



GE105

Introduction to Engineering Design

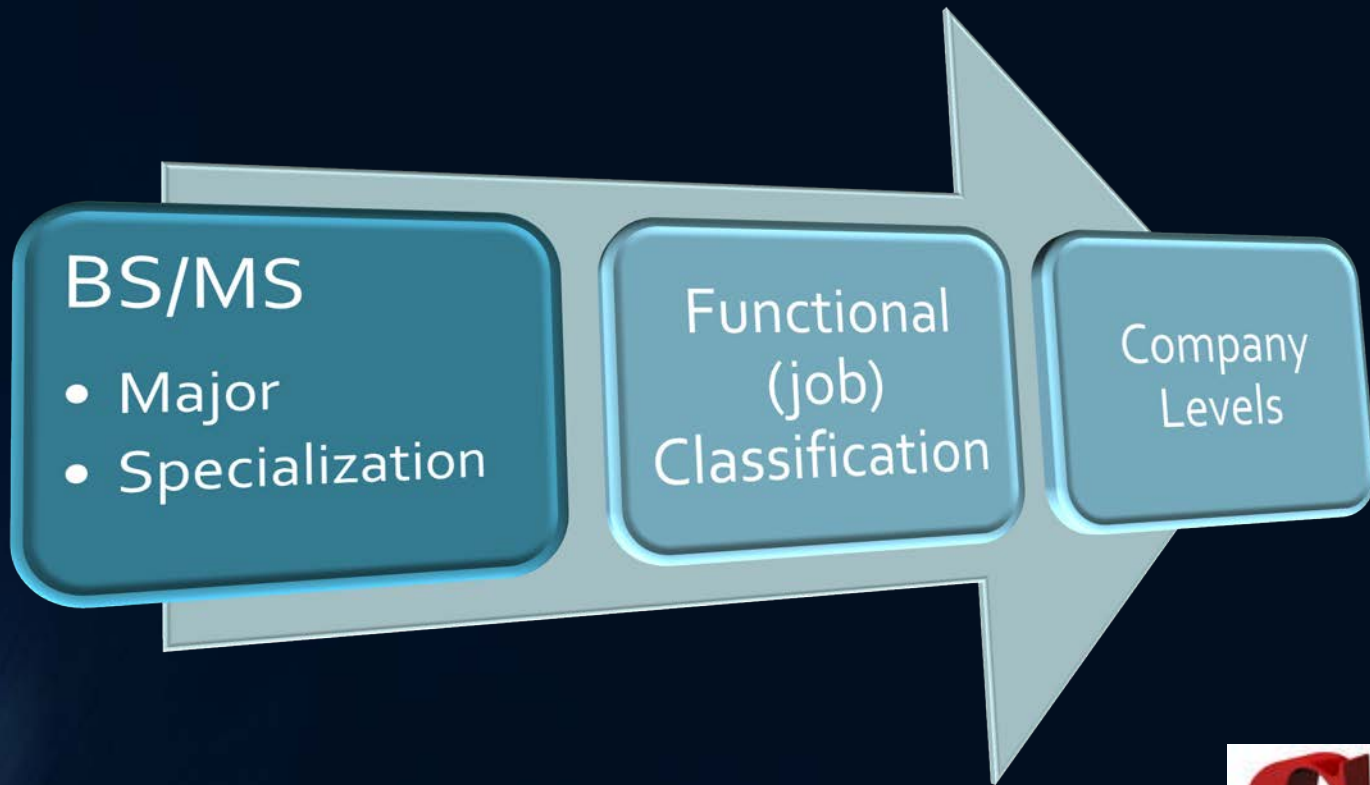
College of Engineering

King Saud University

# Lecture 4. *Engineering Functional Jobs*

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

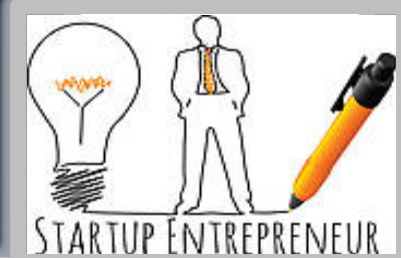
# Engineering Functional Jobs (contn'd)

Title	Function	Skill/Knowledge
<i>Design Eng.</i>	<ul style="list-style-type: none"> <li>• <u>Converts</u> concepts and information into detailed plans and specs from which the finished product can be Manufactured</li> <li>• Restricted by the state of the art</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Creativity</u></li> <li>• Innovation</li> <li>• <u>Knowledge</u> of many disciplines</li> <li>• Understanding of economics and people</li> </ul>
<i>Production Eng.</i>	<ul style="list-style-type: none"> <li>• Devises a <u>schedule</u> to efficiently coordinate materials and personnel</li> <li>• <u>Orders</u> raw materials at the optimum times</li> <li>• Sets up the <u>assembly</u> line</li> <li>• <u>Handles</u> and ships the finished product</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Knowledge</u> of design, economics, and psychology.</li> <li>• Ability to visualize the overall <u>operation</u> of a project</li> <li>• Knowledge of each step of the production effort</li> </ul>

# Engineering Functional Jobs (contn'd)

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

# 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

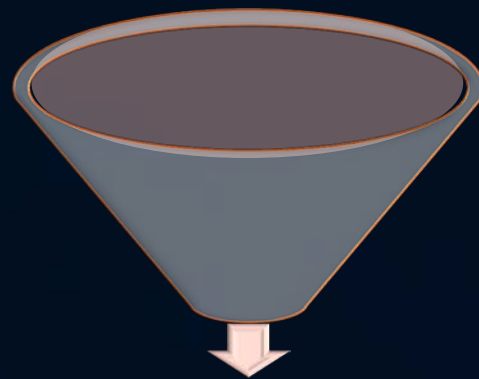
# Other Directions

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*