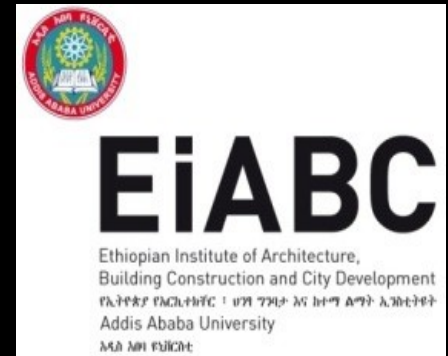




Introduction to Engineering Profession (COTM 1051)

GEREMEW T.

I. Introduction to Engineering Profession

■ **COURSE DESCRIPTION**

- Introduction to Engineering Professions, Architecture, Civil Engineering, CO TM, Electrical and Computer Engineering, Mechanical Engineering, Chemical Engineering, Urban Planning ...

II.COURSE OBJECTIVES:

After the completion of this course, the students will be able to:

1. Understand the constructive interrelation of natural & social sciences as well as business and art to engineering and their positive impact on the socioeconomic aspect of a society.
2. Understand their specific intra-and inter professional roles in the wide and vast engineering disciplines and the ethics and morals involved

III. COURSE CONTENTS

- 1. Introduction to Engineering Professions**
- 2. Professional Profiles of different engineering professions**
(Architecture, Civil, Construction Technology & Management, Mechanical, Chemical, Electrical and Computer, Urban Planning & Design....)
- 3. Roles of the professions in the industry, concept of Ethical professional practice**

IV.LITERATURE:

- compiled manual to be supplied by the course instructor
- Landis, R. B. (2001), Studying Engineering, 2nd Edition, Discovery Press, Burbank, CA.
- “Beyond Engineering: How Society Shapes Technology”, Robert Pool, Oxford University Press, 1997
- Academic Press Dictionary of Science & Technology

V. ASSESSMENT/EVALUATION & GRADING SYSTEM

Evaluation System

- Attendance.....10%
(Mandatory)
- Quiz20% (Tentative)
- Semester-Project30 %
(Tentative)
- Final Exam.....40%
(Mandatory)

1.Introduction to Engineering professions

1.1 Historical Background of Engineering

- **The concept of engineering has existed since ancient times as humans devised fundamental inventions such as the pulley, lever, and wheel.**
- Each of these inventions is consistent with the modern definition of engineering, exploiting basic mechanical principles to develop useful

- The term **engineering** itself has a much more recent etymology, deriving from the word **engineer**, which itself dates back to 1325, when an engine'er (literally, one who operates an engine) originally referred to "a constructor of military engines."

- Later, as the design of civilian structures such as bridges and buildings matured as a technical discipline, the term civil engineering entered the lexicon as a way to distinguish between those specializing in the construction of such non-military projects and those involved in the older discipline of military engineering.

Era of Engineering

■ Ancient Era

The Acropolis and the Parthenon in Greece, the Roman aqueducts, Via Apia and the Colosseum, the Hanging Gardens of Babylon, the Pharos of Alexandria, the pyramids in Egypt, Teotihuacán and the cities and pyramids of the Mayan, Inca and Aztec Empires, the Great Wall of China, among many others, stand as a testament to the ingenuity and skill of the ancient civil and military engineers.



Pyramids of Jeeza, Cairo

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.The earliest civil engineer known by name is **Imhotep**. As one of the officials of the Pharaoh, Djoser.

- He probably designed and supervised the construction of the Pyramid of Djoser (the Step Pyramid) at NSaqqara in Egypt around 2630-2611 BC.

He may also have been responsible for the first known use of columns in architecture

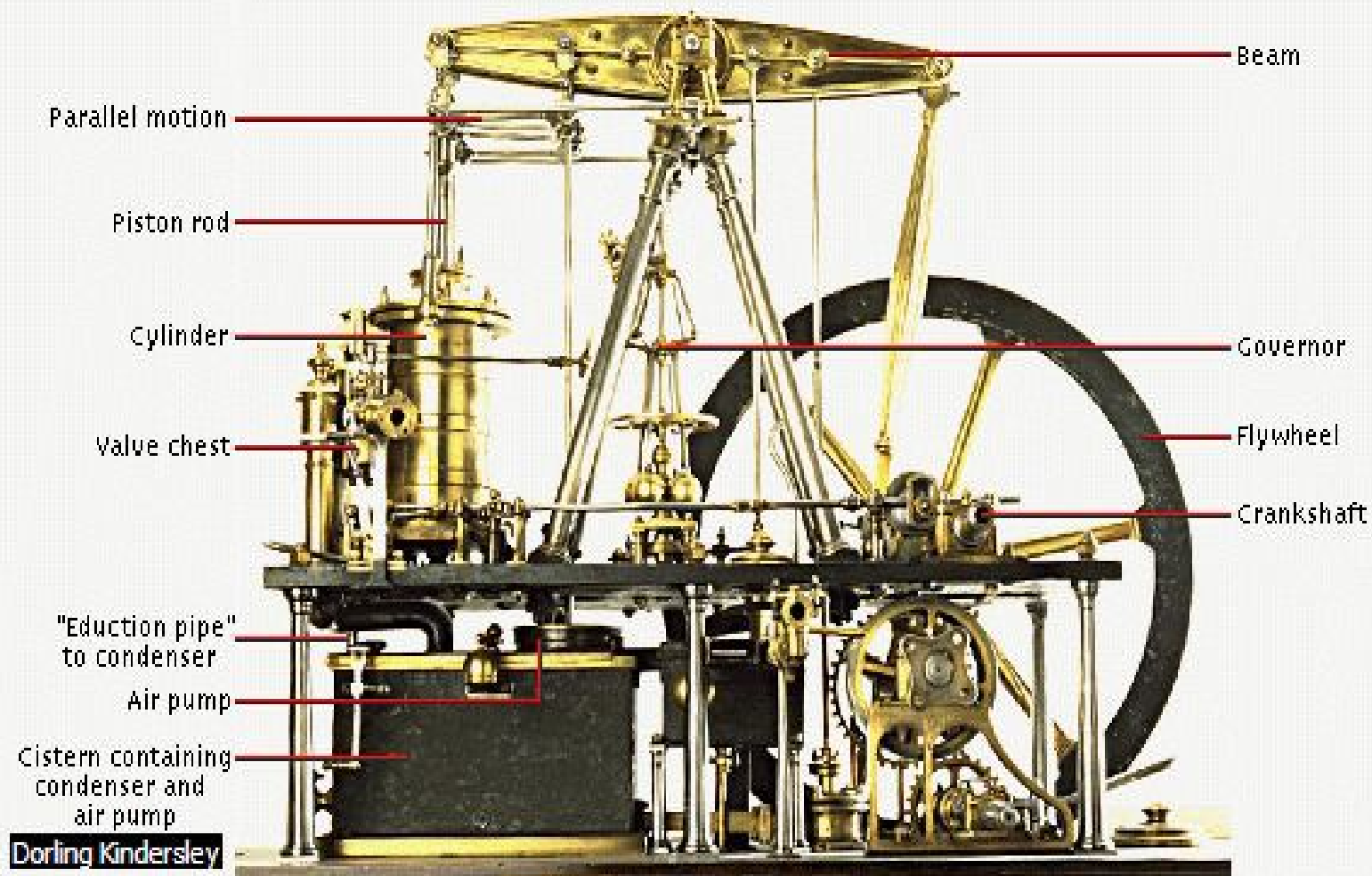


Middle Era

- An Iraqi by the name of **Al-Jazari** helped influence the design of today's modern machines when sometime in between 1174 and 1200 he built five machines to pump water for the kings of the Turkish Artuqid dynasty and their palaces.
- The double-acting reciprocating piston pump was instrumental in the later development of engineering in general because it was the first machine to incorporate both the connecting rod and the crankshaft, thus, converting rotational motion to reciprocating motion.

Renaissance Era

- The first electrical engineer is considered to be William Gilbert, with his 1600 publication of De Magnete, who was the originator of the term "electricity".
- The first steam engine was built in 1698 by mechanical engineer Thomas Savery. The development of this device gave rise to the industrial revolution in the coming decades, allowing for the beginnings of mass production.



Modern Era

- Electrical Engineering can trace its origins in the experiments of Alessandro Volta in the 1800s, the experiments of Michael Faraday, Georg Ohm and the invention of the electric motor in 1872.
- The work of James Maxwell and Heinrich Hertz in the late 19th century gave rise to the field of Electronics.
- The later inventions of the vacuum tube and the transistor further accelerated the development of Electronics to such an extent that electrical and electronics engineers currently outnumber their colleagues of any other Engineering specialty.



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1.2 Engineering Disciplines

- Aerospace Engineering
- Agricultural Engineering
- Biomedical Engineering
- Building Services Engineering
- Chemical Engineering (Biochemical, Food, Petroleum and Petrochemical, Process Control, Pharmaceutical Production)

- Civil Engineering (Geotechnical, Hydraulics (Water), Structural, Transport)
- Coastal and Ocean Engineering
- Construction Engineering and Management
- Electrical Engineering (Computer Systems, Control, Electronics and telecommunications, Power Generation and Distribution)
- Environmental Engineering

- Industrial Engineering
- Marine Engineering
- Materials Engineering
- Mechanical & Manufacturing Engineering (Hydraulics, Manufacturing Systems, Pneumatics, Thermodynamics)
- Minerals and Metallurgical Engineering

- Textile Engineering
- Resource Engineering
- Risk Engineering
- Mining Engineering ...

1.3 Relationships among Science, Technology and Engineering

- **Science is defined as:**
- The systematic observation of natural events and conditions in order to discover facts about them and to formulate laws and principles based on these facts.
- The organized body of knowledge that is derived from such observations and that can be verified or tested by further investigation.
- Any specific branch of this general body of knowledge, such as biology, physics, geology, or astronomy.

- “Engineering is the application of scientific knowledge about matter and energy for practical human uses such as construction, machinery, products, or systems.(1)
- “Engineering is the science by which the properties of matter and the sources of power in nature are made useful to humans in structures, machines, and products.(2)
- Engineering is the art of applying scientific and mathematical principles, experience, judgment, and common sense to make things that benefit people

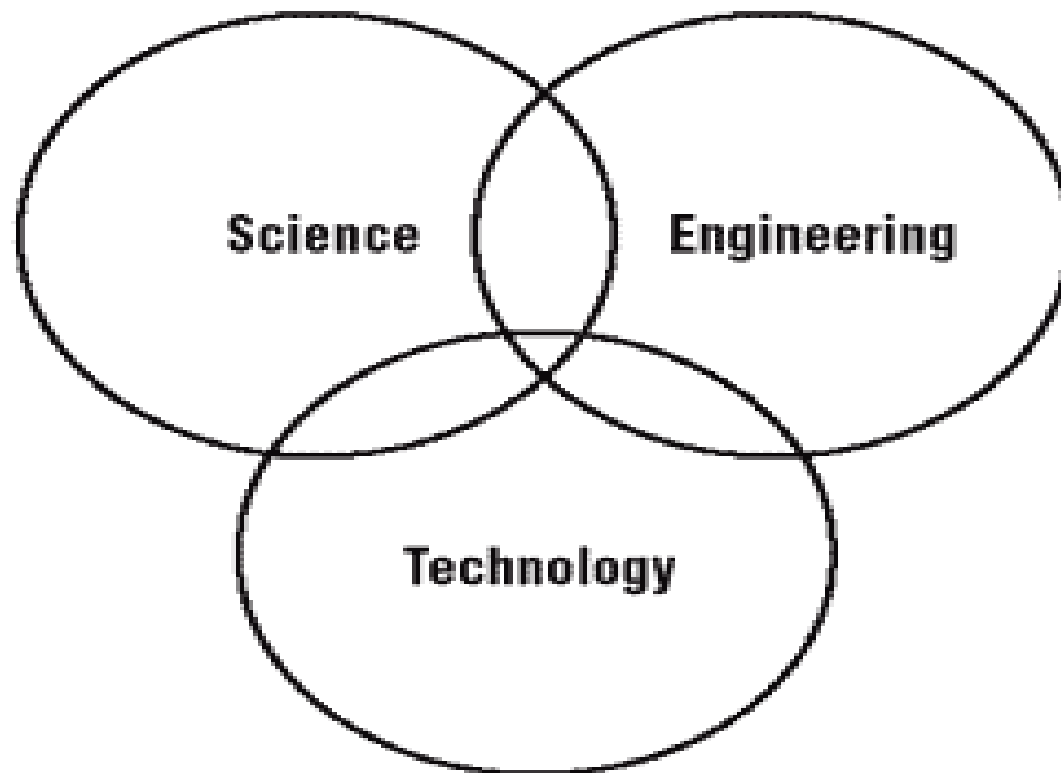
(1) " (Academic Press dictionary of science and technology. San Diego, Harcourt Brace Jovanovich, c1992. p.749.) Q123.A33 1992) .

(2) "(McGraw-Hill dictionary of scientific and technical terms. 6th ed. New York, McGraw- Hill, c2003. p. 722. Q123.M15 2002)

- Technology is a product of engineering and science. In general technology is the relationship that society has with its tools and crafts, and to what extent society can control its environment.
- The Merriam-Webster dictionary offers a definition of the term: "the practical application of knowledge especially in a particular area" and "a capability given by the practical application of knowledge".

The Relationship Among Science, Engineering, and Technology

Science seeks to understand the natural world, and often needs new tools to help discover the answers.



Engineers use scientific discoveries to design products and processes that meet society's needs.

Technologies (products and processes) are the result of engineered designs. They are created by technicians to solve societal needs and wants.

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