WATER FOR A SUSTAINABLE WORLD

Kyung Hee University

2022 Online Summer Program
Short Intensive Course

Program Schedule
August 1 - 5, 2022

Application Deadline
July 15, 2022

Contact

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WATER FOR A SUSTAINABLE WORLD

About the Program

While global water demand has been ever increasing, more areas all over the world are facing on water stress where both humans and ecosystems suffer from the lack of water and/or its low quality. Recent global crises further aggravate many issues related to water scarcity. The COVID-19 pandemic has been striking all aspects of our life and Disease X (currently unknown but potentially cause the next pandemic) may emerge in the future. Some of the pathogenic agents can be detectable in water, implying potential transmission through water cycles. Climate change causes frequent and severe flood, typhoon, and drought, significantly affecting global water sustainability. In line with the Sustainable Development Goal 6 (ensuring availability and sustainable management of water and sanitation for all) established by the United Nations, Kyung Hee University (KHU) aims to provide an international online educational platform towards ensuring global water sustainability. The short-intensive course brings diverse aspects of water resource management, water quality engineering, appropriate (green) technology for water and sanitation and international cooperation/policymaking that can improve global water sustainability against recent challenges.

Program Schedule

August 1 – 5, 2022 (One week)

Apply through

https://forms.gle/TFBoeZXR7iECXmS69

Application Deadline

July 15, 2022

Program Fee

USD 100

- Bank Name : HANA BANK
- Bank Address : 1732, Deogyeong-daero, Giheung-gu, Yongin-si, Gyeonggi-do 17104, Republic of Korea
- Swift Code : KOEXKRSE
- Name of Account Holder : Kyung Hee University, Global Campus (경희대학교국제캠퍼스)
- Account Number : 428-141962-00404

Prospective Participants/Attendees

The program is open to undergraduate students (freshman to senior) with any major across countries and officials, professionals, and scientists/engineers who are interested in future directions in water management and technology.

Program Activities

The program consists of core lectures on various specialized topics. The program brings together both internal (KHU) and guest scholars/experts from diverse countries (e.g., US and Asian countries). Course participants will be able to interact with the instructors in their interdisciplinary approach towards sustainable water management, treatment, and policy. Upon completion of all class hours and submission of a short essay, students will be given a certificate in which total hours and grades are shown.

Program Director

Seungdae Oh (Associate Professor, Department of Civil Engineering, Kyung Hee University)

Time Table (Tentative)

TIME & DATE	MON Aug 1	TUE Aug 2	WED Aug 3	THU Aug 4	FRI Aug 5
10:00-11:00 (KST)	[Orientation & Overview] (30min)	**[Lecture 3]** Climate Change and Water Cycle : The Role of Earth Observation Big Data	**[Lecture 5]** Drinking Water Treatment	**[Lecture 7]** Water-Energy Nexus : Opportunity for Sustainability	**[Lecture 10]** Climate Change and ESG Management
11:00-12:00 (KST)	**[Lecture 1]** Current Status of COVID-19 and Other Waterborne Viral Diseases		**[Lecture 6]** Appropriate Technology for Water and Sanitation	**[Lecture 8]** Wastewater Engineering for Sustainable Management of Urban Water Cycle	
13:00-14:00 (KST)	**[Lecture 2]** Reservoir Management to Enable Sustainable Provision of Clean Water: Cultural and Conservation Park of Sawahlunto	**[Lecture 4]** Drinking Water Distribution Network : From Theory to Application	[Cultural Exchanges] Korean Language Class 2	**[Lecture 9]** Ground Water : Pollution and Remediation Strategies	[Special Lecture] Drinking Korea : Tea, Tisanes, and Potables (Potent and Otherwise)
14:00-15:00 (KST)		[Cultural Exchanges] Korean Language Class 1		[Cultural Exchanges] Taekwondo	[Closing] (30min)

*It is subject to change

Courses

	Title	Hours	Instructor
1	Current Status of COVID-19 and Other Waterborne Viral Diseases	1	Dongwan Yoo University of Illinois at Urbana-Champaign, USA
2	Reservoir Management to Enable Sustainable Provision of Clean Water: Cultural and Conservation Park of Sawahlunto	1	Doddi Yudianto Parahyangan Catholic University, Indonesia
3	Climate Change and Water Cycle : The Role of Earth Observation Big Data	2	Seokhyeon Kim Kyung Hee University
4	Drinking Water Distribution Network : From Theory to Application	1	Doosun Kang Kyung Hee University
5	Drinking Water Treatment	1	Seok-Oh Ko Kyung Hee University
6	Appropriate Technology for Water and Sanitation	1	Sharf Ilahi Siddiqui University of Delhi, India
7	Water-Energy Nexus: Opportunity for Sustainability	1	Jin Gi Hong California State University Long Beach, USA
8	Wastewater Engineering for Sustainable Management of Urban Water Cycle	1	Seungdae Oh Kyung Hee University
9	Ground Water: Pollution and Remediation Strategies	1	Rheo B. Lamorena-Lim University of the Philippines- Diliman, Philippines
10	Climate Change and ESG Management	2	Hyungna Oh Kyung Hee University
	Total Hours	12	

Special Lecture & Cultural Exchanges

	Title	Hours	Instructor
1	Drinking Korea : Tea, Tisanes, and Potables (Potent and Otherwise)	1	Jennifer Flinn Kyung Hee University
2	Korean Language Class 1, 2 : K-Pop & K-Drama Korean	2	Hye-lyeong Jeong Kyung Hee University
3	Taekwondo (Korean Traditional Martial Art)	1	TBA
	Total Hours	4	

Lecture Title: Current Status of COVID-19 and Other Waterborne Viral Diseases

Instructor: Dongwan Yoo

Email: dyoo@illinoise.edu

Profile

Dongwan Yoo is a Professor in the Department of Pathobiology of the University of Illinois at Urbana-Champaign (UIUC), USA. Prior to UIUC, Dr. Yoo was an Assistant Professor and an Associate Professor at the University of Guelph, Ontario, Canada. He is a virologist by training and is interested in virus-host cell interactions. Viruses infect humans, animals, plants, and microbes, and many human illnesses are caused by viruses. Viruses infecting domestic animals can cause enormous economic and societal impacts, and many animal viruses can cross species-boundaries to infect humans. Dr. Yoo uses two viruses that belong to the same group as the COVID-19 virus as models to understand viral strategies for evasion from host innate immunity. Dr. Yoo has developed a reverse genetics system for these viruses and can generate specifically defined mutant viruses in vitro. Using this system as a genetic tool, he studies the function of individual viral proteins and the pathogenic mechanisms for viral diseases in natural host animals.

Course Description

The lecture will describe the general characteristics of viruses, infections caused by waterborne viruses, and emerging and emerged coronaviruses. COVID-19 is a newly identified viral disease that has been causing significant impacts on public health and global economy, and the discussion on COVID-19 will be the major focus in the lecture. Enteric viruses are shedding in excretions during infection and contaminate water and environments. Thus, these viruses are primarily transmitted to other individuals via fecal-oral route for further spread. COVID-19 is a respiratory virus but can cause diarrhea and spread via contaminated water. Other viral agents transmitted by water will also be discussed. The lecture will include the receptor usages of coronaviruses, the detection and diagnosis, and the current strategy of vaccination for prevention and control. In the end of the lecture, students will understand the basic mechanisms for zoonotic transmissions from animals to humans and potential outbreaks of new infections.

Key Learning Outcomes:

Upon completion of the lecture, students will be able to

- Understand the basic biology of coronaviruses
- Define waterborne viruses transmitted via contaminated water and their transmissions
- Vaccination and prevention of COVID-19

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Wang C, Wang Z, Wang G, Lau JYM, Zhang K, Li W. COVID-19 in early 2021: Current status and looking forward. Signal transduction and targeted therapy. 2021, 6:114

Lecture Title: Reservoir Management to Enable Sustainable Provision of Clean Water: Cultural and Conservation Park of Sawahlunto

Instructor: Doddi Yudianto

Email: doddi_yd@unpar.ac.id

Profile

Doddi Yudianto finished his undergraduate in March 1999 at Parahyangan Catholic University (UNPAR), Bandung, West Java, Indonesia and was awarded a Bachelor of Civil Engineering. In September 2001, he obtained the British Chevening Awards sponsored by the Thames Water UK in association with the British Government. Under that particular full scholarship, he pursued a MSc. degree in Water and Environmental at University of Surrey, Guilford, UK. His thesis was entitled "Hydrological Characteristics of the Upper Citarum Catchment". In July 2003, he formally joined the Department of Civil Engineering of UNPAR as lecturer and is responsible for the delivery of urban hydrology and hydraulics courses. Three years after, he enrolled a Ph.D. program under full scholarship of Hohai University. During his Ph.D. studies, he developed a numerical model and modified the kinetic equations employed in biological degradation to optimize the implementation of bioremediation of urban stream. Recently, he has more research works done in field of flood management, sustainable urban drainage, water security, surface water quality modeling, and community empowerment to enhance river restoration. So far, he has published about 100 academic papers. While at university, he also experiences several structural positions such as deputy of civil engineering department, head of civil engineering department, vice dean for academic affairs, head of hydraulics laboratory, and now is taking a role as dean of faculty of engineering.

Course Description

The lecture will provide an introduction on the rainfall management as regard to the provision of clean water. Reservoirs are a common way to store and retain water serving for a multitude of purposes like storage of drinking and irrigation water, recreation, flood protection, navigation, and hydropower production, and have been built since centuries. It is therefore this lecture will explain about the basic concept of reservoir design and simulation in order to be able to estimate the necessary space to store the required water. Integrated and Sustainability principles will also be introduced to the participants. As a case study, this lecture will explain about the rainfall management applied in the development of ex coal mining land to be a cultural and conservation park of Sawahlunto

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to
- Explain the general concept of rainfall management
- Explain the necessity of reservoir and influencing factors in estimating the required capacity
- Conduct the reservoir simulation

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Hydrological Dimensioning and Operation of Reservoirs Practical Design Concepts and Principles
- Reservoir Design and Operation for the Food-Energy-Water Nexus

Lecture Title: Climate Change and Water Cycle: The Role of Earth Observation Big Data

Instructor: Seokhyeon Kim

Email: shynkim@khu.ac.kr

Profile

Seokhyeon Kim is an assistant professor in the Department of Civil Engineering at Kyung Hee University. Seokhyeon Kim received the B.E. and M.E. degrees from Korea University, Seoul, South Korea, in 2001 and 2008, respectively, and the Ph.D. degree from the University of New South Wales (UNSW), Sydney, NSW, Australia, in 2017. Prior to joining KHU, he had worked in Hyundai Engineering and Construction as an engineer and in UNSW Water Research Centre as a research associate. Central to research areas has been the role satellite remote sensing retrievals can play in improving hydrologic modelling and assessment, be it in the context of satellite data merging, flood prediction, deciphering climate change impact, predicting cyanobacterial blooms or soil moisture depletion, or simply assessing and reducing uncertainties to make predictions reliable. Throughout the research career, he has endeavored to improve predictions to benefit underprivileged communities that are often the most remote, unprepared, and underserviced to face the brunt of the low and high extremes that characterize hydrology.

Course Description

More frequent and severe natural disasters resulting from climate change are threatening our societies and economies. In addition to developing scientific knowledge about climate change and extreme weather, the course aims to inspire students to take a broader view of environmental issues and the role of satellite remote sensing as tools for observing the Earth. To effectively achieve this goal, the course introduces students to Earth's water cycle, including the historical five mass extinctions, the Anthropocene, and the 6th mass extinction; Earth's system consists of four spheres; Climate and climate change; overview of satellite remote sensing. This course also assesses the potential impacts of climate changes and extremes on social, economic, and environmental sustainability through a multidisciplinary approach. Lastly, case studies highlighting the link between extreme events (e.g., drought and flood) and global warming caused by greenhouse gases are introduced and students are asked to give their thinking based on their understanding.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Critical thinking and balanced perspective on climate change issues
- Understanding the physical mechanisms behind anthropogenic climate change and how they cause more frequent and severe weather events.
- Raising awareness of environmental issues related to climate change and ultimately promoting environmentally friendly behavior and sustainable lifestyles.
- The role of satellite remote sensing on water cycle and climate change studies

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Yang, J., Gong, P., Fu, R., Zhang, M., Chen, J., Liang, S., ... & Dickinson, R. (2013). The role of satellite remote sensing in climate change studies. Nature climate change, 3(10), 875-883.
- How Is Climate Change Impacting the Water Cycle? https://www.climaterealityproject.org/blog/climate-change-impacting-water-cycle
- Ma, Y., Wu, H., Wang, L., Huang, B., Ranjan, R., Zomaya, A., & Jie, W. (2015). Remote sensing big data computing: Challenges and opportunities. Future Generation Computer Systems, 51, 47-60.

Lecture Title: Drinking Water Distribution Network: From Theory to Application

Instructor: Doosun Kang

Email: doosunkang@khu.ac.kr

Profile

Doosun Kang is currently a professor in the Department of Civil Engineering at Kyung Hee University. He earned his PhD and conducted postdoctoral research at the University of Arizona, US. His research interests are understanding uncertainties in water systems, development and application of optimization algorithms, scenario-based system planning, design and management to improve flexibility and robustness of urban infrastructure, optimal design and operation of water system for long-term sustainable water supply, water reclamation (reuse), advanced water distribution system (WDS), renewable energy production from water distribution networks, community disaster resilience assessment and modeling, and understanding water-energy-food nexus and its applications and modelling.

Course Description

The lecture will provide an overview of a drinking water distribution system. Water utilities in general are responsible to construct, operate, and maintain water supply systems. The basic function of these water utilities is to obtain water from a source, treat the water to an acceptable quality, and deliver the desired quantity of water to the appropriate place at the appropriate time. In many cases in the developing country, water utilities failed to meet the demand due to not only limited sources but also insufficient infrastructures. Leakage and aging are other issues that also influence the reliability of water delivery to customers. This lecture is aimed to explain the theory of water distribution system, component of water distribution system, how it is designed to supply the required water for various purposes, and challenges identified in design and operation of these complex networks. Various state-of-the-art techniques applicable to water networks are also discussed.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Understand the basic theory behind the complex water distribution systems
- Understand the process of design and operation of water pipe networks
- Outline research challenges on sustainable water supply and management
- Have a vision to combine 4th revolution techniques into water networks design/operation

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Water Distribution Systems Handbook, Larry Mays, McGraw-Hill, ISBN (978-0071342131)

Lecture Title: Drinking Water Treatment

Instructor: Seok-Oh Ko

Email: soko@khu.ac.kr

Profile

Seok-Oh Ko is a full Professor of Department of Civil Engineering, Kyung Hee University, Republic of Korea. Prof. Ko holds B.S. (1987) at Korea University, M.Sc. (1989) at Korea Institute of Science and Technology and Ph.D. (1998) from the Texas A&M University. Prof. Ko also held Visiting Professorships in the Department of Environmental Engineering of Clemson University. Prof. Ko's academic background covers hazardous waste management, physico-chemical treatment of emerging contaminants, and soil and groundwater remediation. Prof. Ko also has experience in practical design of water and wastewater treatment processes. He is currently serving as a dean of Academic Affairs at Kyung Hee University. He is also serving as a President of Korea Society of Environmental Engineers (KSEE). Together with graduate students and colleagues, Prof. Ko has published over 60 research papers(SCI/SCIE) in the development of physico-chemical treatment of toxic organic/inorganic contaminants in water/wastewater, best management plans for nonpoint source pollutants, remediation of soils and groundwater contaminated with hazardous materials. He was nominated as an excellent researcher by a number of academic association and Ministry of Environment.

Course Description

This course describes general methods for the facilities and processes needed to provide sufficient quantities and safe water to end users. Through course, you will understand each of the methods in the water intake, transport, processing, distribution and water supply systems. In particular, the characteristics of each unit process are examined for the physical and chemical water purification processes to produce and supply the safe water. It includes an assessment of the applicability of the physical and chemical processes applied to optimal removal of contaminants in water. It also includes an introduction of oxidation techniques for the treatment of toxic trace pollutants that have recently become an issue. This course will foster knowledge to judge the engineering applicability of various constant systems.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Types of basic facilities required for water supply systems
- Types and characteristics of contaminants present in water
- Each method and type of process for removing contaminants from the water supply
- Engineering judgment standards for optimal application of water treatment system

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Hammer and Hammer, Jr., Water and Wastewater Technology, 6th edition, Prentice Hall, 2008

Lecture Title: Appropriate Technology for Water and Sanitation

Instructor: Sharf Ilahi Siddiqui

Email: sharf_9793@rediff.com; sharfillahi@ramjas.du.ac.in

Profile

Sharf Ilahi Siddiqui is currently an assistant professor in the Department of Chemistry, Ramjas College, University of Delhi, India. Prior to joining University of Delhi, he was an assistant professor in the Department of Industrial Chemistry, at Gautam Buddha University, in India. Sharf Elahi Siddiqui has earned his Ph.D. degree in Chemistry from Jamia Millia Islamia University, New Delhi, India. He has done his Master's in Chemistry from Department of Chemistry, Aligarh Muslim University and MPhil from Department of Chemistry, Kanpur University, Kanpur. He is particularly interested in the wastewater treatment using advance materials based on the natural plant materials and nanoparticles, and during his Ph.D., has concentrated upon preparation of multifunctional organic-inorganic nanocomposite having the application properties in the area of photo-catalysis, adsorption, antioxidant and antibacterial. He has developed the low-cost multifunctional material by mixing a low cost and abundant phytogenic plant materials and lower toxic nanoparticles having unique properties. These materials can introduce extraordinary multifunction properties for water treatment having application properties of magnetic separation, photo-catalysis, adsorption and antibacterial properties. He has published several research papers in the peer journals like Journal. He has also published several review papers and book chapters, which cover the recent advancement in the field of water treatment.

Course Description

The variety of challenges are associated with existing adsorbents (e.g., activated carbon) in water treatment technology, although, researchers and scientists are engaged in the development of economical and effective treatment methods. Lots of efforts have been made either to enhance the water treatment efficiency of adsorbents and/ or achieve the alternatives of existing adsorbents, to get the suitable materials having properties of adsorptive removal of variety of water pollutants, photocatalytic degradation of degradable pollutants, inhibition of growth of infectious microbes, and post adsorption magnetic separation. Therefore, in this lecture various concepts related to the current issue of water contamination, health risk assessment, and water treatment technology based on adsorption will be delivered. The lecture will provide an interactive platform where course participants discuss adsorbents from early history (e.g., activated carbon) to recent advances (e.g., natural plant based materials) for wastewater treatment. The session begins with discussing the sources of potential contamination. This goes on to analyze the various methods of water contamination, assess health risk, and adverse effects on those impacted, and concludes with exploration of efficient low-cost treatment technologies that remove toxic pollutants from the water. This lecture incorporates both theoretical and practical information that will be useful for graduate students to understand the water contamination, environmental and health impacts, and the management and treatment of water resources.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Explain the current issue of water contamination, health risk assessment, and water treatment technology based on adsorbents
- Explore extensively the adsorption, photocatalyst, and antimicrobial properties of natural material based adsorbents.
- Implement the current results in environmental issues

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Contamination of Water-Health Risk Assessment and Treatment Strategies, 2021, Ahamad, A., Siddiqui, S.I., and Singh, P., Elsevier, ISBN 978-0-12-824058-8

Lecture Title: Water-Energy Nexus: Opportunity for Sustainability

Instructor: Jin Gi Hong

Email: JinGi.Hong@csulb.edu

Profile

Jin Gi Hong is currently an Associate Professor in the Department of Civil Engineering and Construction Engineering Management at California State University, Long Beach. His research interests include membrane-based technology for water and wastewater treatment, reverse electrodialysis for salinity gradient energy generation, sustainable waste-to-energy systems, and application of nanomaterials for membrane development. Dr. Hong also had worked for Korea Water Resources Corporation (K-water) as a civil engineer, involved in various water facility construction projects including Gyeongin Ara Waterway. He serves Korean-American Scientists and Engineers Association-Southern California as a president-elect starting this August, 2022. He holds a PhD in Environmental Engineering from Georgia Institute of Technology and MS in Environmental Engineering from Cornell University.

Course Description

The lecture will overview the current state of water and energy availability, consumptions, challenges, and some of the conventional and clean technologies associated with water and energy practices. This lecture will also introduce one of the emerging and renewable energy technologies that utilize water and provide potential efforts to establish sustainable water-energy nexus using the process. Also, using the example, the class will discuss some of the approaches and challenges on how we could integrate water and energy systems considering its limiting and non-renewable situations.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Define current water and energy status and environmental issues
- Identify the new approach to secure clean energy and water and their challenges

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- International Energy Agency (IEA), (2022), Data and Statistics (iea.org/data-and-statistics)
- International Renewable Energy Agency (IRENA), (2014), Salinity Gradient Energy Technology Brief (https://www.irena.org/publications/2014/Jun/Salinity-gradient)

Lecture Title: Wastewater Engineering for Sustainable Management of Urban Water Cycle

Instructor: Seungdae Oh

Email: soh@khu.ac.kr

Profile

Seungdae Oh is currently an associate professor in the Department of Civil Engineering at Kyung Hee University. Prior to joining KHU, he was an assistant professor in the School of Civil and Environmental Engineering at Nanyang Technological University in Singapore and a postdoctoral research associate at University of Illinois at Urbana-Champaign. He is interested in diverse aspects of environmental microbiology, bioprocess engineering/modeling, and bioinformatics. Ongoing research projects are related to artificial intelligence modeling of environmental systems, 3D printing synthesis/application of biocomposite/adsorbent, sewage-based epidemiology, and abatement technologies of emerging contaminants (e.g., chemical, antibiotic resistance, and pathogen). One of his works in the areas of water engineering has been featured in Emerging Investigators Series 2020 in the journal of Environmental Science: Water Research and Technology.

Course Description

The lecture will provide an interactive platform where course participants discuss those from early history (e.g., sanitary engineering) to recent advances (e.g., water reclamation) of wastewater treatment. This lecture will expose the course participants to concepts of an urban water cycle, a natural/engineered cycling of water through cities and the critical role of wastewater systems such as collection systems, treatment, and reclamation. The instructor will discuss, with a primary focus, wastewater treatment options at varying levels: from conventional to advanced treatment technologies. The instructor will also present recent challenges (e.g., contaminants of emerging concern and infectious diseases/outbreaks) in the urban water cycle and potential technological solutions that can tackle those issues.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to
- Explain a treatment train of a conventional municipal wastewater treatment plant
- Distinguish advanced treatment options from conventional wastewater treatment
- Outline representative challenges on wastewater treatment and management

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

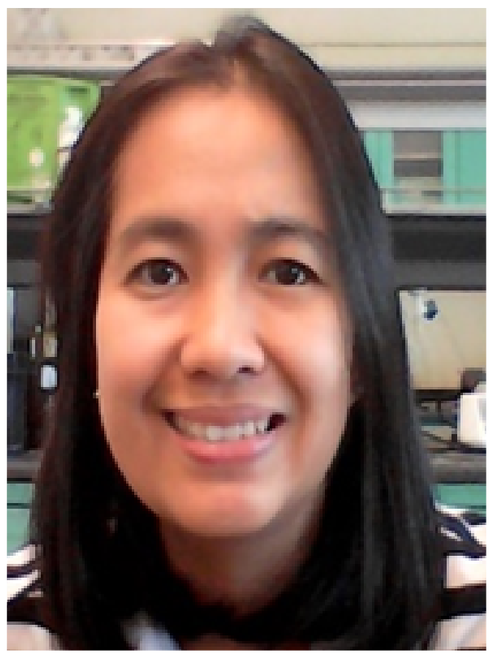
- Water and wastewater engineering, 2nd Edition, Mackenzie L. Davis, McGraw- Hil, ISBN (978-1260132274)

Lecture Title: Ground Water: Pollution and Remediation Strategies

Instructor: Rheo B. Lamorena-Lim

Email: rblamorenalim@up.edu.ph; rheolamorena@upd.edu.ph; rheolamorena9@yahoo.com

Profile



Rheo B. Lamorena-Lim is currently a Professor in the Institute of Chemistry, University of the Philippines-Diliman. She has joined the Institute since 2011 as an Assistant Professor. She got her tenure last 2017 and became full professor last 2019. Dr. Lamorena-Lim's main interests are alternative analytical methods on metal determination in environmental samples (such as soil and sediment samples), mineralization techniques in CO2 sequestration, and measurements of chemical composition of ambient particulate matter. She applies her knowledge in analytical chemistry and physical chemistry for understanding the phenomena in the environment to provide solutions or remediation technologies on environmental problems. Her publications and research outputs on these issues reflect her awareness on current environmental problems in the Philippines. Her spectroscopic studies for solid environmental samples (soil and particulate matter), mineralization/carbonation tech-

-nology studies for CO2 geological sequestration are promising fields of research in the Philippines. Her studies on developed analytical protocols offers up-to-date testing method, less laborious steps (e.g. cost-effective, do not require strong acids during preparation, and fast-turnaround time) including chemical waste disposal reduction.

Due to the dynamic and interdisciplinary nature of research, her other work involved oxidation processes on asphalt aging to understand road construction materials performance, understanding aerosol chemical properties and fabrication of mobile/ wearable sensors for pollutants.

Course Description

This course will first describe the chemical characteristics of groundwater and geochemical processes that could eventually contribute to groundwater pollution. Certain sources of groundwater pollution, as well as transport of chemical contaminants or pollutants in groundwater will be discussed. Chemical equilibrium principles of acids-bases, dissolution-precipitation, oxidation-reduction, and complexation will be reviewed in understanding the complex chemistry of groundwater. These principles lay important groundwork in understanding transport and fate of contaminants as well as achievable remediation strategies.

We will tackle the mechanisms of transport of contaminants and its impacts on groundwater and some description of geochemical models will be involved.

We will identify suitable analytical methods and modelling techniques to explore pollutant pathways and evaluate approaches to pollution mitigation. Certain case studies will be presented to take a comprehensive approach on actual groundwater pollution issues and the appropriate remediation and/or mitigation methods which could be employed in such situations.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to

- Describe and understand the complex nature specially on the chemical characteristics of groundwater
- Demonstrate an understanding the pathways of transport and fate of contaminants in groundwater
- Present information on recognized and innovative remediation technologies for ground water pollution

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Any scientific books, journals or scientific materials
  (national laboratory reports or environmental agency reports on groundwater pollution and treatment topics)

Lecture Title: Climate Change and ESG Management

Instructor: Hyungna Oh

Email: h.oh@khu.ac.kr

Profile

Dr. Hyungna Oh is a Professor of economics in the College of International Studies at Kyung Hee University, with expertise in the areas of climate change and environmental economics. Before she joined Kyung Hee University, she had served as Fellow at the Korea Development Institute (KDI) and Assistant Professor of Economics at West Virginia University in the USA. Dr. Oh assisted the Korean government to design climate policies. Her works have appeared in various academic journals including Climate Policy, Energy Economics, and Annual Review of Environment and Resources. Dr. Oh currently has served as the Division chair of Policy Advisory Committee for Korea's Green New Deal, a member of National Economic Advisory Council and the Carbon Neutrality Council. Dr. Oh received her Bachelor's and Master's degrees from Korea University, and her Ph.D. from Cornell University.

Course Description

The lecture will deal with the issues related to climate change, climate risk, investment decisions, and ESG management. Students will look at the current state of climate actions such as the Paris Agreement, net-zero strategies in a country. After the introduction, they will learn details of ESG Metrics and their links to climate change. The class will focus on ESG practices and case studies implemented by global companies.

Key Learning Outcomes:

Upon successful completion of the entire course, students will be able to
- Explain differences between ESG management and profit-seeking management
- Outline techniques which global companies are looking for

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- OECD, (2021), ESG Investing and Climate Transition Market Practices, Issues and Policy Considerations (https://www.oecd.org/finance/ESG-investing-and-climate-transition-market-practices-issues-and-policy-considerations.pdf)

Lecture Title: Drinking Korea: Tea, Tisanes, and Potables (Potent and Otherwise)

Instructor: Jennifer Flinn

Email: jmflinn@khu.ac.kr

Profile

Jennifer Flinn holds a degree in Sociology and Anthropology from Agnes Scott College in GA, USA and a masters in East Asian Studies with a concentration on Korea from UCLA. After graduation from university, she was a Fulbright ETA recipient, and later received a Korea Foundation grant to study language in Seoul. Before joining Kyung Hee University, she worked at Korea University's International Center for Korean Studies, UNESCO Korea, and the Korean Overseas Information Service at the Ministry of Culture. Her research interests center on food and gender in East Asia.

Course Description

Holding the idea of water as central, this lecture will concentrate on introducing Korean culture through liquid refreshment – namely teas, infusions and tisanes, and fermented and distilled beverages consumed on the peninsula throughout history. We will examine both the historical development of traditional Korean drinks (both potent and otherwise), and the modern drinks that shape the landscape, placing them in their greater cultural context, including, etiquette, and regional variations. We will also look at the material culture, such as ceramics, associated with drinks. Additionally, we will include some basic recipes so that student can make their own drinks, and perform a tea ritual

Key Learning Outcomes:

Students will have an overview of traditional and modern drinks in Korea, including how they're made and consumed.

Required Course Materials:

Individual computer with audio, camera, and zoom capabilities

Required Readings:

- Brother Anthony of Taize and Kyŏng-hŭi Hong. 2007. The Korean way of tea: an introductory guide.
- Yoo, Yang-Seok. 2007. The book of Korean tea a guide to the history, culture and philosophy of Korean tea and the tea ceremony. (https://www.tasteatlas.com/most-popular-beverages-in-korea)

Contact

Kyung Hee University

Office of International Affairs

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