Lecture 1

What is Civil Engineering

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Lecture Overview

Overview

Civil Engineering

Civil engineering is the oldest branch of engineering that deals with providing people with a livable built environment

It deals with people's everyday needs such as:

- food and water
- livable shelter
- ways to travel
- safety from disaster

Civil Engineering

Each basic need is related to at least one civil engineering technical area.

Civil Engineering Technical Areas

Structural Engineering

Structural engineering is the technical specialty that deals with analysis and design of structures.

Structural design aims at providing a structure with sufficient level of resistance against these loads with minimum cost

Structural Engineering

Technical Sub-Areas

It has several technical sub-areas, named according to the type of structure or to the type of load it carries.

- Earthquake Engineering
- Wind Engineering
- Structural Reliability
- Fire Engineering
- Bridge Engineering
- Dam Engineering
- Building Engineering
- Forensic Engineering

Geotechnical Engineering

Geotechnical engineering is the technical specialty that deals with soil and rock as supporting materials for structures

It deals with the various foundation types that work between the structure and the ground.

It also deals with the stability of soil and rocks.

Geotechnical Engineering

Technical Sub-Areas

Technical areas of study pertinent to geotechnical engineering includes:

- Engineering Geology
- Soil Mechanics
- Rock Mechanics
- Foundation Engineering
- Soil Improvement
- Tunnel Engineering

Water Resources Engineering

Water resource engineering is the specialty that deals with use of water in different human needs.

It includes finding and preservation of water sources, its means of delivery to a city or region, as well as studying its movement, and its erosive effects.

Water Resources Engineering

Technical Sub-Areas

Its core and related areas of study include:

- Water Resources System Engineering
- Hydraulic Engineering
- Coastal Engineering
- Ocean Engineering

Transportation Engineering

Transportation engineering deals with the efficient transport of people and goods.

Involved in the design of roads, harbors, and airport, as well as railways and traffic control.

Transportation Engineering

Technical Sub-Areas

Technical specialties include:

- Transportation Planning
- Transportation System Engineering
- Highway Engineering
- Railway Engineering
- Port and Harbor Engineering
- Airport Engineering
- Traffic Engineering

Construction Engineering

Construction engineering deals with the execution of the plan designed on paper into physical reality.

It involves management of different resources required in the construction process.

Construction Engineering

Technical Sub-Areas

Engineering and management aspects include:

- Construction Methods
- Electric and Mechanical Facilities
- Construction Machineries
- Financial and Cost management
- Contracts and Specifications
- Health and Safety Issues
- Legal Issues and Risk Management

Related Disciplines

Geomatics Engineering

A technical specialty that deals the measurement of and assembling spatial data of any natural or constructed objects in the earth.

It is involved in documentation of real estate, location of routes and points needed in construction, and collecting global data for resource analysis and utilization.

Geomatics (Survey Engineering)

Technical Sub-Areas

Technical areas of study include:

- Plane Surveying
- Route Location
- Land Surveying
- Geodetic Surveying
- Aerial Photography and Satellite Imaging
- Geographical Information System

Environmental Engineering

Environmental engineering involves the application engineering to protect human health and preserve the natural environment.

It relies on the knowledge of fundamental sciences of chemistry, biology, ecology, and health.

Environmental Engineering

Technical Sub-Areas

Technical areas of study include:

- Water Treatment and Supply
- Wastewater Treatment and Disposal
- Solid Waste Disposal

Urban Planning

Urban planning integrates land use planning, infrastructure planning, and public policy for new developments or renewal of urbanized communities.

Successful urban planning requires the application of the knowledge developed in social, economic, architectural, and engineering studies

Other Related Disciplines

Other Related Disciplines

The following disciplines interact or overlap with civil engineering:

- Applied Mechanics
- Architectural Engineering
- Agricultural Engineering
- Aerospace Engineering
- Biomedical Engineering
- Naval Architecture

Civil Engineering Processes

Civil Engineering Processes

Any kind of civil engineering project involves four main phases:

- Planning
- Design
- Construction
- Maintenance/Operation

Planning

- The planning stage involves the study of its effects to private or public interest.
- Includes feasibility studies which involves financial and legal assessment.
- May take years to complete

Design

- Involves two stages: preliminary and final
- Includes the concept, scope, structure, materials, method of construction, and cost and timeline estimate

Construction

- The actual implementation of the project.
- Includes the monitoring of financial and time aspects of the project, as well as safety and environmental regulations

Maintenance/Operation

- Begins when the construction phase ends, and the owner accepts the completed project.

The End

Questions? Comments?