Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

Expected Implementation in Academic Year	AY2024-25
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Structural Analysis 1
Course Code	CV2011
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CV1011 Mechanics of Materials
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to:
Provide you with the knowledge of the fundamental principles structural analysis;
Equip you with basic understanding of the theory and application of structural analysis trusses, beams and frames

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Differentiate between real structures and idealized systems, and the distribution of forces on structural systems.
ILO 2	Describe and explain concepts of loading, boundary condition, and equilibrium of systems in structural analysis
ILO 3	Identify and determine the physical response of structures to loading and the effect this has on the response
ILO 4	Perform basic calculations to determine internal forces of truss structures and appreciate the importance of structural analysis in the design of practical structures.
ILO 5	Perform basic calculations to determine internal forces of frame structures and appreciate the importance of structural analysis in the design of practical structures.
ILO 6	Perform basic calculations to determine deflections of simple beam and frame structures
ILO 7	Perform basic calculations to determine deflections of simple truss structures

Course Content

1. Structural forms and classifications. Loads. Structural analysis and design.
2. Idealized structures. Principle of superposition. Equations of equilibrium, Internal forces, Free body diagrams.
3. Structural stability, Stability evaluation through nominal degree of freedom; Static determinacy, Static aspects of structures
4. Introduction to planar trusses, Stability and determinacy of trusses
5. Analysis of planar trusses
6. Analysis of simple beams
7. Analysis of simple frames
8. Deflections of beams: The double integrating method
9. Deflections of beams: Moment-Area Method
10. Deflections of beams: Moment-Area Method
11. Deflections of beams: energy methods: Principle of Work and Energy, Principle of Virtual Work (PVW)
12. Deflections of trusses: Principle of Virtual Work (PVW)
13. Deflections using energy methods: Other Types of Virtual Strain Energy

Reading and References (if applicable)

1. R.C. Hibbeler, “Structural Analysis”. Pearson Prentice-Hall, 9th Edition, 2014.
2. H, West, Harry; L.F. Geschwinder “Fundamentals of structural analysis” Wiley, 2nd ed. 2002.
3. J.M. Gere, “Mechanics of Materials”. Thomson Brooks/Cole, 6th Edition, 2004

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Scope of the course. Introduction. Structural forms and classifications. Loads. Structural analysis and design.	1			Lectures & Tutorial
2	Idealized structures. Principle of superposition. Equations of equilibrium, Internal forces, Free body diagrams. Structural stability, Stability evaluation through nominal degree of freedom; Static determinacy, Static aspects of structures	2			Lectures & Tutorial
3	Introduction to planar trusses, Stability and determinacy of trusses, Analysis of planar trusses	3			Lectures & Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
4	Analysis of planar trusses II Analysis of simple beam I: internal forces and their sign convention	3, 4			Lectures & Tutorial
5	Analysis of simple beam II: shear force and bending moment functions	4, 5			Lectures & Tutorial
6	Analysis of simple frame I: shear force and bending moment diagrams	5			Lectures & Tutorial
7	Analysis of simple frame II: shear force and bending moment diagrams				Lectures & Tutorial
8	Deflections of beams: Deflection Diagrams and Elastic Curves	6			Lectures & Tutorial
9	Deflections of beams: The double integration method; Macaulay's Method				Lectures & Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
10	Deflections of beams: Moment-Area Method (theorems)				Lectures & Tutorial
11	Deflections using energy methods: Principle of Work and Energy, Principle of Virtual Work (PVW)				Lectures & Tutorial
12	Deflections using energy methods: Deflections of truss by PVW, Deflections of Beams by PVW	6,7			Lectures & Tutorial
13	Deflections using energy methods: Deflections of Frames by PVW; Other Types of Virtual Strain Energy	6,7			Lectures & Tutorial

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Weekly lectures to provide you with the specific knowledge and techniques to achieve the learning outcome stated above.
Tutorials	Weekly tutorials to enable you to apply the knowledge to solve structured problems. We encourage you to explore alternative approaches and techniques.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Description of Assessment Component	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Others([final examination])	All	EAB SLOs (a),(b),(c), (e)	60		Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(Quiz 1)	1,2,3,4	EAB SLOs (a), (b),(c)	20		Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Test/Quiz(Quiz 2)	5,6	EAB SLOs (a), (b),(c)	20		Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

Formative Feedback

Feedback will be through the dissemination of the student's performance in quizzes as well as review of the quiz questions in class.
We encourage you to initiate an Individual consultation sessions on your particular learning needs.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Creative Thinking	Basic
Decision Making	Basic
Problem Solving	Basic
Critical Thinking	Basic
Design Thinking	Basic

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

The standing university policy governing student responsibilities shall apply.
No special policy for this course.

Policy (Absenteeism)

NA

Policy (Others, if applicable)

Last Updated Date: 31-10-2025 15:23:50

Last Updated By: YANG En-Hua