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

Course Overview

Expected Implementation in Academic Year (New format)	
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	Civil Engineering Laboratory A
Course Code	CV2711
Academic Units	1
Contact Hours	30
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

Laboratory work is an integral part of engineering training provided at NTU. It complements the lectures and tutorials, and provides a form of visual aid to theories which are often difficult to explain in words. Laboratory session aims to provide the studentsprovide you with a hands-on practical experience in collecting, analyzing and discussing experimental data in relation to the theories learned in lectures.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Carry out experiments and verify theories in CEE courses relating to fluid mechanics, environmental engineering, soil mechanics and mechanics of materials.
ILO 2	Carry out investigative open-ended projects to include independent methodology to relate theories and principles to experimental results on various test apparatuses relating to above courses.
ILO 3	Estimate percent uncertainty in experimental data and results.
ILO 4	Analyse, interpret and infer from experimental data and results.
ILO 5	Write a project report with professional and technical competency and clarity.

Course Content

EXPERIMENT CODE	TITLE OF EXPERIMENT	LABORATORY
A-1 (WR)	Hydrostatic Forces - Centre of Pressure	Hydraulics Studio
A-2 (WR)	The Energy Principle – Discharge Through an Orifice	Hydraulics Studio
A-3 (WR)	Impact of a Jet	Hydraulics Studio
A-4 (WR)	Friction Losses in Pipe Flow	Hydraulics Studio
A-5 (EN)	Water Quality Analysis	Environment Lab
A-6 (EN)	Wastewater Quality Analysis	Environment Lab
A-7 (GE)	Atterberg Limits and Grain Size Analysis	Geotechnics Lab
A-8 (GE)	Permeability and Quick Sand Model Observation	Geotechnics Lab
A-9 (CT)	Torsion	Protective Engineering Lab
A-10 (CT)	Beam Bending	Protective Engineering Lab

Reading and References (if applicable)

Lab manuals will be provided at the beginning of the semester, which include related theories and test procedure, as well as lab report requirement.

Planned Schedule

Week or Session	Topics or Themes	ILO	Delivery Mode	Activities	Readings
1	The lab sessions start from week 2, and will usually end at week 12. The schedule is determined each semester in line with the course content listed above.	1-5	In-person	Manuals, experimental procedure, data analysis, discussion, report writing	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Attend briefing	Learn theoretical foundation and test procedure (ILO -1).
Conduct experiments	Learn hands-on practical experience (ILO – 2,3).
Write Lab report	Learn skills on collecting, analysing and discussing experimental data (ILO – 1,3,4,5).

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	Continuous Assessment (CA): Others(Each Lab session - Group Test, Individual Report)	1 to 5	LO 1 to 5 CEE SLOs: (b), (e), (f), (j) EAB SLOs: (d), (e), (f), (h)	100		Team	Holistic	Relational

Description of Assessment Components (if applicable)

Proposed new Civil Engineering Programme SLOs (2017):

Knowledge

(a) Competence in mathematics, science, information technology and modern engineering tools for the solution of civil engineering and sustainable infrastructure development problems;

Skills

(b) Ability to design and conduct experiments, analyse and interpret data, and synthesise valid conclusions for problems related to civil engineering and sustainable infrastructure development;

(c) Ability to design a system, component, or process, and synthesise solutions for complex problems in civil engineering and sustainable infrastructure development to achieve desired needs and understand the solutions' limitations;

(d) Ability to identify, formulate, research through relevant literature review, and solve civil engineering and sustainable infrastructure development problems reaching substantiated conclusions;

(e) Ability to use state-of-the-art techniques, skills, and modern engineering tools necessary for civil engineering and sustainable infrastructure development practices with appropriate considerations for public health and safety, cultural, societal, and environmental constraints;

(f) Ability to communicate effectively;

Professional awareness and insight

(g) Ability to acquire knowledge for continual professional development in civil engineering through lifelong learning or pursue graduate study and recognize its importance;

(h) Awareness of the impact of civil engineering solutions in a societal context and to be able to respond effectively to the needs for sustainable development;

(i) Ability to function effectively within multi-disciplinary teams and understand the fundamental precepts of effective civil engineering and sustainable infrastructure project management;

(j) Ability to recognize the importance of ethics, and the need to uphold high moral standards in relation to professional conduct and apply appropriate ethical principles in practices

EAB's generic graduate attributes (SLOs)

Engineering knowledge: Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

Problem Analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

Investigation: Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

The engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long Learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Formative Feedback

The reports submitted by the students will be marked by TAs, who will enable you to see your progress via the feedback they receive through the reports and the lab sessions.

NTU Graduate Attributes/Competency Mapping

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

Attributes/Competency	Level
Care for Environment	Basic
Collaboration	Basic
Curiosity	Basic
Influence	Intermediate
Problem Solving	Intermediate

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)

Students must follow the lab protocols and regulations stated during the safety briefings at all times.

Policy (Absenteeism)

Policy (Others, if applicable)

This course will adopt NTU's policy on the use of AI for take-home assignments and reports, and project reports and presentation slides. More details could be found via the link https://entuedu.sharepoint.com/sites/Student/dept/ctlp/SitePages/Exploring-the-Impact-of-Generative-Artificial-Intelligence-(GAI)-Tools-on-Education.aspx#1-proper-citations-and-acknowledgements

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Last Updated By: Siti Nur Amirah Binte Suhari