COURSE CONTENT

Academic Year	2023-2024	**Semester**	2
Course Coordinator			
Course Code	CV2712		
Course Title	Civil Engineering Laboratory B		
Pre-requisites	NIL		
No of AUs	1		
Contact Hours	Total: 30 Hours (Laboratory: 30 hours)		
Proposal Date	12 September 23		

Course Aims

This course is open to Year 2 students in the second semester. This course aims to verify the theories taught in class with practical experiments to enhance their learning experience. This is such that you can gain relevant exposures and develop practical understanding of the theories learned.

Course Learning Outcomes (Course LO)

By the end of this course, you shall be able to:

1. Carry out experiments and verify theories in CEE courses relating to civil engineering materials, environmental engineering and soil mechanics.
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.
3. Estimate percent uncertainty in experimental data and the results.
4. Analyse, interpret and infer from experimental data and results.
5. Write a project report with professional and technical competency and clarity.

Course Content

S/N	Topic	Lecture Hrs	Lab Hrs
1	Los Angeles abrasion and polished stone value	-	2
2	Concrete designing & mixing, casting, demoulding and slump test	-	4
3	Tests on hardened concrete & tensile test of reinforcing bars	-	3
4	Solids analysis	-	3
5	10% fines / sand equivalent tests	-	3
6	Marshall test, bitumen penetration & softening point	-	3
7	Compaction	-	3
8	One-dimensional consolidation test	-	3
9	Shear strength of sand	-	3
10	Shear strength of clay	-	3
	Total:	-	30

Assessment

Components	Course LO tested	Related programme SLO or graduate attributes	Weighting	Team/ Individual	Assessment rubrics
1. Laboratory Experiments: Log-sheets	1, 2, 3, 4	EAB SLOs (a), (b), (c), (d), (i), (j)	60%	Team	Refer to Appendix 1
2. Laboratory Experiments: Formal Reports	1, 2, 3, 4, 5	EAB SLOs (a), (b), (c), (d), (i), (j)	40%	Individual	Refer to Appendix 1

*CEE SLOs = Student Learning Outcome For Civil Engineering Programme (Per BEng Civil Engineering Accreditation)

Related Programme LO or Graduate Attributes

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

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

c. **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.

d. **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

e. **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.

f. **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.

g. **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.

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

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

j. **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.

k. **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.

l. **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

1. Feedback will be through the dissemination of the student's performance in their grades obtained through the submission of log-sheets and formal report.

Learning and Teaching approach

Approach	**How does this approach support students 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.

Textbooks/References:

1. Lab Manual

Course Policies and Student Responsibilities

The standing university policy governing student responsibilities shall apply.

No special policy for this course.

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. 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 If you are uncertain of the definitions of any of these terms, you should go to the Academic Integrity Handbook for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email

Planned Weekly Schedule

Week	Topics	Course LO	Activities
1	Los Angeles abrasion and polished stone value	1, 2, 3, 4, 5	Lab Session
2	Concrete designing & mixing, casting, demoulding and slump test	1, 2, 3, 4, 5	Lab Session
3	Tests on hardened concrete & tensile test of reinforcing bars	1, 2, 3, 4, 5	Lab Session
4	Solids analysis	1, 2, 3, 4, 5	Lab Session
5	10% fines / sand equivalent tests	1, 2, 3, 4, 5	Lab Session
6	Marshall test, bitumen penetration & softening point	1, 2, 3, 4, 5	Lab Session
7	Compaction	1, 2, 3, 4, 5	Lab Session
7	One-dimensional consolidation test	1, 2, 3, 4, 5	Lab Session
8	Shear strength of sand	1, 2, 3, 4, 5	Lab Session
9	Shear strength of clay	1, 2, 3, 4, 5	Lab Session
10	Los Angeles abrasion and polished stone value	1, 2, 3, 4, 5	Lab Session

Appendix 1: Assessment Rubric

	Performance Level/Criteria			
Performance Indicators/ Course LO Tested	**Outstanding: 4**	**Good: 3**	**Average, meet expectation: 2**	**Below expectations: 1**
Carry out experiments and verify theories /LO(1) and (2)	Excellent ability in understanding key concepts/theories involved in the experiment	Good ability in understanding key concepts/theories involved in the experiment	Ability in understanding key concepts/theories involved in the experiment	Unable to understand key concepts/theories involved in the experiment
Estimate uncertainties and analyse data /LO(3) and (4)	Excellent ability in estimating uncertainties and performing data analysis	Good Ability in estimating uncertainties and performing data analysis	Ability in estimating uncertainties and performing data analysis	Unable to estimate uncertainties and analyse data
Write a report/LO(5)	Excellent ability in presenting results and completing a report	Good Ability in presenting results and completing a report	Ability in presenting results and completing a report	Unable to present results and complete a report