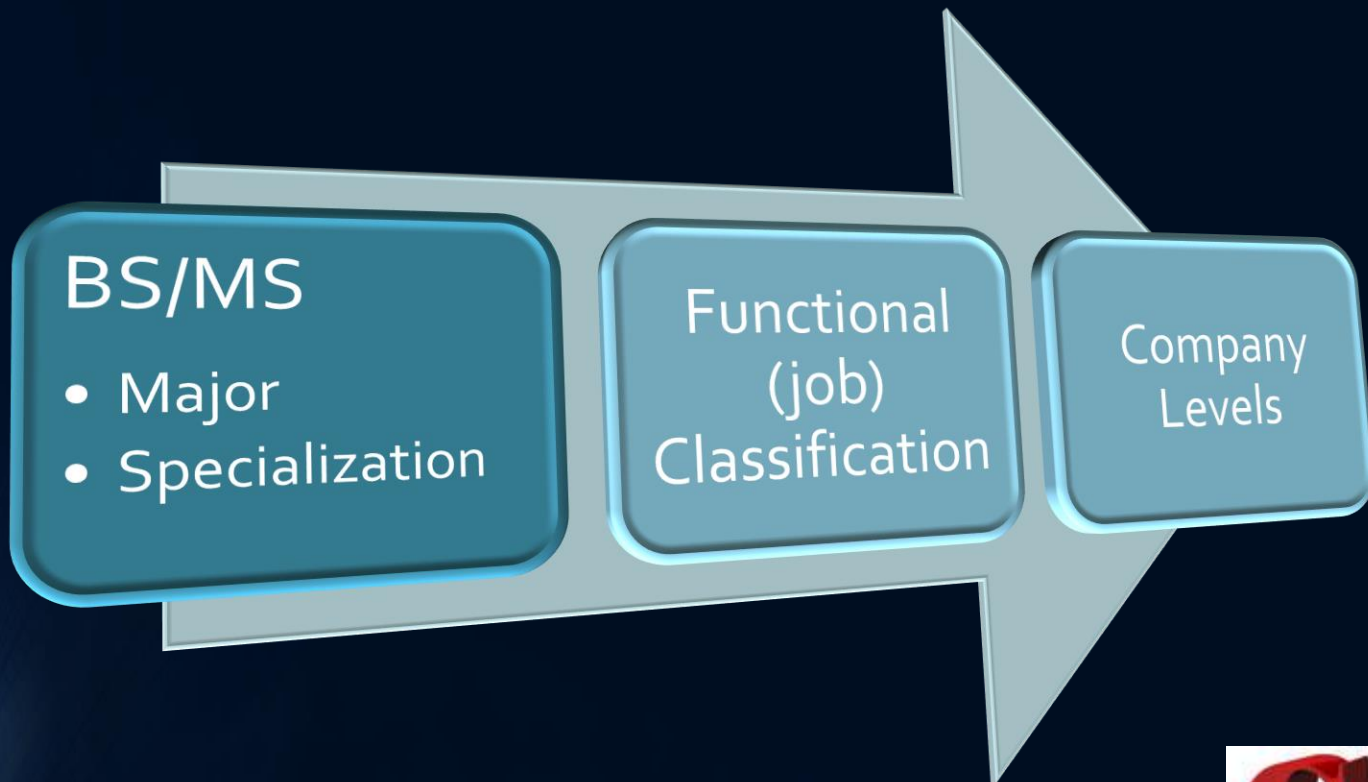
College of Engineering

King Saud University

Lecture 4. *Engineering Functional Jobs*

FALL 2022

The Path to a Professional Engineer



The Path (contn'd)

BS/MS

**Functional (Job)
Classification**



- 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 <u>new</u> problems. • Obtains <u>new</u> data. • Devises <u>new</u> methods of calculation • Gains <u>new</u> knowledge | <ul style="list-style-type: none"> • Perceptiveness • <u>Patience</u> • Self-Confidence |
| <i>Analytical Eng.</i> | <ul style="list-style-type: none"> • <u>Models</u> physical problems using math to predict performance. • Performs failure <u>analysis</u> | Math, physics, engineering science, software |
| <i>Develop. Eng.</i> | <ul style="list-style-type: none"> • Develops products, processes, or systems • Uses well-known <u>principles</u> and employs existing <u>processes</u> or machines to perform a new function • Concerned only with a <u>prototype</u> or model | <ul style="list-style-type: none"> • <u>Ingenuity</u> • Creativity • Judgment |

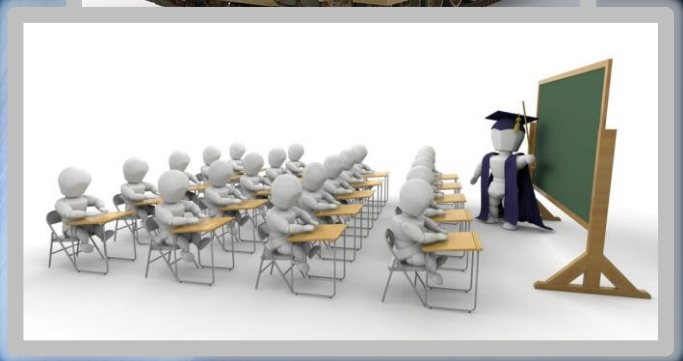
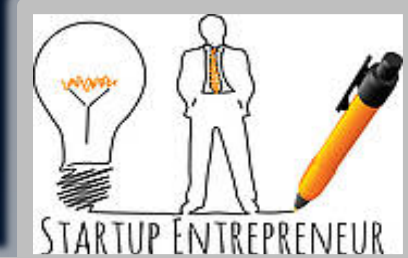
Engineering Functional Jobs (contn'd)

| Title | Function | Skill/Knowledge |
|------------------------|--|---|
| <i>Design Eng.</i> | <ul style="list-style-type: none"> • <u>Converts</u> 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"> • <u>Creativity</u> • Innovation • <u>Knowledge</u> of many disciplines • Understanding of economics and people |
| <i>Production Eng.</i> | <ul style="list-style-type: none"> • Devises a <u>schedule</u> to efficiently coordinate materials and personnel • <u>Orders</u> raw materials at the optimum times • Sets up the <u>assembly</u> line • <u>Handles</u> and ships the finished product | <ul style="list-style-type: none"> • <u>Knowledge</u> of design, economics, and psychology. • Ability to visualize the overall <u>operation</u> 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 <u>verify</u> that a new product meets design specs • Products are tested for structural integrity, <u>performance</u>, and <u>reliability</u> • Testing is performed under all expected environmental <u>conditions</u> | <ul style="list-style-type: none"> • Knowledge of <u>statistics</u>, product and process <u>specifications</u>. • <u>Measurement techniques</u> • Fundamental engineering • Aspects of the design |
| <i>Operations or Plant Eng.</i> | <ul style="list-style-type: none"> • Selects sites for facilities • Specifies the <u>layout</u> for all facets of the operation • Selects the fixed equipment for climate control, lighting, and communication • Responsible for <u>maintenance</u> and <u>modifications</u> | <ul style="list-style-type: none"> • <u>Industrial</u> engineering • Economics and <u>law</u> |

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 board
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

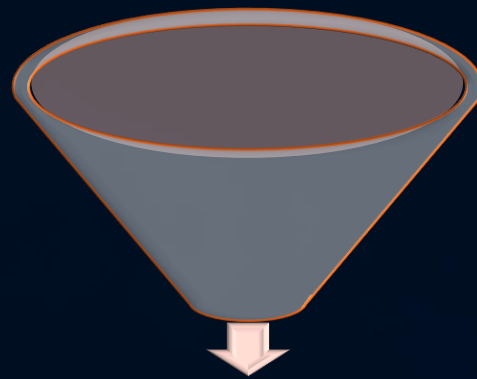
Other Directions

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*