CE Undergraduate Electives

1ˢᵗ Semester AY 2022-2023

Coastal Engineering

CE 117 MCDE | M 9:00 AM – 12:00 NN | 1st semester A.Y. 2022-2023
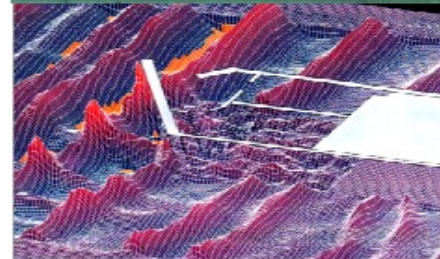
The Philippines is the 5th country in the world with the longest coastline.

More than 62% of our communities lie within 1 km from the coast.

Fishing and tourism industry (beaches) contribute significant amount of revenues to our GDP.

Coastal hazards (e.g. storm surge, coastal erosion, etc.) are prevalent.

Are we managing our coastal resources sufficiently enough?

Geotechnical Engineering III

CE 164 THY | TTH 4:00 PM - 5:30 PM | 1st semester A.Y. 2022-2023

- The course covers advanced topics not found in CE 162 and CE 163. It integrates the learnings in the geotechnical engineering courses and presents a practical and sequential framework in solving unique geotechnical engineering problems.

- **MAIN OBJECTIVE**: Introduce and expose the student to the practical applications (both design and construction) of geotechnical engineering to various infrastructure projects.

- **PREREQUISITE**: CE 163

- **REQUIREMENTS**: Homeworks, Research, and Final Report

- **COURSE OUTLINE**:

  – Soil Investigation for Various Structures

  – Obtaining Geotechnical Parameters

  – The Geotechnical Evaluation Report

  – Geotechnical Interpretation

  – Geotechnical Risks

Sustainable Design and Construction

CE 197 MWX1 and MWX2 | M 1:00 PM – 4:00 PM | 1st semester A.Y. 2022-2023

Environmentally Sustainable Transport

CE 197 THU | TTh 10:00 - 11:30 AM | 1st semester A.Y. 2022-2023

Course Objectives:

- To introduce concepts of Environmentally Sustainable Transport (EST) as well as its relevant policies and impacts.
- To enable students to analyze transport problems and think of solutions with environmental sustainability as a core priority and taking on perspectives of multiple stakeholders.
- To increase students' exposure to real-world transport problems.

Topics to be covered:

Concepts and policies related to the components that comprise the EST framework such as Public health, Air Quality, Transit Oriented Development, Non-motorized Transport, Gender and Accessibility in Transport, among others.

Course requirements:

Case study and discussion papers

Prerequisite: 4th year standing

Transportation is essential for economic development and personal welfare but

How will our generation manage the growth?

Source: Wall Street Journal

INTRODUCTION TO FINITE ELEMENT MODELING

CE 197 MWX3 | M 1:00 PM – 4:00 PM | 1st Semester A.Y. 2022-2023

COURSE DESCRIPTION:

This course aims to provide students with fundamentals of the finite element method (FEM) and its application to model the behavior of structures or components subjected to static loads. The course will cover the implementation of one-, two-, and three-dimensional FEM in a working program, which can be used in verification and validation studies. The topics to be discussed include geometry discretization, derivation of element matrices, solver for the derived systems of equations, and postprocessing of results. This course requires knowledge on numerical analysis and programming skill.
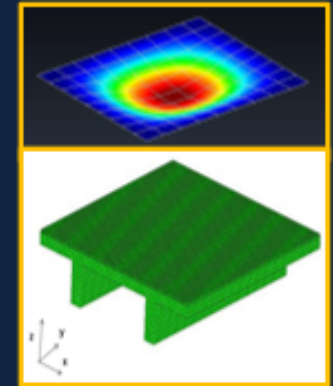
PREREQUISITE: CE 25 & CE 151

COURSE LEARNING OUTCOMES:

After completing the course, a student should be able to:
1. demonstrate understanding of the finite element method applied to static problems, specifically on the derivation of element matrices and discretized equations from the governing partial differential equation,
2. implement the finite element method in a working program, and
3. analyze one-, two-, and three-dimensional models of structures and components subjected to static loads

COURSE REQUIREMENTS:

1. Online Lectures / Discussions
2. Machine Exercises
3. Machine Problems
4. Project with Presentation

TARGET AUDIENCE:

This course is intended for BS CE students who are interested in numerical modeling and structural analysis.

Introduction to Sustainable Development Goals

CE 197 THW | TTh 1:00PM - 2:30PM | 1st semester A.Y. 2022-2023

This course is open for undergraduate students who are interested in the key concepts and practices of sustainability.

Topics include the importance of sustainable development, the development and idea of the SDGs, the aggregation of the SDGs into the three pillars of sustainable development: social, economic, and environmental, and the implementation of SDGs through global partnerships.

Course requirements include but are not limited to UVLe quizzes, case study, and reflection papers.

Prerequisite: CE 130 or CE 131, and preferably 4th year standing

CE Graduate Electives

1st Semester AY 2022-2023

Fundamental Coastal Hydrodynamics (with Engineering Applications)

CE 270 TYZ | T 4:00 PM – 7:00 PM | 1st semester A.Y. 2022-2023

TOPICS:
- Introduction, Coastal Engineering, Marine Civil Engineering
- Water wave mechanics
- Wave hindcasts
- Wave records analysis

- Wave spectra
- Shallow water wave transformations
- Long waves
- Tides, Storm surges
- Wave forces

- Marine piles
- Subsea cables and pipelines
- Mound breakwaters
- Wave-induced currents
- Coastal numerical models

PREREQUISITE: ES 15 (or equivalent)
COREQUISITE: ES 201

This course is recommended to graduate students in:
- MS Civil Engineering (all tracks)
- MS Energy Engineering (renewable energy, wave energy, ocean energy)

PANGUIL BAY BRIDGE
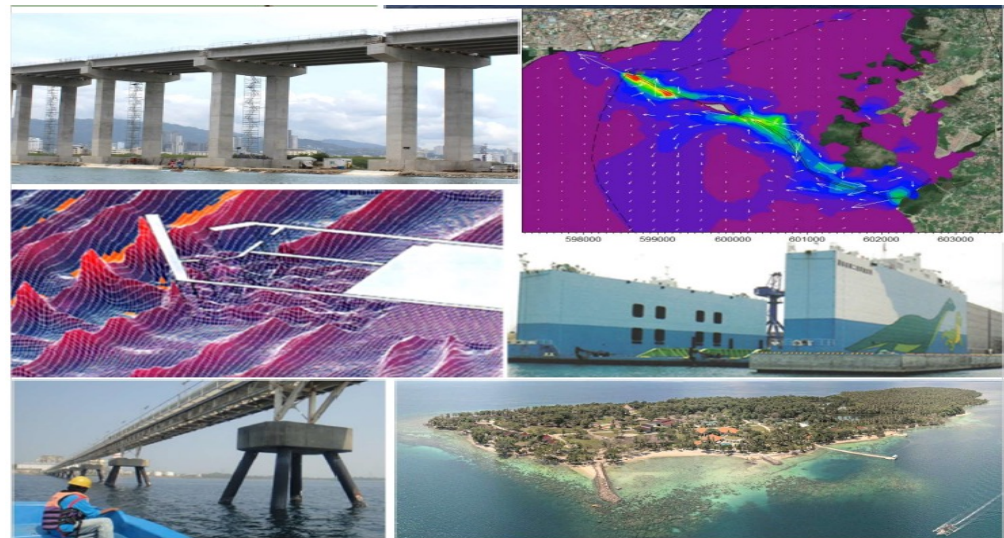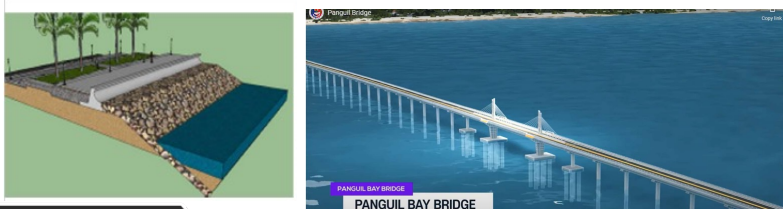
Introduction to Urban Mobility

CE 297 MZZQ| M 6:00 PM – 9:00 PM | 1ˢᵗ semester A.Y. 2022-2023

Course Objectives:

1. To introduce various elements of sustainable urban mobility including relevant policies, best practices, and solutions.

2. To introduce metrics for evaluating the state of urban mobility for cities and practice applying these metrics using available data.

3. To expose students to various real-world issues faced by urban areas.

Course requirements: Case study and discussion papers
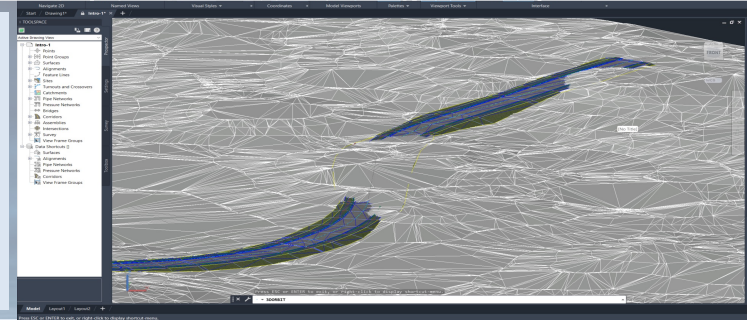**Pre-requisite: None**

Highway Engineering

CE 243 | Lec T 6 – 8PM, Lab Th 6 – 9PM | 1st semester A.Y. 2022-2023

Course Objectives:

- To introduce concepts of Highway Engineering.
- To understand the elements of road design using Civil 3D.
- To develop basic skills in road design using Civil 3D.

Topics to be covered:

History of Road Engineering, Elements of Highway Engineering, Standard Design of Highway Engineering, Basic Function of Civil 3D, Elements of Design, Design Controls and Criteria
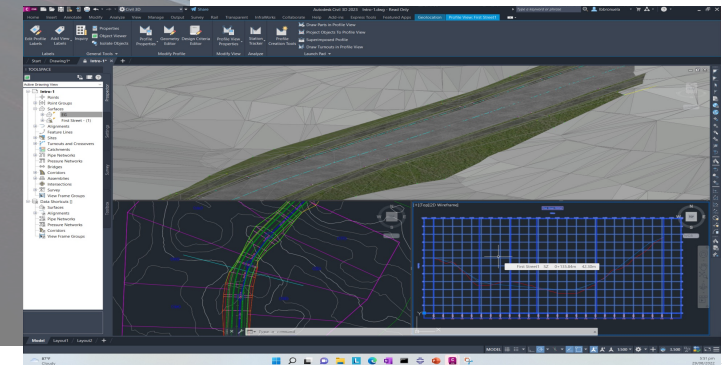
Course requirements:

Personal Computer/Laptop that can accommodate the system requirement for Civil 3D.

Prerequisites:

CE 240 and CE 249

Design your road to success!

INTRODUCTION TO STRUCTURAL HEALTH MONITORING

CE 297 FZZQ | F 6:00 PM – 9:00 PM | 1st Semester A.Y. 2022-2023

COURSE DESCRIPTION:

The process of implementing a damage detection strategy for aerospace, civil, and mechanical engineering infrastructure is referred to as *Structural Health Monitoring (SHM)*.

PREREQUISITE: CE 226

COURSE LEARNING OUTCOMES:

1. Familiarity with the concepts of SHM.
2. Familiarity with available techniques and procedures used in SHM.
3. Analyze recorded vibration data to determine dynamic properties of structures using system identification.
4. Application of selected SHM technique in monitoring an existing structure.

COURSE REQUIREMENTS:

1. Online Lectures / Discussions
2. Journal Paper Reporting
3. Group Project with Written Report and Presentation
4. Final Exam

TARGET AUDIENCE:

This course is intended for graduate students who already have familiarity with concepts and procedures on Structural Dynamics. This is for students who are interested in learning state-of-the-art research on damage detection for existing structures.
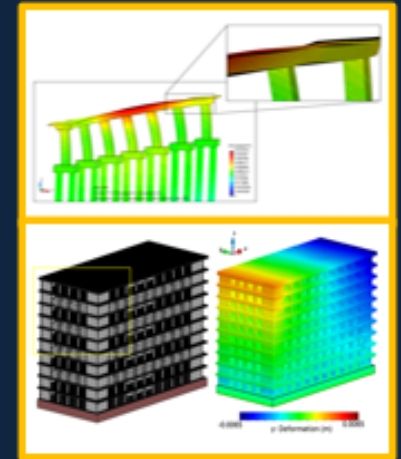
FINITE ELEMENT METHOD FOR STRUCTURAL DYNAMICS

CE 297 TYZ | T 4:00 PM – 7:00 PM | 1st Semester A.Y. 2022-2023

COURSE DESCRIPTION:

This course aims to provide students with knowledge on the application of the finite element method (FEM) to model the behavior of structures or components subjected to dynamic loads. The course will cover the implementation of the two- and three-dimensional FEM with time integration methods in a working program, which can be used in verification and validation studies. The topics to be discussed include geometry discretization, derivation of element matrices, time integration methods, solver for the derived systems of equations, postprocessing of results, and approaches to improve computational efficiency. This course requires knowledge on numerical analysis and programming skill.

PREREQUISITE: ES 204 & CE 226

COURSE LEARNING OUTCOMES:

After completing the course, a student should be able to:
1. demonstrate understanding of the finite element method applied to structural dynamics problems, specifically on the derivation of element matrices and fully discretized equations from the governing partial differential equation,
2. implement the finite element method and time integration methods in a working program, and
3. analyze two- and three-dimensional models of structures and components subjected to dynamic loads

COURSE REQUIREMENTS:

1. Online Lectures / Discussions
2. Machine Exercises
3. Machine Problems
4. Project with Presentation
5. Journal Review with Presentation

TARGET AUDIENCE:

This course is intended for MS CE students (Thesis or Non-Thesis Track) who are interested in computational mechanics