

Water Resource Systems

United Nations University (UNU-IAS)

Autumn 2022

Location: 6th fl., lecture room

Time: From October 2022 until Feb 2023

Lecturer: Jian Pu, Marcin Jarzebski

Contact Information : (pu@unu.edu)

Office Hours: by appointment

As of 22 July 2022 (Subject to change)

Course Description

Water resources are under immense pressure due to increases in water demand owing to population growth and expanded industrial and economic activity. The stress has been further exacerbated by increasing water pollution and global climate change. Adequate water quality and quantity are essential for the sustainable growth of any region or country. This course aims to provide a broad understanding of the hydrological processes, socio-economic development, global environmental changes, and their roles and interaction in water resources management. This course highlights integrated watershed management, providing watershed and system concepts. The course offers various issues related to water resources and sustainability through case studies and field visits.

Course Objectives and Learning Goals

The students will gain a comprehensive overview of water and its relation to human and environmental well-being. The students will be familiar with global and regional water-related issues and acquire basic knowledge and techniques to manage water-related problems.

Requirements and Grading Policy

Assessment will be based on class attendance, presentation and discussion, a short final test and extended essay with the following allocations;

- *Active attendance: 20 % of total marks (80 % attendance is required)*
- *Assignment: 50% of total marks (Critical review on topics chosen by the students based on the above lectures)*
- *Presentation: 30% of total marks (30 minutes presentation on water resource systems including question and answers, maximum number of slides not more than 30)*

Class Participation

The course requires students to attend all classes, to finish tasks in each class. At the discretion of the instructor, frequent late arrivals or absences may result in a lower grade. Please note that the first session is of particular importance and cannot be missed. Materials of each class will be shared by the instructor before the class.

Course Outline

Lecture No.	Title	Date	Instructors/Invited Speakers if any
1	The world's fresh water resources	Wednesday, October 12 th , 2022 ~ 14:00-15:40	TBD
2	Water resource sustainability and challenges to it	Wednesday, October 19 th , 2022 ~ 14:00-15:40	TBD
3	Water withdrawals and uses	Wednesday, October 26 th , 2022 ~ 14:00-15:40	TBD
4	Water for hydroelectric generation	Wednesday, November 2 nd , 2022 ~ 14:00-15:40	Jian Pu
5	Water excess and flood control	Wednesday, November 9 th , 2022 ~ 14:00-15:40	Dr. Jiaqi Liu
6	Risk analysis for hydrologic and hydraulic design	Wednesday, November 16 th , 2022 ~ 14:00-15:40	Dr. Jiaqi Liu
7	Water quality, water sanitation and pollution	Wednesday, November 30 th , 2022 ~ 14:00-15:40	Jian Pu
8	Water Nexus	Wednesday, December 7 th , 2022 ~ 14:00-15:40	Dr. Geetha Mohan (Speaker will be online)
9	Disinfection by-products in drinking water	Wednesday, December 14 th , 2022 ~ 14:00-15:40	Dr. Yu Yang (Speaker will be online)
10	Occurrence and distribution of microplastics in natural water	Wednesday, January 4 th , 2022 ~ 14:00-15:40	Dr. Lei Wang (Speaker will be online)
11	Resource and energy recovery from wastewater	Wednesday, January 11 th , 2022 ~ 14:00-15:40	Dr. Oskar Modin (Speaker will be online)

12	Field Trip	Wednesday, January 18 th , 2022 ~ 14:00-15:40	Jian Pu, TBD
13	Water and SDGs (Groupwork)	Wednesday, January 25 th , 2022 ~ 14:00-15:40	Jian Pu, TBD
14	Water and SDGs (Groupwork)	Wednesday, February 1 st , 2022 ~ 14:00-15:40	Jian Pu, TBD
15	Water and SDGs (Groupwork; Presentation)	Wednesday, February 8 th , 2022 ~ 14:00-15:40	Jian Pu, TBD

Course Readings

- *Water Resources Engineering* by Larry W. Mays, John Wiley & Sons, 2nd Edition, 2010.
- *IPCC AR5 WG 2 Summary report for policy makers, 2014.*
- *World Water Assessment Programme (2009): The United Nations World Water Development Report 3. Water in a Changing World, UNESCO, Part 1 (Ch. 1, 3, 5), Part 2(Ch. 7, 8), Part 3(Ch. 10,11)*
- *Water Evaluation and Planning System (2012): A collection of stand-alone modules to aid in learning the WEAP software (<http://www.weap21.org/index.asp?action=213>)*

Additional reading materials: to be determined and selected by instructors for each session.

Important Information

Class Conduct & Etiquette

Students are expected to arrive on time and not to engage in disruptive behavior during class. This includes, among other things, private side conversations, the use of cell-phones and other electronic devices, or the reading of newspapers. Cell-phones should be switched off and stored in the bag. We wish to create an atmosphere of open and tolerant discussion in the classroom and request students to recognize every individual's right to have an opinion. The lecturer and other students should be treated with dignity and respect, in particular in discussions on contentious political issues where a diversity of opinion is likely to arise. However, we also recognize that there are limits to tolerance and the lecturer reserves the right to request disciplinary action against any student who violates this policy or repeatedly shows disruptive behavior in class.

Academic Misconduct

If evidence of academic misconduct on tasks and final test should be found, the student may receive a failing grade for the entire course and will be reported to the appropriate authorities for disciplinary action.

Invited Speakers/Lecturers Bio

Dr. Yu Yang (Lecture 9)

Associate Professor, School of Environment; Director of Water Quality Control Process Research Institute, Beijing Normal University, China

Dr. Yu Yang is an Associate Professor of environmental engineering at Beijing Normal University. She got her PhD degree in The University of Tokyo in 2012. Her research interest is drinking water and wastewater treatment technologies, especially membrane technology. She has hosted or participated in various core research projects (e.g., “China National Natural Science Foundation”, “National Water Pollution Control and Treatment Science and Technology”, “Beijing Municipal Natural Science Foundation”, etc.), and published dozens of papers in top-level journals.

Dr. Lei Wang (Lecture 10)

Professor, Environmental Science, Nankai University, China

Dr. Lei Wang is a full Professor and Department Chair of Environmental Science, Nankai University (NKU), China. He has been the Deputy Director of the Ministry of China Education Key Laboratory of Pollution Processes and Environmental Criteria since 2016. His main research area is environmental geochemistry and the health risks of emerging contaminants. Professor Wang is the recipient/co-recipient of many national and international awards. He also serves as the Asian deputy editor of Bulletin of Environmental Contamination and Toxicology, and the editorial board member of Ecotoxicology and Environmental Safety.

Dr. Oskar Modin (Lecture 11)

Professor, Division of Water Environment Technology, Chalmers University of Technology

Dr. Oskar Modin got his PhD degree in The University of Tokyo in 2008. His research subject is environment biotechnology. He is particularly interested in how microbial communities function and how we can use them to recover resources from waste streams such as wastewater. A few examples of research areas include microbial electrochemistry (e.g., microbial fuel cells), anaerobic digestion, and aerobic granular sludge. Oskar is a member of the Bioresource Labs research group.

Dr. Geetha Mohan (Lecture 12)

Professor, Center for Far Eastern Studies, Toyama University, Japan

Geetha Mohan joined the Center for Far Eastern Studies (CFES) as a Professor in May 2022. He holds his doctoral degree in Economics from India. Before joining the University of Toyama, Dr Mohan worked as a Research Fellow at the United Nations University Institute for the Advanced Study of Sustainability. He has more than one decade of experience in sustainability science studies, climate change adaptation, impact assessment, the economics of climate change, water management, and impact assessment.