NANYANG TECHNOLOGICAL UNIVERSITY

COURSE CONTENT

Academic Year	AY2017/18	**Semester**	1
Course Coordinator	A/P Low Bak Kong		
Course Code	CV4110		
Course Title	Excavation & Retaining Walls		
Pre-requisites	CV3013 Foundation Engineering		
No of AUs	3		
Contact Hours	Lecture: 26 hrs; Tutorial: 13 hrs; Lab: 0 hrs		
Proposal Date	29 Nov 2017		

Course Aims

This course aims to provide you with an in-depth understanding of the principals involved in the design and analysis of open and supported excavations, and retaining structures.

Course Learning Outcomes (Course LO)

By the end of this course, you (as a student) would be able to:

1. Explain the purpose of instrumentation for deep excavation support systems
2. Analyze and design for different failure modes of retaining walls
3. Design retaining wall and deep excavation support systems based on philosophy and procedures taught

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1	Shear strength of soils	2	1
2	Introduction to deep excavation	2	1
3	Groundwater control	2	1
4	Stability of excavations	2	1
5	Design of support systems	2	1
6	Ground movements	2	1
7	Construction monitoring	2	1
8	Lateral earth pressures and seepage pressures	2	1
9	Compaction pressures and externally applied loads	2	1
10	Backfilled walls	2	1
11	Reinforced soil walls	2	1
12	Cantilevered and propped walls	2	1
13	Anchored bulkheads	2	1
	Total:	26	13

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team /Individual	Assessment rubrics
1. Final Examination	1, 2, 3	EAB SLOs (a), (b), (e)	60%	Individual	

2. Continuous Assessment 1 (CA1): Quiz	1, 2, 3	EAB SLOs (a), (b), (e)	20%	Individual	
3. Continuous Assessment 2 (CA2): Quiz	2, 3	EAB SLOs (a), (b), (e)	20%	Individual	
Total			100%		

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 quizzes as well as review of the quiz questions in class.
2. Additional channel will be through individual consultation initiated by students on their particular learning needs.

Learning and Teaching approach

Class meets 3 hours per week in lecture/tutorial format.

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Formal lectures on the topics with in-class discussions
Tutorial	Formal tutorial on the topics with in-class discussions

Reading and References

1. Lecture slides; and additional reading materials where needed.
2. Recommended text and reference materials.

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. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website 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
A/P Low Bak Kong	N1-01b-40	6790-5270	cbklow@ntu.edu.sg
A/P Anthony Goh	N1-01b-41	6790-5271	ctcgoh@ntu.edu.sg

Planned Weekly Schedule

Two hours of lecture and one hour of tutorial.

The actual schedule will need to be adjusted to accommodate public holidays and official time off approved by University such as Union Day.

Week	Topic	Course LO	Readings/ Activities
1	Shear strength of soils	2, 3	Tutorials and Lectures
2	Introduction to deep excavation	2, 3	Tutorials and Lectures
3	Groundwater control	2, 3	Tutorials and Lectures
4	Stability of excavations	2, 3	Tutorials and Lectures
5	Design of support systems	2, 3	Tutorials and Lectures
6	Ground movements	2, 3	Tutorials and Lectures
7	Construction monitoring	1	Tutorials and Lectures
8	Lateral earth pressures and seepage pressures	2, 3	Tutorials and Lectures
9	Compaction pressures and externally applied loads	2, 3	Tutorials and Lectures
10	Backfilled walls	2, 3	Tutorials and Lectures
11	Reinforced soil walls	2, 3	Tutorials and Lectures
12	Cantilevered and propped walls	2, 3	Tutorials and Lectures
13	Anchored bulkheads	2, 3	Tutorials and Lectures