



សន្និសីទ និងពិព័រណ៍ទឹកកម្ពុជាលើកទី៤

The 4th Cambodian Water Conference & Exhibition

Education and R&D of Water and Environmental Engineering in ITC

By Saret Bun

Water and Environmental Engineering

INSTITUTE OF TECHNOLOGY OF CAMBODIA

Phnom Penh | November 29-30, 2022

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OUTLINE

- About HRE Faculty and ITC
- Water and Environmental Engineering Program
- Recent R&D of WEE in ITC



ABOUT ITC AND HRE FACULTY

- Institute of Technology of Cambodia (ITC) is the public university institution for human resource development in the field of **engineering, science and technology**.



វិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា



STAFF:

- 90 PhDs
- 142 Masters
- 71 Engineers



FACULTY:

- 5 Faculties
- 1 Graduate School
- 1 Research Center



PROGRAM:

- 5 Doctoral
- 8 Master
- 11 Engineer
- 4 Associate
- 1 International



ABOUT ITC AND HRE FACULTY

- **Faculty of Hydrology and Water Resources Engineering (HRE)**
- Faculty of Chemical Engineering and Food Technology
- Faculty of Civil Engineering
- Faculty of Electrical Engineering
- Faculty of Geo-resources and Geotechnical Engineering
- Graduate School
- Research and Innovation Center

- 1964: Hydro-Technics
- 1980: Hydraulique Agricole
- **1994: Department of Rural Engineering (GRU)**
- **2017: HRE Faculty**





មហាវិទ្យាល័យ វារីសារស្ត្រ

FACULTY OF HYDROLOGY AND WATER RESOURCES ENGINEERING

ENVIRONMENTAL ENGINEERING | WATER SUPPLY & SANITATION | HYDRAULIC STRUCTURE | CLIMATE CHANGE | GIS-REMOTE SENSING | COASTAL ENVIRONMENT

- Founded in 1964 with the mission to produce **high-quality engineers** at the **undergraduate level, graduate level, and technician level** in the field of **water & environmental engineering, and water resources engineering & rural infrastructure** to meet the need of societal development and to solve environmental issues.



ACADEMIC STAFFS: 40

- PhD holders: 16
- Master Degree holders: 21
- Senior Engineers: 03



STUDENTS: 333

- Engineers 300
- Master: 28
- PhD: 05



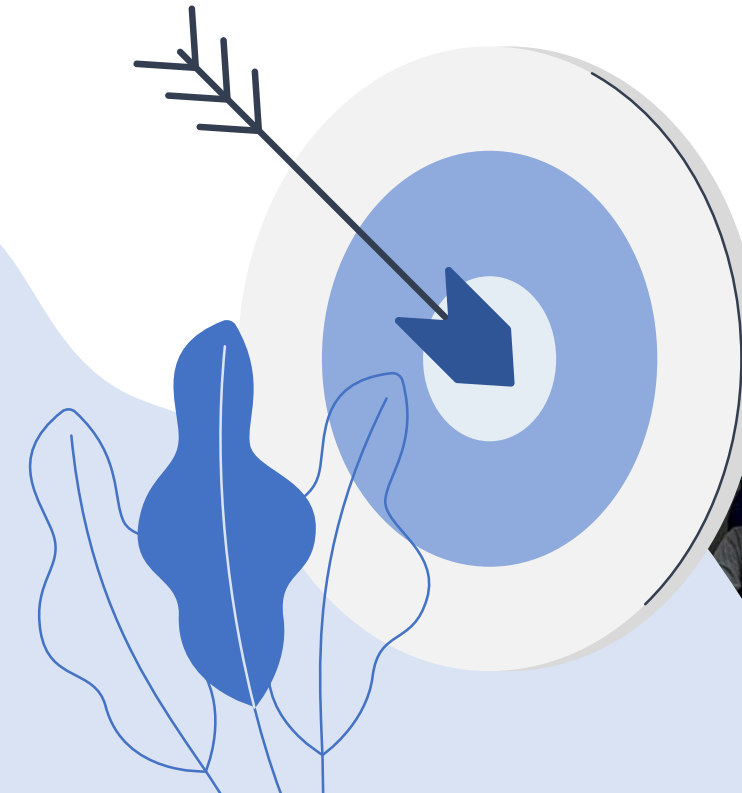
ABOUT ITC AND HRE FACULTY



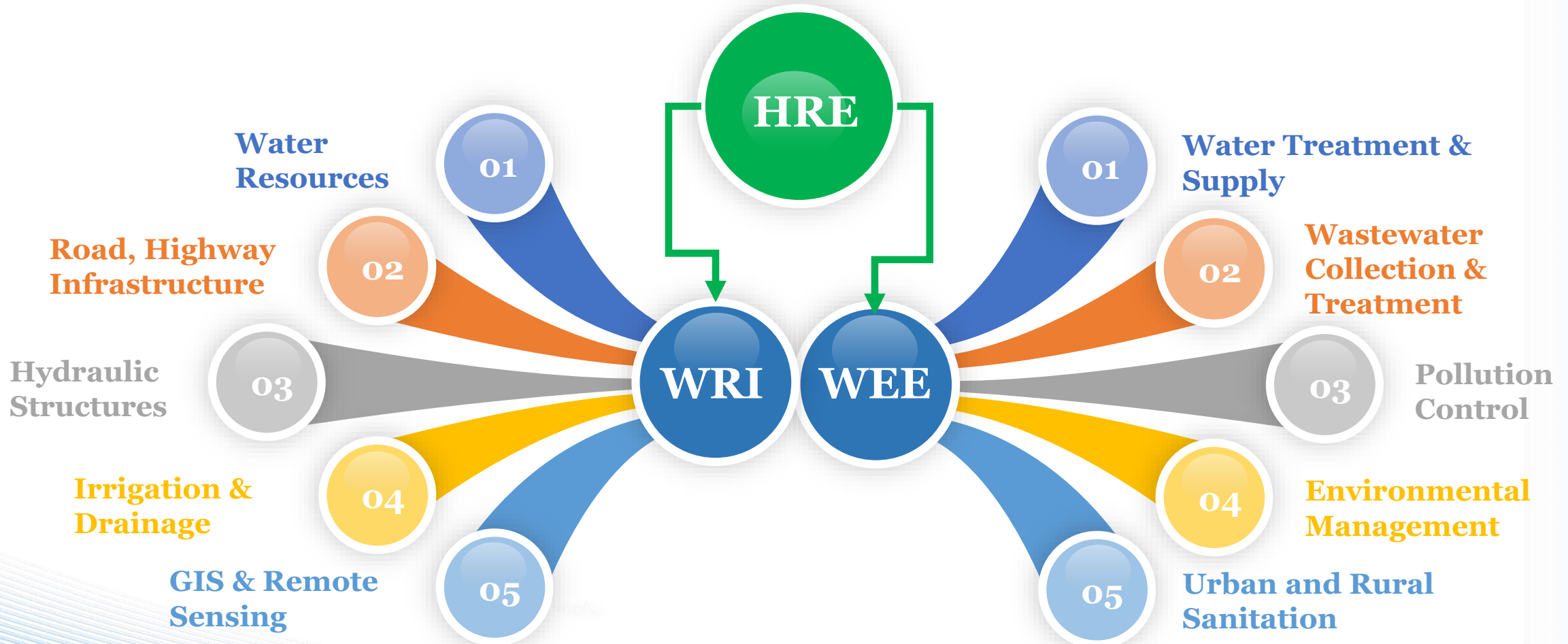
**Water Resources
Engineering and Rural
Infrastructure (WRI)**



**Water and
Environmental
Engineering (WEE)**



ABOUT ITC AND HRE FACULTY



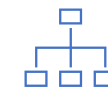
WATER AND ENVIRONMENTAL ENGINEERING

- To train the students to be engineers with a competent knowledge in both theoretical and practical of planning, designing, consulting, and operating in Water and Environmental Engineering fields including:

Drainage system and wastewater treatment



Water pollution control and management



Water supply and treatment



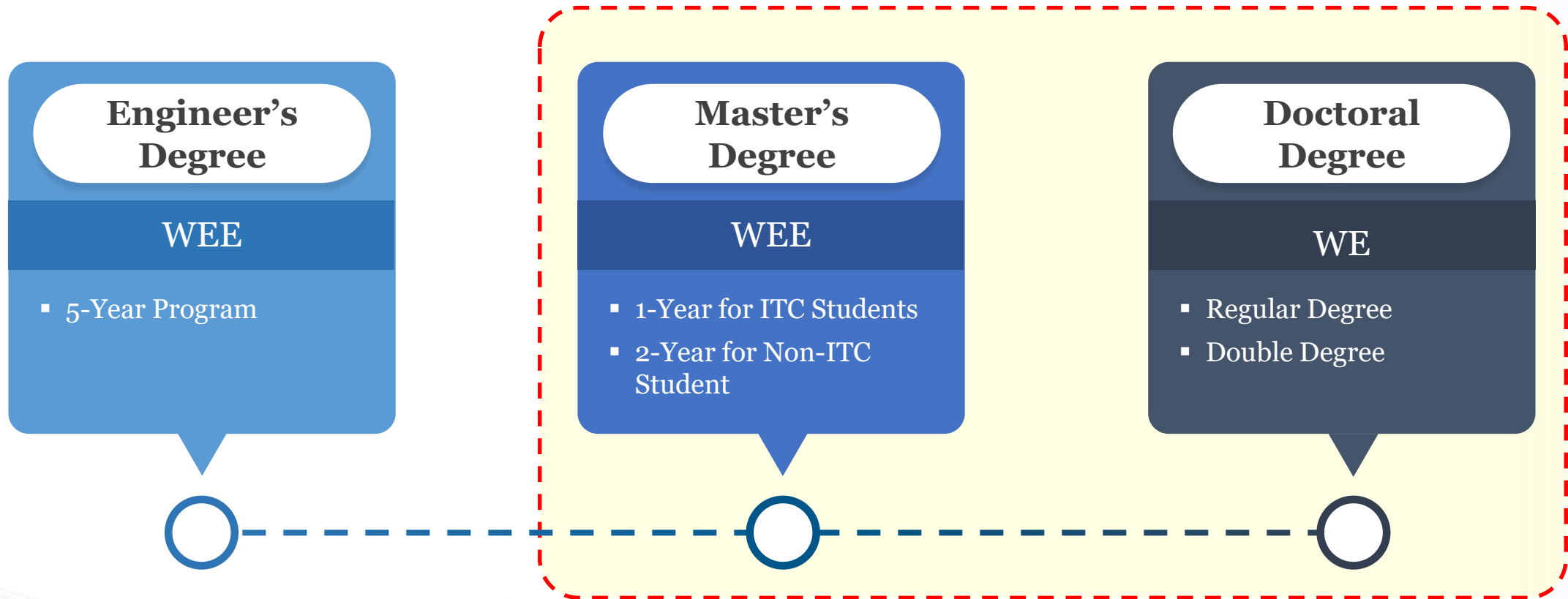
Environmental management and sanitation



Urban and rural sanitation

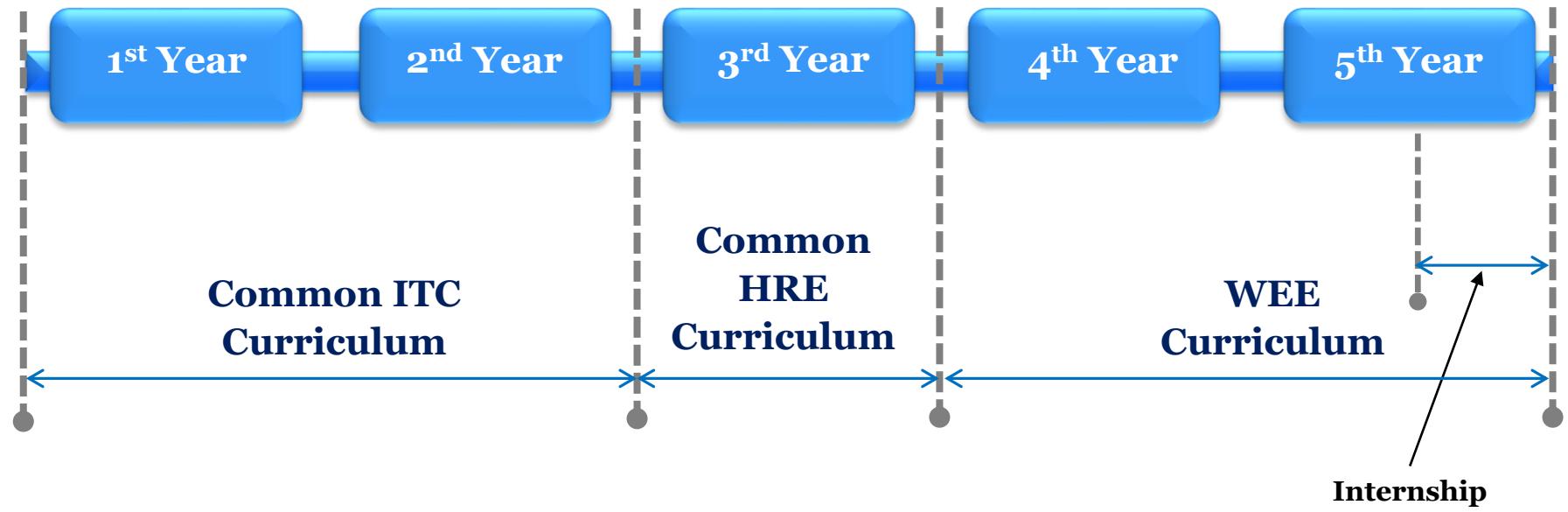


WATER AND ENVIRONMENTAL ENGINEERING



WATER AND ENVIRONMENTAL ENGINEERING

- Engineering curriculum is mainly divided into three stages:



WATER AND ENVIRONMENTAL ENGINEERING

Engineering Program Curriculum



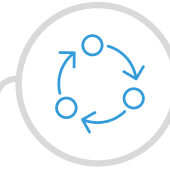
Year 4-S.1

- Chemistry for Env. Eng.
- Water Quality Analysis and Management
- Environmental Eng. Lab
- Biology for Env. Eng.
- Unit Operations for Env. Engineering
- Sustainable and Green Energy Systems
- Environmental Hydraulics
- GIS and Remote Sensing



Year 4-S.2

- Water Treatment Processes and Design
- Water Supply Engineering
- Building Sanitation/Plumbing Design
- Environmental Pollution Control
- Environmental Impact Assessment
- Hydroinformatics



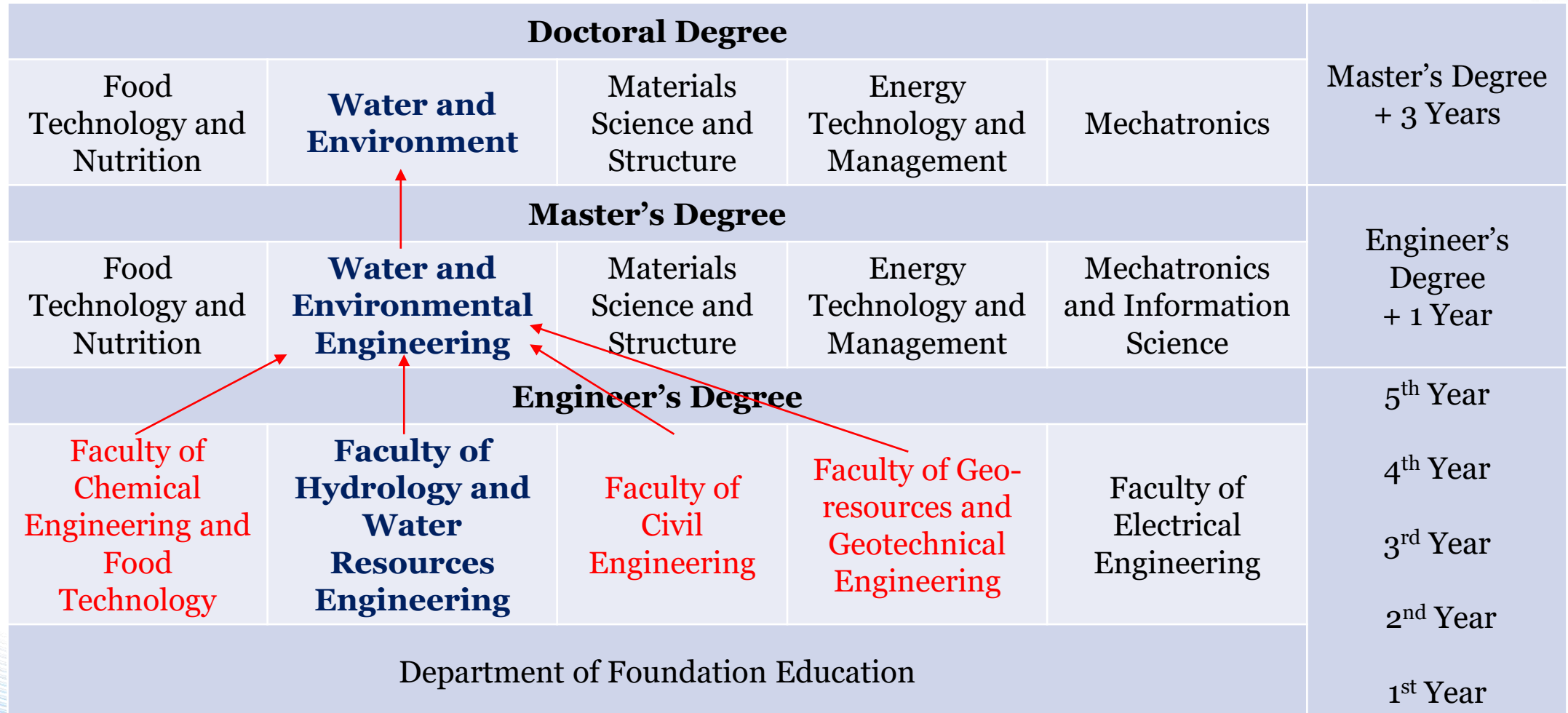
Year 5-S.1

- Design of Wastewater Treatment and Collection System
- Urban Drainage and Sewage System
- Solid Waste Management
- Environmental Engineering Project
- Work Safety
- Research Methodology

***Y5-S2: Internship**



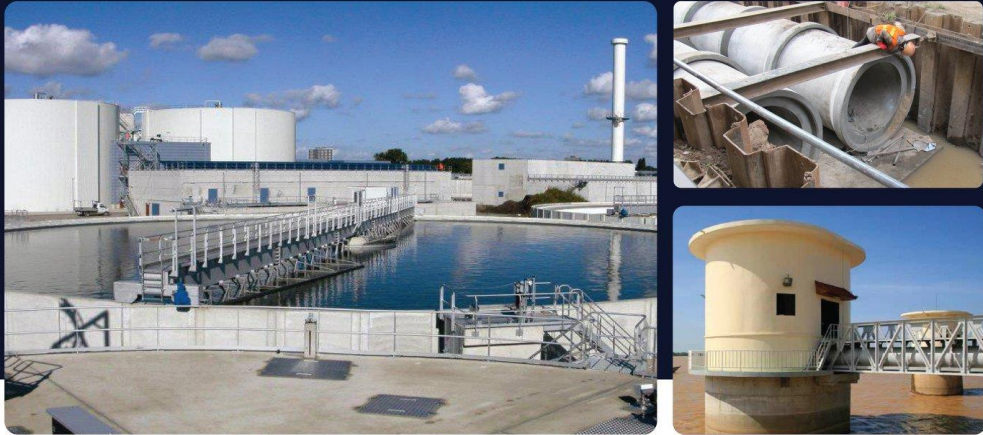
WATER AND ENVIRONMENTAL ENGINEERING





INSTITUTE OF TECHNOLOGY OF CAMBODIA
GRADUATE SCHOOL
MASTER OF WATER AND ENVIRONMENTAL ENGINEERING

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Specializations

Urban Water and Sanitation Engineering
Environmental Engineering and Management
Water Resources Engineering



Your Future Growth

- * Real-world problem solving approach
- * Opportunities for scholarships
- * Project linkage with industry
- * Innovative technologies
- * Becoming scientist
- * Intellectual skills
- * International experiences

Call for application 2020
 Application deadline: 31 August 2020

Affiliations



Collaborative partnerships



Program Content

The Master Program of Water and Environmental Engineering (MWEE) offers three specializations:

I) MWEE in Water Resources Engineering (WRE)

Year 1 (M1): Hydrology (2 (credits)), Applied Statistics (2), Project Management (2), GIS and Remote Sensing (3), Research Methodology (1), Seminar on Water and Environmental Engineering (1), Water and Environmental Laboratory (2), Elective Course (2), Processes Engineering (2), Irrigation and Drainage (2), Water Quality Assessment and Management (2).

Year 2 (M2): Entrepreneurship (2), Applied Statistics (2), Agricultural Water and Irrigation System Management (3), Urban Flood Management and Disaster Risk Mitigation (2), Water Resources System Engineering (3), Sustainable Hydropower Development (2), Mini-project (2), Elective Course (2), Research Proposal (required), Scientific Conference (required), Thesis and Defense (12).

II) MWEE in Urban Water and Sanitation Engineering (UWE)

Year 1 (M1): Chemical Kinetics (2), GIS and Remote Sensing (3), Project Management (3), Research Methodology (1), Seminar (1), Water and Environmental Laboratory (2), Elective Course (2).

Year 2 (M2): Entrepreneurship (2), Management of Water Supply and Sanitation (2), Applied Statistics (2), Water Treatment and Distribution System Design (2), Urban Drainage and Sewerage System Design (3), Wastewater and Sludge Treatment Process (3), Mini-project (2), Elective Course (2), Professional Internship and Thesis Defense (12).

III) MWEE in Environmental Engineering and Management (EEM)

Year 1 (M1): Hydrology (2), Project management (2), GIS and Remote Sensing (3), Research Methodology (1), Seminar on Water and Environmental Engineering, Water and Environmental Laboratory (2), Elective Courses (6), IWRM and Watershed Management (2), Processes Engineering (2), Irrigation and Drainage (2), Water Quality Assessment and Management (2).

Year 2 (M2): Entrepreneurship (2), Applied statistics (2), Sustainable and Green Energy Systems (2), Industrial Resource Management and Cleaner Production (3), Sustainable Solid Waste and Hazardous Management (2), Air Pollution Control and Monitoring (3), Mini-project (2), Elective Course (2), Research Proposal (required), Scientific Conference (required), Thesis and Defense (12).

MASTER OF WATER AND ENVIRONMENTAL ENGINEERING

2020-2021



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AN
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**INSTITUTE OF TECHNOLOGY OF CAMBODIA
GRADUATE SCHOOL
MASTER OF URBAN WATER AND SANITATION
ENGINEERING**



Your Future Growth

- * Real-world problem solving approach
- * Exchange study abroad (e.g. France, Belgium, Japan, Thailand etc.)
- * Project linkage with industry
- * Innovative technologies
- * Becoming scientist
- * Intellectual skills

Call for application 2022
Application deadline
30 September 2022

Available **AFD-EU Scholarship**



Affiliation



About Program

Urban Water and Sanitation Engineering (UWE) is a specialization under Master Program of Water and Environmental Engineering. This program aims to produce high capable water specialist to meet the urgent need for operating and managing water supply, wastewater treatment, drainage and sewerage system. Ultimately, it aims to improve urban water and environment by providing highly skilled workforce to meet the challenges of rapid urbanization.

Courses

Year 1 (M1): Chemical Kinetics (2 credits), GIS and Remote Sensing (3), Project Management (3), Research Methodology (2), Seminar on WEE (1), Water and Environmental Laboratory (2), Elective Course (2).

Year 2 (M2): Entrepreneurship (2), Management of Water Supply and Sanitation (2), Applied Statistics (2), Water Treatment and Distribution System Design (2), Urban Drainage and Sewerage System Design (3), Wastewater and Sludge Treatment Process (3), Mini-project (2), Elective Course (2), Professional Internship and Thesis Defense (12).

Program Information

Type of Degree: Master of Engineering
Type: Full-time, 1 year (ITC engineer students), max. 3 years.
Total Credits: Around 50 credits.
Language: English.
Pathway:

- 1) Course-Research Pathway
Complete and pass a series of courses of 14-40 credits minimum
Research activities 12 credits minimum:
Presentation in scientific conference: Required
Thesis: 12
- 2) Research-Based Pathway
Complete and pass a series of courses of 12 credits minimum
Major course: 6 credits
Research-oriented course: 6 credits
Research activities 42 credits minimum with at least one publication
Primary research report and defense: 9 credits
Detailed research proposal defense: 3 credits

Application Requirement

ITC students (GPA ≥2.5) (1Year Study) start from M2 with a background in: Engineering Degree from Faculty of Hydrology and Water Resources Engineering, Faculty of Chemical Engineering and Food Technology, Faculty of Geo-resources and Geotechnical Engineering, Faculty of Civil Engineering.

Non-ITC students/Foreigner Students (2 Year Study) starts from M1 with a background in: Bachelor's Degree or equivalent in engineering (civil, chemical, mechanical, environmental, food, industrial, agricultural) and/or natural and physical sciences or an equivalent qualification.

Certificate of English/French of proficiency.

Scholarship of AFD-EU

Tuition fee: 1200 USD/year, **Monthly allowance:** 250 USD/month.
Exchange study programs to EU & ASEAN countries.
Research fund: 1000 USD, **Book allowance:** 200 USD.

How to apply

Download application and application instruction via link:
<https://bit.ly/itcmaster2022-23>
Submit the application to Graduate School, room B-110, Building B, Russian Blv, P.O. Box 86 Phnom Penh, Cambodia.

Important dates

Application deadline extended to:
30 September 2022 at 5 pm.
Result of application: 10 October 2022.
Registration period: 15 October 2022.

Information

Graduate School / ITC
https://t.me/MWEE_ITC
<http://www.itc.edu.kh/graduate/en>
<https://www.ric.itc.edu.kh/research-units/water-and-environment-unit>



Contact

Dr. Pinnara KET (Program Head)
pket@itc.edu.kh
+855 078 900 477

Collaborative partnerships



Collaborative partnerships



WATER AND ENVIRONMENTAL ENGINEERING

- Specialized in Urban Water and Sanitation Engineering:

Year 1 Sem. 1

- Chemical Kinetics
- Project Management
- GIS and Remote Sensing for WEE
- Research Methodology
- Seminar on WEE
- Water and Environmental Laboratory
- (Elective Course ×1)

Year 1 Sem. 2

- Elective Course
- Processes Engineering
- Micro-biology and Toxicology
- Water Quality Assessment and Management
- (Elective Courses ×2)

Year 2 Sem. 1

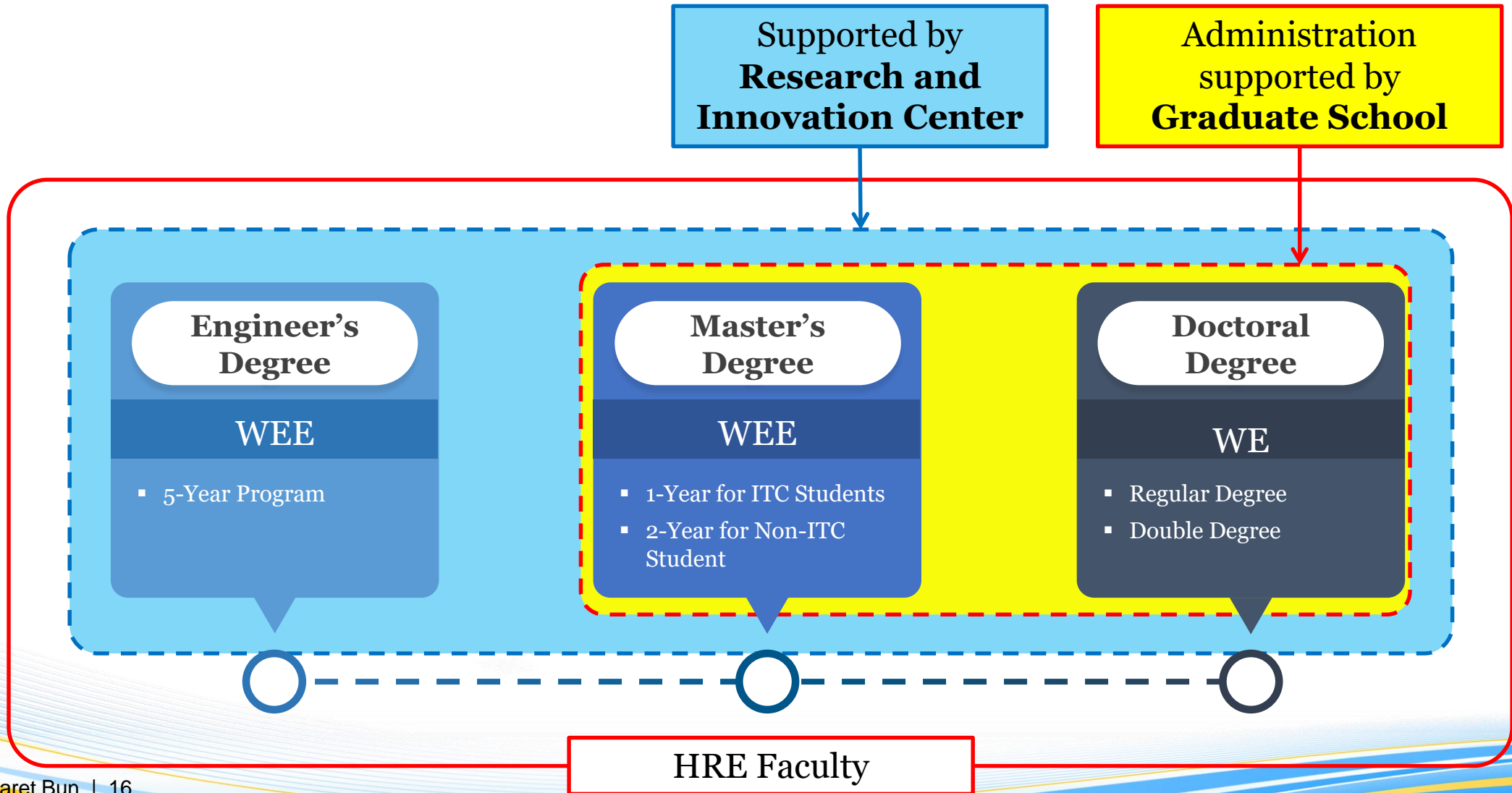
- Entrepreneurship
- Applied Statistics
- Water Treatment and Distribution System Design
- Urban Drainage and Sewerage System Design
- Wastewater and Sludge Treatment Process
- Management of Water Supply and Sanitation
- (Elective Course ×1)

Year 2 Sem. 2

- Research Proposal
- Scientific conference with presentation
- Master Thesis and Defense



RECENT R&D OF WEE IN ITC



RECENT R&D OF WEE IN ITC



Energy
Technology and
Management
(ETM)



Food Technology
and nutrition
(FTN)



Materials Science
and Structure
(MSS)



Mechatronics and
Information
Technology (MIT)



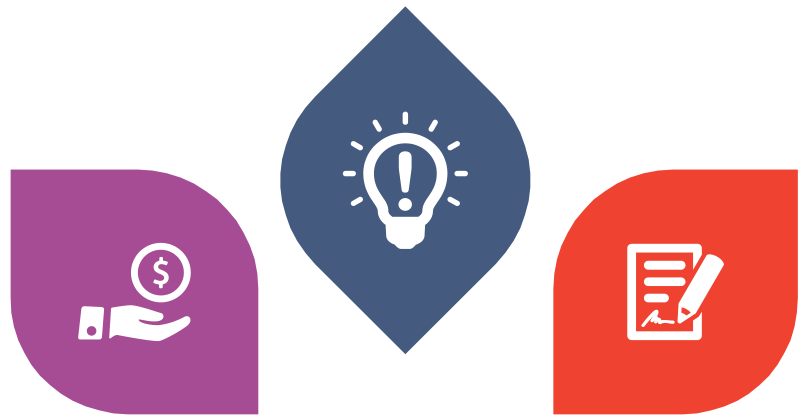
Water and
Environment
(WAE)



RECENT R&D OF WEE IN ITC

- Research Theme: Urban Environment Management (UEM)

Water Supply and Wastewater (WSW)



Coastal and Marine Environment (CME)

Water and Watershed Management (WWM)

Disaster Management and Climate System (DCS)



RECENT R&D OF WEE IN ITC

- Research Projects (1/4):
 - Nutrient Recovery from Aquaculture Wastewater: An Aquaponic Recirculation System
 - Development of Climate Data Information System for Cambodia
 - Formulating Design Criteria for Water Supply in Cambodia
 - Water Evolution and Vulnerability Under Global Changes in Coastal Catchments of Cambodia
 - Reducing foodborne pathogen contamination of vegetables in Cambodia: Innovative Research, Targeted Interventions, and Impactful, Cambodian-Led Engagement
 - Assessment of Silicon (Si) in water and bottom sediment in Tonle Sap Lake: an implication for highly productive ecosystem
 - Development of a biofilter system model to control of air pollution toward industrial application
 - Improving Sustainable Water Supply and Sanitation in Cambodia: Case of Tonle Sap Lake's Floating Villages



RECENT R&D OF WEE IN ITC

- Research Projects (2/4):
 - Sustainable Rice Production within an Agroecology Framework
 - Improvement and development of fish and meat products for better preservation using innovative technology
 - Addressing Water Scarcity in a Rural Community of Cambodia through Groundwater Use
 - Development of Eco-friendly and Low-cost Wastewater Treatment System as an On-site Product
 - Experimental and Empirical Investigation of Oily Wastewater Separation using Air Flotation Integrated Coagulation Process
 - Diagnostic Investigation of Water Eutrophication in Stung Treng Ramsar Site, Cambodia
 - Aquaculture in Cambodia: Sustainability and Risk Prevention
 - Improvement and development of fish and meat products for better preservation using innovative technology



RECENT R&D OF WEE IN ITC

- Research Projects (3/4):
 - Spatio-temporal assessment of surface water quality affected by urban and aquaculture wastewater: case study in Tamouk Lake Area
 - Development of Electrocoagulation Reactor Integrated Sedimentation for Turbidity and Color Removal from Industrial Wastewater
 - Development of Climate Data Information System for Cambodia
 - Strengthening Flood and Drought Risk Management and Early Warning System in the Lower Mekong of Cambodia
 - Strengthening Flood Risk Management induced by Climate Change in Stung Sen River Basin, Cambodia
 - Termite bioturbation in Cambodia-From characterisation to application
 - Investigating the Effects of Algae Bloom in Tonle Sap Lake source water on Water Supply Treatment Efficiency



RECENT R&D OF WEE IN ITC

- Research Projects (4/4):

- Improving capacity on integrated coastal management with low impact development considering environmental sustainability and climate change in coastal area of Cambodia (CLID)
- Influence of locally made effective microorganisms (EM) on the treatment of domestic wastewater using conventional septic tank
- Water Use Behavior in peri-urban communities of Southeast Asian Countries: case study in Phnom Penh City, Cambodia
- Antimicrobial Resistance Circulation along the Mekong River and its Delta (ARCIMED)
- Ecosystem-based Adaptations for Sustainable Groundwater Resources Management in the Transboundary Cambodia-Viet Nam Mekong Delta Aquifer, Lower Mekong Region (GEBA)
- Kinetic and Influence of Iron Co-Presence on Arsenic Removal from Groundwater



RECENT R&D OF WEE IN ITC

- Research Laboratory:





ABOUT US

WAE was founded in 2017 by the Research and Innovation Center of ITC. WAE's vision is to become a well-known knowledge hub to provide the scientific research information, consultation, and services on water and environment for sustainable development in the region.



MEMBERS

Lecturer-Researcher: 13 holding PhD and Master's Degree
Full-time researcher: 4 PhD students

FUNCTION AND CAPACITY



RESEARCH THEMES

1. Hydrology and water resources management
2. Climate change and disaster risk management
3. Urban water supply, and wastewater treatment and management
4. Coastal and marine environment
5. Soil and irrigation



CURRENT PROJECTS/FUNDER

1. SATREPS Project on Establishment of Environmental Conservation Platform of Tonle Sap Lake funded by JICA/JST
2. SATREPS: Establishment of Risk Management Platform for Air Pollution in Cambodia funded by JICA/JST
3. Water Evolution and Vulnerability Under Global Changes in Coastal Catchments of Cambodia (IRD)
4. Aquaculture Cambodia: Sustainability and Risk Prevention (AquaCAM) funded by IRD
5. Water and Health Risk in Cambodia (WatHealth) funded IRD
6. Provincial Water Supply and Sanitation Project funded by EU/AFD (9 Projects)
7. Higher Education Improvement Program Project (6 Projects)
8. Improving capacity on integrated coastal management with low impact development considering environmental sustainability and climate change in coastal area of Cambodia (CLID) funded by CCCA
9. Nutrient Recovery from Aquaculture Wastewater: An Aquaponic Recirculation System funded by AUN/SEED-Net
10. Laboratory Based Education funded by JICA (2 Projects)

PARTNERS



OUR CONTACT

ric_itc@itc.edu.kh
Tel: (855) 23 880 370 / 095 353 112
Fax: (855) 23 880 369

Institute of Technology of Cambodia, Building H, Russian Federation Blvd., P.O. Box 86, Phnom Penh, Cambodia



Our Lab Research & Services

WE Lab?

A research team works on **Water and Wastewater Treatment Technology Development under Water and Environmental Engineering** (Department), Faculty of Hydrology and Water Resources Engineering, ITC

Our Research Themes



Research Lab Services (RLS)

LAB-BASED RESEARCH

Provide experimental laboratory research on water and wastewater

LAB ANALYSIS

Provide service of water/wastewater quality analysis

CONSULTATION SERVICE

Provide consultation service on water/wastewater treatment and sewage drainage design and installation

TRAINING SERVICE

Provide training service on water quality assessment and treatment

Our Core Team

Dr. Saret Bun
Water and Wastewater Specialist
 Dr. Rathborey Chan
Wastewater and Solid Waste Specialist
 Dr. Phaly Ham
Water and Air Pollution Specialist

Collaboration

- Ministry of Education Youth and Sport (Cambodia)
- Ministry of Industry, Science, Technology and Innovation (Cambodia)
- Chulalongkorn University and Kasetsart University (Thailand)
- The University of Tokyo and Tokyo Institute of Technology (Japan)
- Japan International Cooperation Agency (JICA)

Contact:

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**INSTITUTE OF TECHNOLOGY
OF CAMBODIA**

SOIL LAB

**Faculty of Hydrology and Water Resources
Engineering**

The ITC Soil Lab provide high quality soil testing and comprehensive analytical services and research support to the public, and private companies. Soil testing can be applied in different fields: irrigation design, environmental soil re-search, hydraulic engineering, and agricultural productivity.

OUR SERVICE

SOIL TESTING AND ANALYSIS

SOIL PHYSICS



Soil Hydro-Physics (SHP), soil infiltration, water retention, soil texture, soil bulk density, sediment, soil water capacity, soil scanning

FIELD SERVICE

Sampling Expertise
Field Testing
Soil data surveying and GIS management



SOIL CHEMISTRY

Soil fertility, micronutrient, pH level, soil salinity, pesticide, a wide variety of trace elements, toxic substances and organic compound

RESEARCH, TRAINING AND CONSULTATION

Soil quality assessment
Precise irrigation scheduling with soil based
Soil degradation and improvement
Soil water crop productivity

EQUIPMENT

Some of our equipment includes KSAT meter, Pressure plate, HYPROP and WP4C, GC/MS-MS, AAS analyzer, Total Organic Carbon (TOC) analyser, Ion chromatography, Soil pH meter, EC meter, Microwave Plasma Atomic Emission Spectroscopy (MP-AES), Scanning Electron Microscope (SEM), Cary 80 UV-Vis Spectrophotometer.



KEY STAFF

Dr. Ket, Pinnara
Dr. Ann, Vannak
Ms. Phoeum, Chanarun
Ms. Muon, Ratha
Ms. Lai, Chenda

Contact Us

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www.hreitc.com

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SHIP



INSTITUTE OF TECHNOLOGY OF CAMBODIA

Faculty of Hydrology and Water Resources Engineering

HydroMet and Disaster Management Lab

LAB MEMBERS

Lab members:

- 4 PhDs and 7 master members
- 15 intern students (undergraduate + graduate students)

INTERNSHIP OPPORTUNITY

We offer:

- Research exchange host
- Master thesis work
- Undergrad level

LAB SERVICE AND CONSULTANCY



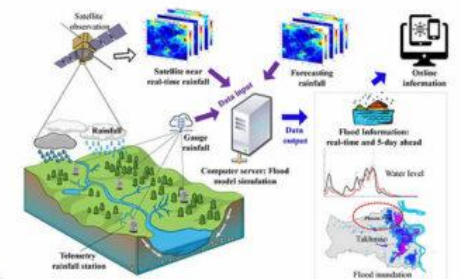
PROJECTS AND PARTNERSHIPS

Projects:

- Higher Education Improvement Project (HEIP) of MoEYS
 - Sustainable Mekong Research Network (SUMERNET)
 - Asia-Pacific Network (APN) and others
- #### Partnerships:
- National Committee for Disaster Management (NCDM)
 - Kyoto University (KU)
 - Stockholm Environment Institute (SEI)
 - Others

CONTACT US

Address: Room 101D ITC
sokty@itc.edu.kh (855)11-980-698



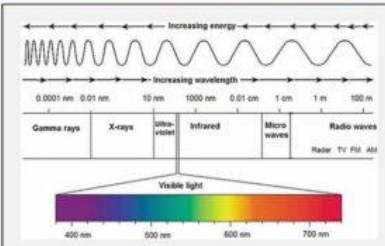
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Our partnership and funds



erAid



The purpose of this poster is to provide an overview of a future GIS and Remote Sensing (Khmer Earth Observation, KHEOBS) Lab. It is being developed to:

- strengthen the ongoing curriculum in Geographic Information System (GIS) and Remote Sensing at Institute of Technology of Cambodia (ITC),
- develop research activities by integrating hydrological and environmental monitoring with remotely sensed data set,
- train experts in remote sensing who will be able to respond to various calls for projects requiring such need,
- strengthen the cooperation between Cambodia and France, especially build synergies between the different stakeholders in remote sensing.

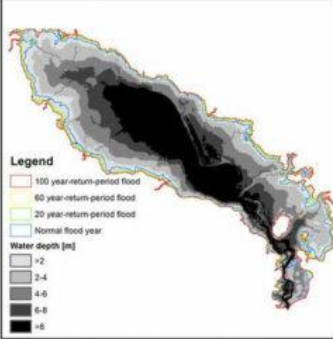
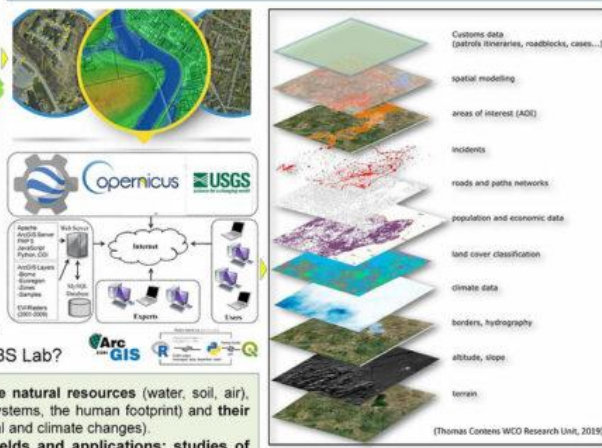
The poster outlines the rationale and vision for the work, progress to date, and highlights some examples that show **data acquisition and utility**.



Context and rationale - Why the need for KHEOBS Lab?

- Earth observation allows to describe and monitor the natural resources (water, soil, air), their organization (which reflects the diversity of ecosystems, the human footprint) and their changes (including hydrological dynamics, environmental and climate changes).
- Earth observation is now used in a variety of fields and applications: studies of biodiversity, agriculture, hydrology, climate, health.
- Earth observation has been developing since the 1970s, but major advances have been made over the last decade with the free provision of satellite data, tools, processing and post-processing algorithms that opened up new possibilities and uses.
- In Cambodia, training in remote sensing remains limited, restricting its use to a few institutions or individuals despite its tremendous potential.
- In order to capture and take full advantage of the latest advances in earth observation technologies, it is necessary to consolidate a reference laboratory in this field, which is the objective of this PHC Tonlé Sap project.

Tonlé Sap is the largest freshwater lake in Southeast Asia, it contains an exceptional large variety of interconnected eco-regions with a high degree of biodiversity and is therefore a biodiversity hotspot. It was designated a UNESCO biosphere reserve in 1997.



Communications from the project activities will be made using the social networks of the institutions (ITC and IRD) and the research teams involved.

CONTACT US
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 Vincent HERBRETEAU, PhD
 Researcher
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Coastal and Wetland Environmental Laboratory

The laboratory of Coastal and Wetland Environment of ITC was established in 2021 to support the research activities of researchers and students in the coastal zones and wetland environment of Cambodia. The massive growth of urban and industrial activities in coastal provinces contributes to sustaining the economic growth of the country. The coastal environment requires deep understanding and innovative strategies to cope with the potential threat imposed by the development. The laboratory is equipped with human resources and research tools which could provide scientific-based research to improve knowledge of the coastal environment which requires continuous observation and monitoring.

OUR WORKS

- ❖ Bathymetry surveying
- ❖ Urban flood assessment
- ❖ Bank erosion protection
- ❖ Slope stability assessment
- ❖ Seawater intrusion modelling
- ❖ Groundwater quality and vulnerability assessment

PROJECTS & FUNDING

- ❖ 4C-WATER
- ❖ CLID-CCCA III
- ❖ COSTEA Cambodia
- ❖ INOWASIA
- ❖ WAT-HEALTH

Research, Training and Consultation

- ❑ Urban drainage design
- ❑ Coastal hydrodynamic analysis
- ❑ Water quality monitoring and analysis
- ❑ Flood modelling and flood system design
- ❑ Coastal mapping (water quality, water table, vulnerability and risk)

CORE RESEARCH TEAM

OUR PARTNERS

CONTACT US
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<https://www.hecitc.com/>
 Room 107B, Institute of Technology of Cambodia, Russian Federation: Boulevard, Phnom Penh, Cambodia.



