



College of Engineering
GE106: Introduction to Engineering Design

The Engineering **Profession** & Engineering **Functional** Jobs

By

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- **Engineering Profession**
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 - Is Engineering a Profession?
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What is a Profession?

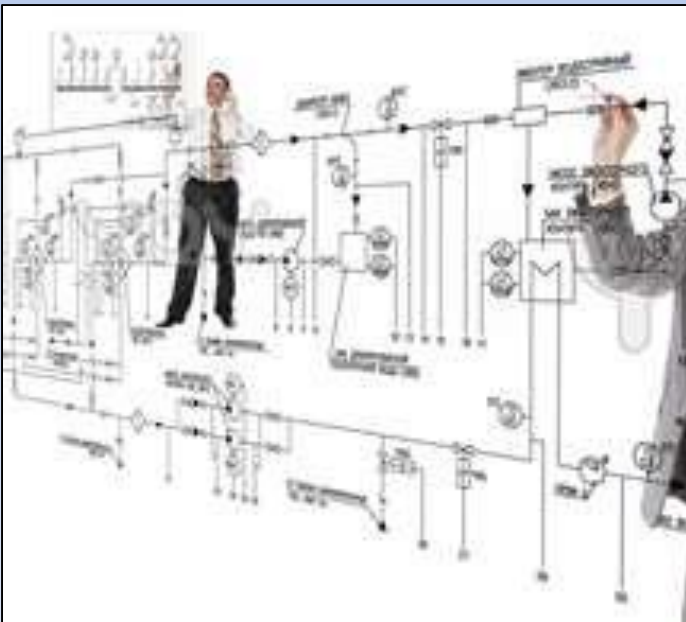
- Requires specialized and highly skilled knowledge
- Requires an academic training
- Regulated by professional bodies
- Examination of competence
- Vital to society
- Compensation is higher than other occupations
- Enforces high standard of legal and ethical conduct



The Engineering Profession

- Engineering is a career based on logical, systematic problem solving, generally in high-tech, industrial, or scientific fields.

- Whether the end result is a product, a process, a system or service, engineers need to consider safety, reliability, and cost-effectiveness.



Is Engineering a Profession?

Engineering possesses those attributes that typically characterize a profession



- Satisfies an indispensable and beneficial need
- Requires the exercise of carefulness and judgment
- Involves activities that require knowledge and skill not commonly possessed by the general public
- Has group consciousness for the promotion of knowledge and professional ideas and for rendering social services
- Has a legal status and requires well-formulated standards of admission

Yes Indeed.....

Engineering is a Profession!!!

What Engineers Do?

- Design products
- Design machinery to build and test these products.
- Design Plants in which those products are made.
- Design the systems that ensure the quality and efficiency of the manufacturing process.



- Design, plan and supervise the construction of buildings, highways, transit systems.
- Develop and implement ways to extract, process and use raw materials such as petroleum and natural gas
- Exploit resources to satisfy the nations needs

Scientists Versus Engineers

Engineer

Applies knowledge of math and the physical sciences to the efficient design and construction of usable devices, structures and processes.



Scientist

The primary goal is the expansion of knowledge and understanding of physical processes.



Elements of Professionalism



Elements of Professionalism (cont'd)



- Relevant, up-to-date knowledge and capabilities in a given area
- Appropriate non-technical competences: communication, business, leadership and management skills
- A broader foundation of relevant experience and understanding
- Relevant qualifications
- Continuing Professional Development

Elements of Professionalism (cont'd)



2 Integrity

- A clear commitment to abide by a **code of ethics** which is recognized and administered by the professional community.

Elements of Professionalism (cont'd)



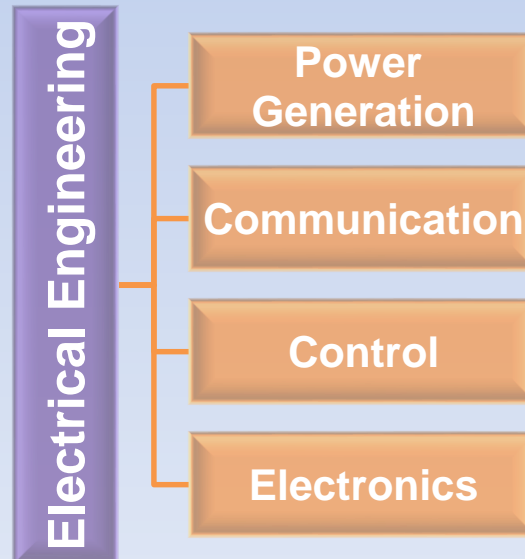
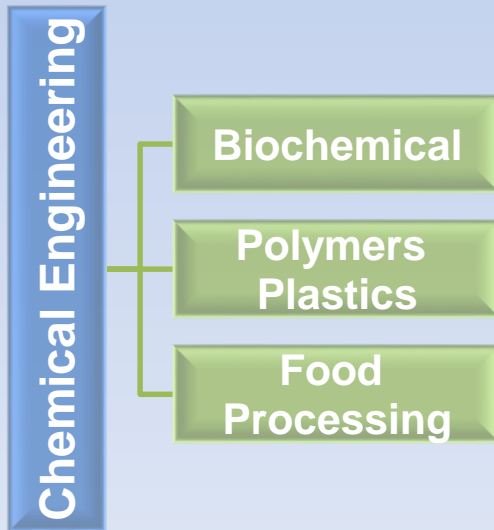
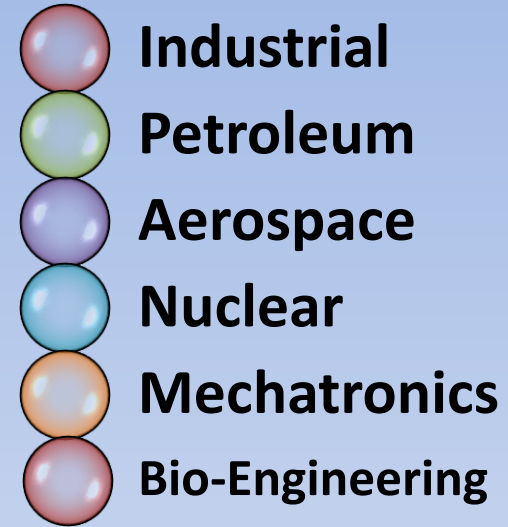
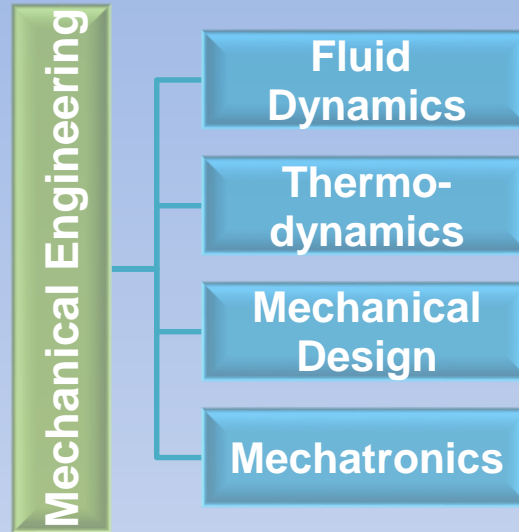
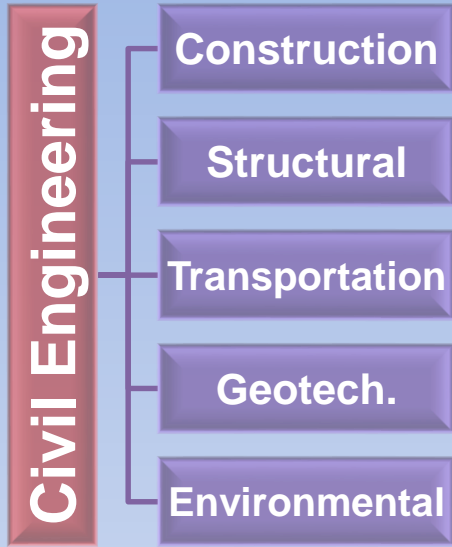
- A set of personal obligations and responsibilities which sit alongside the contractual obligation to an employer or client.
- A matching accountability which is also separate from that of an employer.

Elements of Professionalism (cont'd)

4 Public Obligation

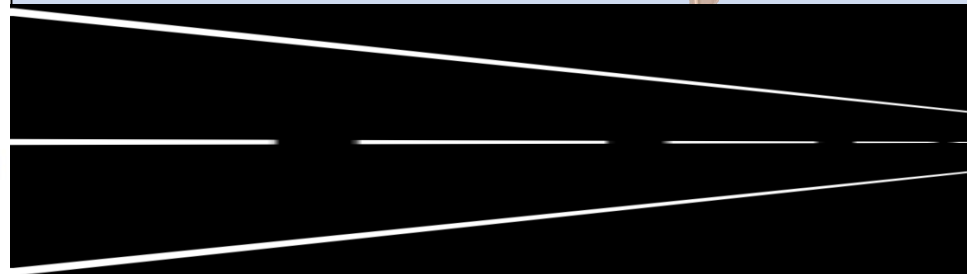
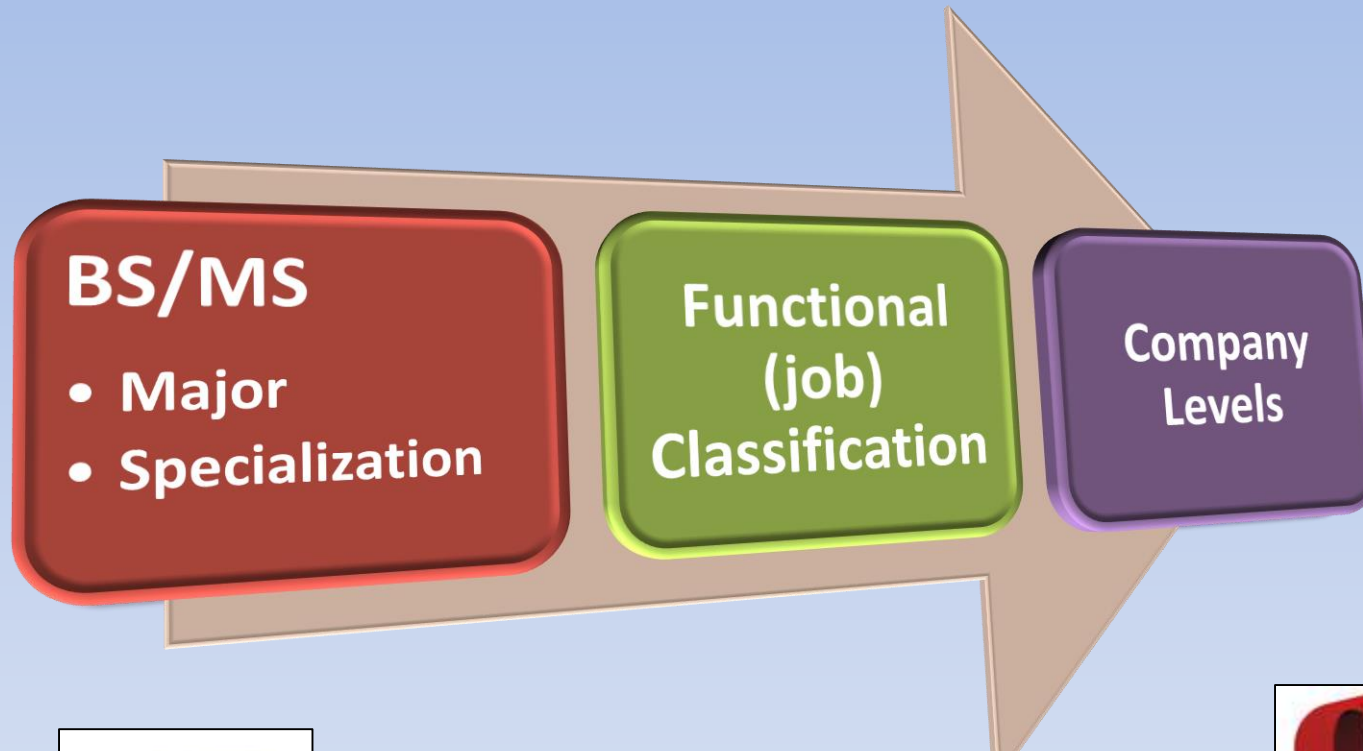
- Regard for and contribution to the public good
- Protect the public interests
- Social responsibility
- Commitment and contribution to the professional community

Engineering Departments

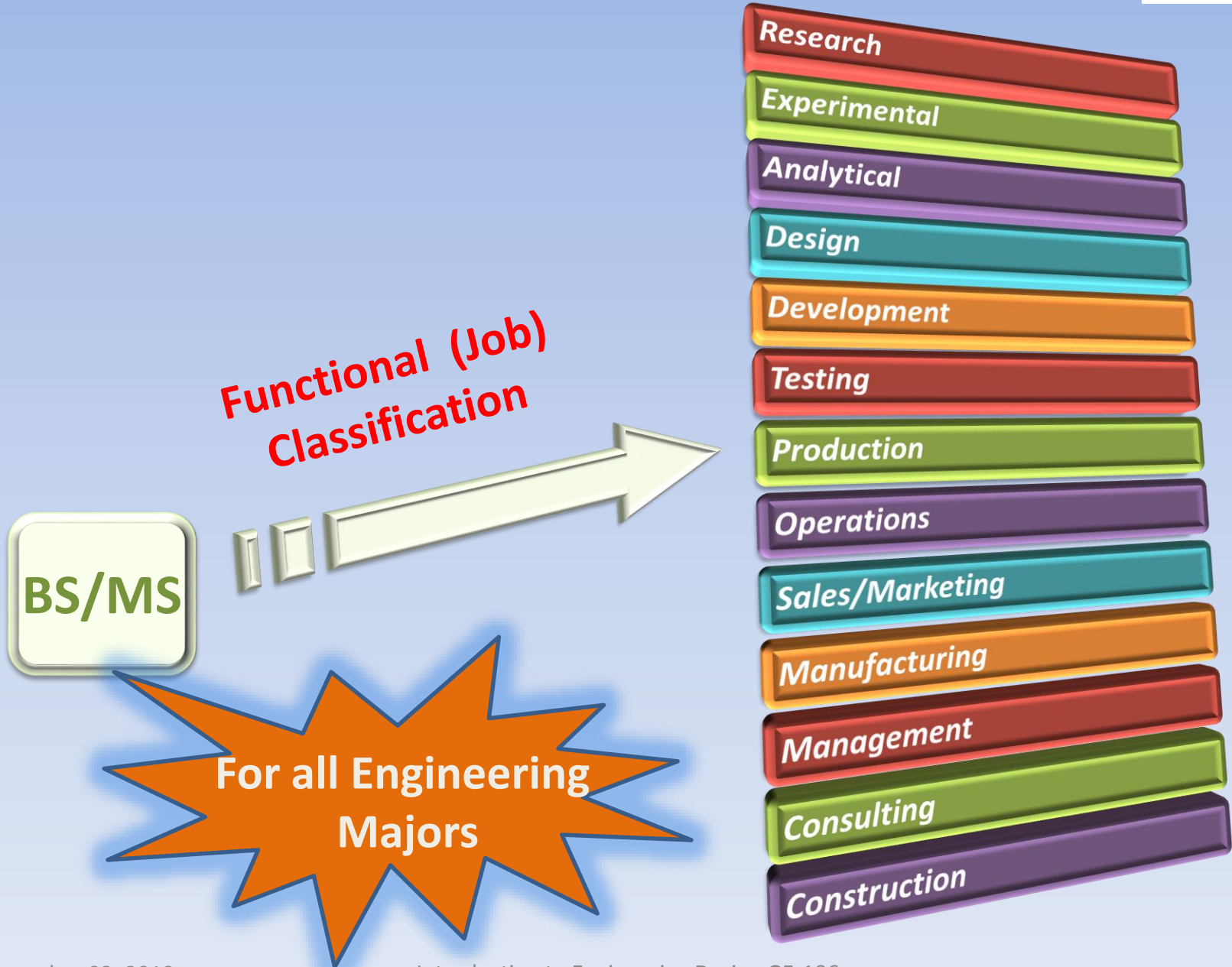


ENGINEERING FUNCTIONAL JOBS

The Path to Becoming a Professional Engineer



The Path (cont'd)



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 <u>science</u> , 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 (cont'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 (cont'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</u> 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 <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)



Board of Management



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 Possible Career Directions

1. Advanced Degrees-Academic Institutions
(Teaching, researching, publishing, community involvement)
2. Engineering Management (MSE/MBA)
3. Law (Patent law, Corporate Law)
4. Bio-Medical Engineering (bioengineering, prosthetics, "Bionic man/Women")
5. Government, Defense
6. Engineering Consultant
7. Your Own Business
8. **2020 ???**



Becoming a Professional Engineer

- Understand that Engineering is a Profession.
- Become familiar with Code of Ethics of your Discipline.
- Join Student Engineering Societies.
- Join other Professional Organizations.
- Always think of how you would like to be treated under similar circumstances.



*****There's more to being an engineer than technical competence.*****



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