NANYANG TECHNOLOGICAL UNIVERSITY

COURSE CONTENT

Academic Year	AY 2021-22	**Semester**	1
Course Coordinator			
Course Code	EM5103		
Course Title	Water Resources Management		
Pre-requisites	None		
No of AUs	3		
Contact Hours	Lecture: 26 hours; Tutorial: 13 hours; Lab: 0 hour.		
Proposal Date			

Course Aims

To introduce the basic principles of the hydrological principles, water quality and quantity, and water treatment which are essential fundamentals for the design of water resources related projects.

Intended Learning Outcomes (ILO)

After the successful completion of this course, you should be able to:

1. Describe the fundamental knowledge of hydrological principles, precipitation, evaporation, surface runoff and unit hydrograph.
2. Apply the hydrological principles in flood routing and groundwater.
3. Describe the fundamental knowledge of water demand and supply, water pollution and water quality standards.
4. Apply the knowledge to assess on urban impacts, dissolved oxygen and eutrophication.
5. Apply the knowledge to water and wastewater treatment.

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1.	Hydrology, precipitation and evaporation	5	2
2.	Surface runoff, Unit hydrograph	4	2
3.	Flood routing, Groundwater	4	2
4.	Water demand and supply	2	1
5.	Water Pollution	3	1
6.	Water quality standards	1	1
7.	Urban Impacts	1	1
8.	Dissolved oxygen and eutrophication	3	1
9.	Water and wastewater treatment	3	2
	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, 4, 5	CVE SLO* a, c, e, g, j	60%	Individual	
2. Continuous Assessment 1 (CA1): Quiz 1	1, 2	CVE SLO* a, c, e, g, j	20%	Individual	
3. Continuous Assessment 2 (CA2): Quiz 2	3, 4, 5	CVE SLO* a, c, e, g, j	20%	Individual	
		Total	100%		

* EAB SLO stands for the Engineering Accreditation Board Student Learning Outcomes. The list is below:

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

The instructor (s) will provide feedback on your performance on the CA. Guidance will also be provided through active interactions during tutorial sessions and consultation meetings

Learning and Teaching approach

Class meets three times per week in lecture (2 hours) and tutorial (1 hour) format.

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Formal lectures on the topics with in-class discussion
Tutorial	This helps you to achieve one or more of the outcomes as you would need to work on tutorial questions using the concepts and principles taught in the lectures. (The class is split into groups for tutorials so that the instructor-student interaction can be more effective)

Reading and References

Textbooks:
1. Linsley, R.K., Franzini, J.B., Freyberg, D.L. and Tchobanoglous, G., "Water Resources Engineering", Mc Graw Hill International, 4th edition, 1992.
2. Chapra, S.C., "Surface Water Quality Modelling" Mc Graw Hill International, 1997, Reissued 2008 by Waveland Press, Inc..

References :
1. Tchobanoglous, G. and Schroeder, E.D., "Water Quality: Characteristics, Modelling and Modification". Addison-Wiley, 1985.
2. Hammer, M.J. and Hammer Jr, M.J., "Water and Wastewater Technology" 7th Edition, New International Edition, Pearson Prentice Hall, 2013.

Course Policies and Student Responsibilities

You are advised to go through the class material and related texts before the lecture. You are also encouraged to share and deliberate on the challenges and difficulties of the tutorial exercises during the tutorials.

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

Planned Weekly Schedule

Planned Weekly Schedule

Week	Topic	Course ILO	Readings/ Activities
1-3	Hydrology, precipitation and evaporation	1	5 lectures and 2 tutorials
3-5	Surface runoff, Unit hydrograph	1, 2	4 lectures and 2 tutorials
5-7	Flood routing, Groundwater	3	4 lectures and 2 tutorials
7-8	Water demand and supply,	4	2 lectures and 1 tutorials
8-10	Water Pollution and Water quality standards	5, 6	4 lectures and 2 tutorials
10-12	Urban Impacts and Dissolved oxygen and eutrophication	7, 8	4 lectures and 2 tutorials
12-13	Water and wastewater treatment	9	3 lectures and 2 tutorials