

SURVEYING-I

Introduction of Subject Teacher

Dr. Naeem Ejaz

- PhD in Civil/Environmental Engineering, University of Engineering & Technology, Taxila.
- MS in Environmental Engineering IEER, University of Engineering & Technology, Lahore.
- BS in Civil Engineering, University of Engineering & Technology Taxila
- Lecturer of Civil and Environmental Engineering, UET Taxila and AIOU Islamabad
- Experience NESPAK and environmental consultation.

Dr. Naeem Ejaz (cont.)

- Teaching
 - Introduction to Environmental Engineering
 - Environmental Impact Assessment EIA
 - Solid waste Engineering & Management
 - Water Quality Modeling
 - Surveying-I & II
 - Ecological Design; City, Landscape and Transport.
 - Solid, Hazardous and Industrial Waste Management
 - Research Methodology

Dr. Naeem Ejaz(cont.)

- Research
 - Environmental Impact Assessment
 - Drinking Water Quality
 - Industrial Air Pollution
 - Industrial waste Management
 - Coastal Environmental
 - Surface Water Quality
 - Ecological design of Buildings

Dr. Naeem Ejaz(cont.)

- Other Professional Activities
 - Visiting teacher at AIOU for the course of Environmental Design
 - Design Engineer in NESPAK. E&PHE Division from 2003 to 2005
 - Involved in different faculty research projects at university of engineering & technology Taxila
 - Research Scholar at the University of Auckland, New Zealand for one year.

Choosing a Profession...

- There are many things that you can do to plan your career. The best place to start is to decide on your interests. Build a career on the aspects of engineering that you enjoy.
- Exploring the different engineering disciplines is a good way to see what is out in the work world.

What is Engineering?

“Engineering is the profession in which the knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind.”

ABET

A Great Profession...

“It is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it brings jobs and homes to men. Then it elevates the standards of living and adds to the comforts of life. That is the engineer’s high privilege.”

Herbert Hoover

Introduction to Civil Engineering

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Learning Objectives

- **Understand how Civil Engineers impact lives**
- **Identify some different areas of specialization**
- **Understand job benefits**
- **Identify necessary skills**

What is Civil Engineering?

- Civil Engineering is the oldest and broadest of the engineering disciplines. As the name implies, civil engineers serve people, and thus they have been called "the engineers and architects of our constructed world."
- Civil engineers design and supervise the construction of roads, high rise buildings, airports, tunnels, dams, barrages, canals, bridges, and water supply and sewage systems.

Civil Engineers

- build structures that meet function, looks, cost, and reliability specifications. They are the largest users of Building materials.



MAJOR DUTIES AND RESPONSIBILITIES

- Civil engineers conceive, plan, design, construct, operate and maintain the facilities and systems that serve the basic needs of our society. This infrastructure includes buildings, bridges, water tanks, transmission lines, pipelines, highways, railroads, airports, harbors, water and wastewater collection/treatment/ distribution systems, dams and power plants.

Civil Engineers- the builders of a civilized world

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Seven Wonders Of World

- Pyramids of Egypt
- Statue of Independence
- Taj Mahal
- Great Wall of China
- Hanging Gardens of Bablon
- Efle Tower
- Pisa Tower

Civil Engineering Specialties

Civil engineering, considered one of the oldest engineering disciplines, encompasses many specialties.

Geotechnical

Water Resources

Structures

Construction

Transportation

Environmental

Structural Engineering

Structural engineers face the challenge of analyzing and designing structures to ensure safety and proper performance. These structures (office buildings, bridges, skyscrapers, stadiums, etc.) must support their own weight and resist environmental loads from hurricanes, earthquakes, and floods. Knowledge of the properties and behavior of concrete, steel, aluminum, timber, and plastic is essential for the structural engineer.

Structural Engineering

Usually work closely with the Architect. Structural engineering does analysis of the forces on a structure given specific applied loads. The following are different aspects of Structural engineering:-

- structural design and analysis
- stress analysis
- structure stability
- seismic proof and reinforcement

Structural Engineering

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Structural Engineering

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Water Resource Engineering

Water is essential to our lives. Water resource engineers deal with issues concerning the quality and quantity of water available for the public. These engineers work to prevent floods, to supply water for cities, industry, and irrigation, to protect beaches, or to manage and redirect rivers. It deals with the quantity of surface and ground water for energy, food, transportation, environmental enhancement and hazards mitigation. It embraces the areas of hydrology, hydraulics, and water resources system planning.

Water Resource Engineering

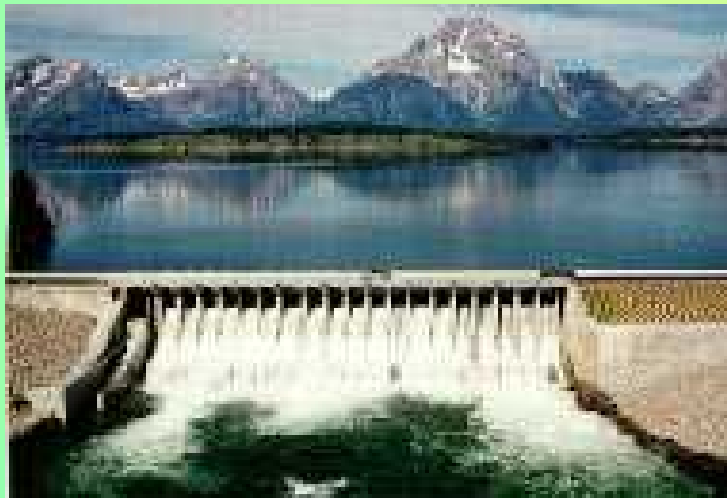
Responsibilities include

- water management,
- ground water resources,
- Salinity problems,
- sediment transport ,
- effective distribution of waters,
- water reservoir, canals and rivers management



Water Resource Engineering

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Transportation Engineering

Transportation engineers design, build, operate, and maintain all types of facilities for railroads, automobiles, airplanes, and ships. They are involved in controlling traffic, and in developing better transportation systems. They strive for greater safety in the movement of people and goods at higher speeds, thereby serving mankind in meeting the demands of modern living with a minimum loss of time, material, or life.

Transportation Engineering

Within this broad range of responsibility, transportation engineers must, then, be concerned with the design, construction, and maintenance of physical facilities (highways, railroads, airports, terminals, etc.) that are needed for our transportation system, and with the further development and operation of this multi-model transportation system to meet the constantly changing social, economic, geographical and political needs of society

Transportation Engineering

Major responsibilities include

- public transportation systems,
- traffic operations,
- highways and streets



Transportation Engineering

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Geotechnical Engineering

Almost all of the facilities that make up our infrastructure are constructed in, on, or with earth materials. Geotechnical engineers use principles of mechanics and mathematics to solve problems involving earth materials (i.e. foundations, embankments, retaining walls, tunnels, and slopes). Input data is usually obtained from intensive field or laboratory testing programs.

Geotechnical Engineering

These engineers design earth and rock filled dams, levees, tunnels, braced excavations and foundations for structures of all types. These engineers are also involved in geo-environmental issues, such as landfill design and performance, contaminant transport through soils, and soil remediation. They should have a knowledge of both geology and structural engineering. mechanics and foundation engineers utilize soil and rock as engineering materials.

Geotechnical Engineering

Specializes in:

- survey
- soil mechanics and dynamics
- earth structure
- earthquake engineering



fourth edition



Geotechnical Engineering

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Geotechnical Engineering

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Don't skip geotechnical analysis !

Construction Engineering

Civil engineer that specializes in construction must know various construction methods and the construction equipment required to build structures. The engineer must understand what the designer intended and how the structure best reflects the artistic message. The civil engineer must be a master at construction management since there are so many people involved in the construction process. And the civil engineer must be able to make accurate cost predictions to ensure the project is funded to completion while satisfying all the original specifications.

Construction Engineering

Construction engineers manage and direct construction. These civil engineers are experts in many areas because they deal with the different aspects of civil engineering. Required skills

- methods and equipment
- structures
- construction management
- cost estimation and analysis



Construction Engineering

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Environmental Engineering

Environmental engineers provide treatment facilities that render industrial and human wastes free from contaminants. They design, construct, and operate systems that purify water for drinking, industrial, and recreational uses. They also develop and implement air purification devices and models that describe the transport, transportation, and removal of contaminants in the atmosphere. Many environmental engineers develop plans and conduct research to solve problems related to our rapidly changing technological society and expanding human population.

Environmental Engineering

Environmental engineers have taken an increasingly important role in the activities of the world in recent years, because of the problems related to air, land, and water contamination. Responsibilities include:

- disposing hazardous materials
- waste management and treatment
- biological processes in pollution control
- water and waste
- water quality



Environmental Engineering

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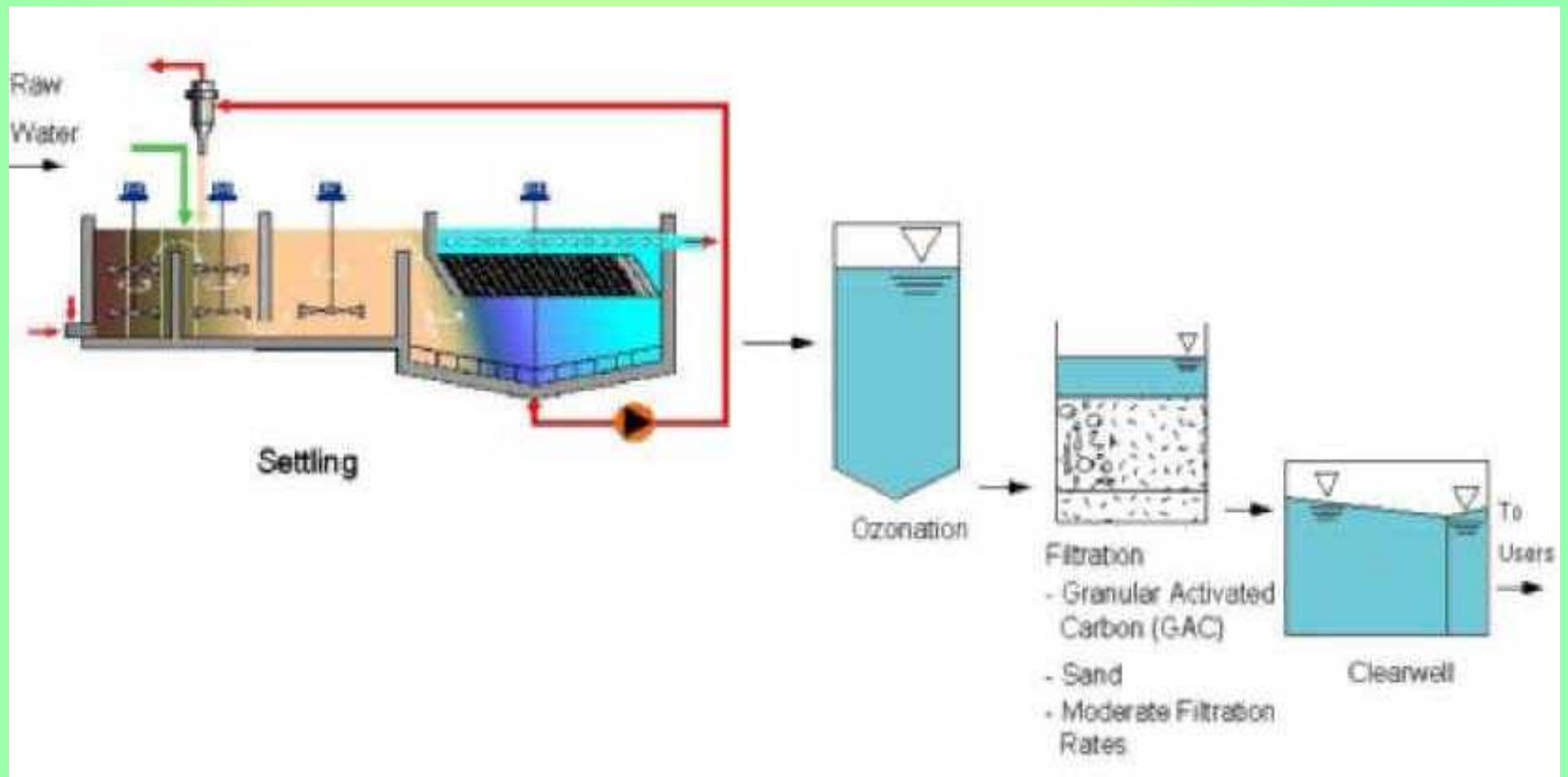


Environmental Engineering

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Environmental Engineering



What does it take to be a successful CE?

- ❖ Strong background in fundamentals
- ❖ Engineering design skills
- ❖ Strong writing and presentation skills
- ❖ Practiced communication skills
- ❖ Experience and judgment
- ❖ Leadership skills!

1. Engineering Fundamentals

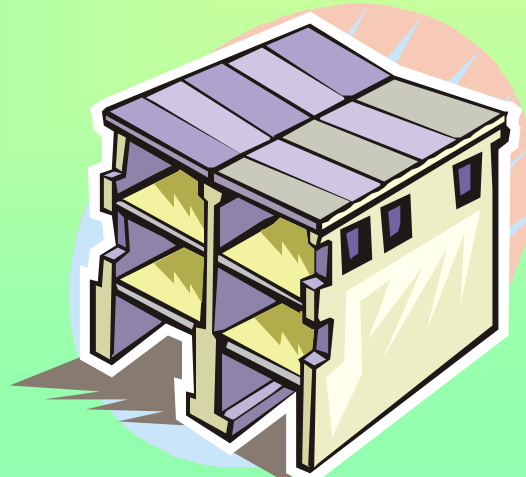
Civil and Environmental Engineering students should be competent in core Civil Engineering fundamentals including:

1. Water resources
2. Structures
3. Environmental
4. Transportation
5. Geotechnical
6. Mechanics

2. Engineering Design

“Designing a bridge or any other large structure is not unlike planning a trip or vacation. The end may be clear and simple: to go from here to there. But the means may be limited only by our imaginations.”

Petroski



2. Engineering Design

- ❖ Knowledge of analysis tools
- ❖ Able to analyze alternatives
- ❖ Concept of safety factors
- ❖ Economical considerations
- ❖ Creativity!



I cannot ‘lecture’ you on how to design effectively – you have to do it. That’s why we call it engineering **PRACTICE**.

3. Writing & Presentations

Strong writing and presentation skills are essential for you to be successful.

4. Communication

Effective communication will be *essential* for you to succeed in your career.

Remember, you will be working with...

- ❖ Design teammates
- ❖ Instructors
- ❖ Clients
- ❖ Other engineers
- ❖ Potential sub-consultants & subcontractors

5. Experience and Judgment

“An instrument too often overlooked in our technical world is a human eye connected to the brain of an intelligent human being.”

Ralph B. Peck (1972)

6. Leadership

**Managers – get others
to do the work.**

**Leaders – get others
to want to do the work.**

Employment Opportunities

Many civil engineers hold supervisory or administrative positions, from supervisor of a construction site to city engineer. Others may work in design, construction, research, and teaching. CE graduates work in

- **Private Sector (Consulting)**
- **Public Sector (Federal, State, City)**
- **Construction**
- **Government Research Laboratories**
- **Military**
- **University and Community College**

Employment Opportunities

Civil engineers usually work near major industrial and commercial centers, often at construction sites. Some projects are situated in remote areas or in foreign countries. In some jobs, civil engineers move from place to place to work on different projects.

Job Outlook

Spurred by general population growth and an increased emphasis on infrastructure and security, more civil engineers will be needed to design and construct safe and higher capacity transportation, water supply, and pollution control systems, and large buildings and building complexes. They also will be needed to repair or replace existing roads, bridges, and other public structures.

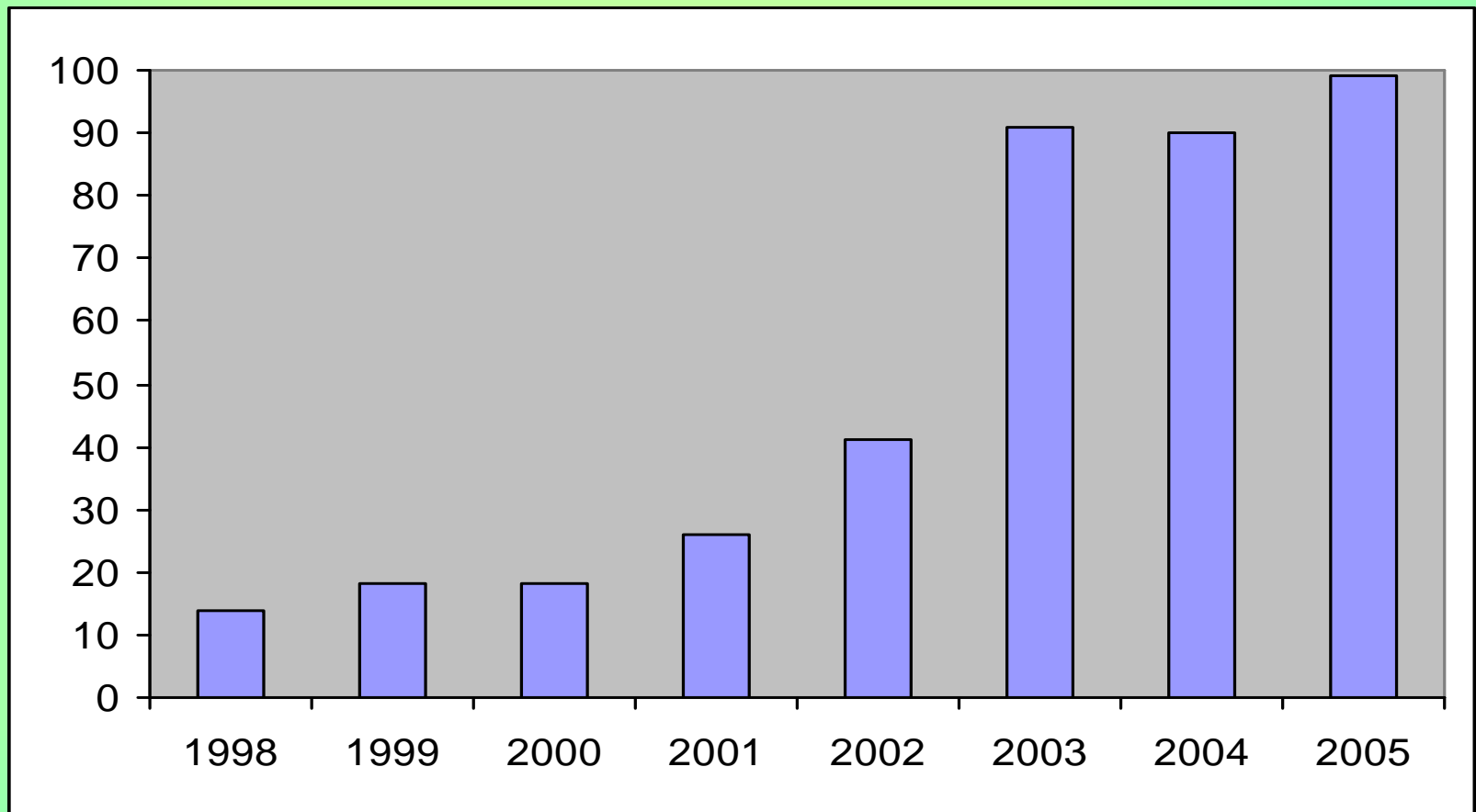
Job Outlook

Because construction and related industries—including those providing design services—employ many civil engineers, employment opportunities will vary by geographic area and may decrease during economic slowdowns, when construction often is curtailed.

Job Trends in Civil Engineering

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Job's Percentage



Year

Skills to Develop

- Math and Science
 - Algebra, trigonometry, analytical geometry, and calculus
 - Physics, chemistry
 - Computer languages
- Communication Skills
 - Written English
 - Speech and presentation skills
 - Foreign Language

Civil Engineering Benefits

- Solve societal problems
- Allows indoor and outdoor work
- Responsible, highly respected job
- Challenging technical career
- Utilize modern technology
- Work with people of various backgrounds
- Well paid

Thanks