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7. Experience of UACEG in organizing summer schools for students from India

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University of Architecture, Civil Engineering and Geodesy - Sofia

Training of WB Teachers and Staff at UACEG, Sofia
28 February – 04 March 2022
and 04 April – 08 April 2022.

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1. Summer Schools at UACEG

- ***International Education Program (IEP 2019)***
  - Agreement between UACEG and Gujarat Technological University, India
- **In 2018 and 2019 – Summer schools**
  - **Students in Architecture**
- In 2019 – Summer school for students in Civil Engineering
  - 37 BSc students from Gujarat University
  - Topics
    - ✓ Hydraulic Structures
    - ✓ Irrigation Engineering
    - ✓ Hydraulic Modelling
    - ✓ Site visits

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1. Summer Schools at UACEG

- Summer school for Civil Engineering Students (2019)
  - ➢ Summer school duration – 5 weeks
  - ➢ General schedule
    - ✓ 2 weeks lectures and project development
      - – Hydraulic Structures
      - – Irrigation Engineering
    - ✓ One week – Workshop on Hydraulic and Hydrological Modelling
    - ✓ One week – Site visits (Hydraulic systems and structures in Bulgaria)
    - ✓ One week – cultural trip (sightseeing of most important Bulgarian cities and cultural sites)

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1. Summer Schools at UACEG

- Summer school for Civil Engineering Students (2019)
  - ➢ Accommodation
    - ✓ UACEG dormitories
    - ✓ Breakfast, Lunch and Dinner at UACEG canteen
  - ➢ Transport from UACEG dormitories to UACEG and back
  - ➢ Field visits to hydraulic structures
    - ✓ 1-day trips
    - ✓ Breakfast at UACEG canteen
    - ✓ Transport to the sites
    - ✓ Lunch at restaurant near the site
    - ✓ Dinner at UACEG canteen
  - ➢ Cultural trip – overnight stays in hotels in Bulgarian cities

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2. Summer School Schedule

- **LECTURE WEEKS (17th – 22nd of June and 24th – 29th of June)**

Day	Hours						
	7:30 – 8:00	8:30 – 9:15	9:15 – 13:00	13:00 – 14:15	14:15-18:00	18:00-18:45	18:45 – 19:15
Mo	Transport to UACEG	Breakfast	Lectures	Lunch	Lectures	Dinner	Transport to dormitories
Tu	Transport to UACEG	Breakfast	Lectures	Lunch	Lectures	Dinner	Transport to dormitories
We	Transport to UACEG	Breakfast	Lectures	Lunch	Lectures	Dinner	Transport to dormitories
Th	Transport to UACEG	Breakfast	Lectures	Lunch	Lectures	Dinner	Transport to dormitories
Fr	Transport to UACEG	Breakfast	Lectures	Lunch	Lectures	Dinner	Transport to dormitories
	Hours						
	9:00 – 9:30	9:30 – 10:15	10:15 – 13:00	13:00 – 14:30	14:30-15:00		
Sa	Transport to UACEG	Breakfast	EXAM	Lunch	Transport to dormitories		

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2. Summer School Schedule

- **WORKSHOPS WEEK (1st of July – 5th of July)**

Day	Hours						
	7:30 – 8:00	8:00 – 9:00	9:15 – 13:00	13:00 – 14:15	14:15-18:00	18:00-19:00	19:00 – 19:30
Mo	Transport to UACEG	Breakfast	Workshop 1	Lunch	Workshop 1	Dinner	Transport to dormitories
Tu	Transport to UACEG	Breakfast	Workshop 1	Lunch	Workshop 1	Dinner	Transport to dormitories
We	Transport to UACEG	Breakfast	Workshop 1	Lunch	Workshop 1	Dinner	Transport to dormitories
Th	Transport to UACEG	Breakfast	Workshop 2. Irrigation	Lunch	Workshop 2. Irrigation	Dinner	Transport to dormitories
Fr	Transport to UACEG	Breakfast	Workshop 2. Irrigation	Lunch	Workshop 2. Irrigation	Dinner	Transport to dormitories

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2. Summer School Schedule

- **SITE VISITS WEEK (8th of July – 12th of July)**

Day	Hours				
	7:30 – 8:00	8:00 – 9:00	9:00 – 18:00	18:00-19:00	19:00 – 19:30
Mo	Transport to UACEG	Breakfast	Travel and visit of site of Cordell company	Dinner	Transport to dormitories
Tu	Transport to UACEG	Breakfast	Travel and visit of site of SAT company (WWTP "Kubratovo")	Dinner	Transport to dormitories
We	Transport to UACEG	Breakfast	Travel and visit of site of Sofiyska voda company (Water Treatment Plant "Rila")	Dinner	Transport to dormitories
Th	Transport to UACEG	Breakfast	Travel and site visit (Topolnitsa Dam)	Dinner	Transport to dormitories
Fr	Transport to UACEG	Breakfast	Travel and site visit	Dinner	Transport to dormitories

2. Summer School Schedule

- **CULTURE TRAVEL WEEK (15th of July – 21st of July)**

Day	Route and Sites
Mo	SOFIA - PLOVDIV (Ancient city of Plovdiv, Free tour of the city)
Tu	PLOVDIV – KAZANLUK Starosel Thracian Tomb, Hissarya, Tracian Valley of the Kings (Thracian Tombs visits)
We	KAZANLUK – VELIKO TURNOVO (Shipka Church and Shipka Monument; Ethnographic Complex "Etura", Veliko Turnovo – old capital of Bulgaria – Sightseeing)
Th	VELIKO TURNOVO – ROUSSE (Rock monasteries near Rousse; Free tour of Rousse city)
Fr	ROUSSE – SOFIA (Visit of Pleven, Kayluka Park and Hydraulic Structures, HEPP at the Iskar gorge)

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3. Lectures

- The students were divided in 2 groups
  - 1st group
    - ✓ Week 1 – Classes on Hydraulic Structures
    - ✓ Week 2 – Classes on Irrigation Engineering
  - 2nd group
    - ✓ Week 1 – Classes on Irrigation Engineering
    - ✓ Week 2 – Classes on Hydraulic Structures
- Classes include:
  - Lectures
  - Course project development / Tasks solving
- Saturday Exam - Test

3. Lectures

- The subject content
  - ➢ According to study curricula of Gujarat Technological University
  - ➢ Irrigation Systems subject – example of the detailed schedule

Day	9:00 – 10:00	10:00 – 11:00	11:00 – 12:00	12:00 – 13:00	13:00 – 14:00	14:00 – 15:00	15:00 – 16:00	16:00 – 17:00	17:00 – 18:00
Mo	T1. Introduction	T2. Irrigation Schemes			T3. Soil Water	T4. Crop Water Requirements		***E1 – Crop Water Requirements***	
Tu	T4. Crop Water Requirements	T5. Distribution Principles			***E2 – Crop Water Rqrmnts + corrections***		T6. Surface Irrigation	T7. Sprinkler Irrigation	
We	T8. Drip Irrigation		T9. Irrigation Canals		***E3 – Irrigation canals + corrections***			T9. Irrigation Canals	T10. Drop Structures
Th	T10. Drop Structures	T11. Cross Drainage Works: Inverted Siphons and Aqueducts			***E4 – Inverted Siphon + corrections***			T12. Check structures & Autom.	
Fr	T12. Check structures & Autom.	T13. Other structures	T14. Pressurized Distrib. Networks		**E5 – Correc-tions**	T14. Pressurized Distrib. Networks	T15. Water Logging and Drainage Measures		
Sa		**EXAM TEST**							

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3. Lectures

- **IRRIGATION SYSTEMS**

Lectures + Exercises

Lecturer: *Assoc. Prof. Petar Filkov, M.Eng., PhD*

Lectures: 29 hours; **Exercises:** 11 hours; **Independent work:** 8 hours.

Course Contents	Hrs
1. Introduction: 1 h	3
- Necessity of irrigation; Water Budget; supplementary irrigation; Basic definitions; Basic Equation of Irrigation; Benefits and ill effects of irrigation; Scope of irrigation engineering (in BG; in India)	
2. Irrigation Schemes 2 h	
- types of irrigation systems (classification acc. to different criteria) - command area - Structure and elements of Irrig. Scheme; Irrigation Fields concept (and relation with Irrigation methods) - Performance indicators; Efficiency of irrigation and intensity of irrigation	
3. Soil-water plant relationship:	1
- Classification of soil water, Moisture and holding capacity, Depth of soil water available to plants, -permanent and ultimate wilting point; soil moisture contents - infiltration (percolation) and filtration	
4. Crop Water Requirements (Irrigation Scheduling)	3+3
- (Soil) Water Balance Equation (Soil Moisture/Soil Water Budget), Estimation of constituents - Depth of water applied during irrigation; Delta of crops (Irrigation requirement – in arid and semi-arid areas) - Hydromodule (BG) and Duty of water (India), improvement of duty, incl. crop rotation, - Yield-Water relationship, -water quality (assessment of irrigation water)	

3. Lectures

5. Principles of water distribution	2
Frequency, duration and flow rate; Schedules: Rotation, Arranged, On-demand; Flexibility vs costs	
6. On-farm Irrigation (Irrigation Methods): Surface irrigation	1
- basic kinds (flooding, border strip, furrows); paddy fields; - advantages and disadvantages	
7. On-farm Irrigation Methods: Sprinkler Irrigation	2
- System layout and elements; sprinklers, parameters; sprinkler installations and machines; advantages and disadvantages	
8. On-farm Irrigation Methods: Drip Irrigation	2
- System layout and elements; Emitters - types, disposition; drip laterals and drip tapes; Manifolds, Blocks (layout, pipe sizing); Main Pipelines, Filters; advantages and disadvantages	
Selection of On-farm Irrigation methods	
9. Delivery Network - Irrigation Canals	2+2
- Types of canals. Alignment; Canal cross sections – lined and unlined canals. Canal capacity and losses; Hydraulic design - FSL of canal, admissible velocities. Stream load. Design of canal in alluvial soil and non-alluvial soils; Lining of irrigation channels; design of lined canal; drainage behind lining.	
10. Delivery Network – Drop Structures	2
Longitudinal profile of canals – requirements. Drop structures: Canal fall- necessity and location- types of falls; Sarda fall, Glacis fall – Design principles	
11. Cross Drainage Works: *Inverted Siphons and Aqueducts*	2+2
Types- selection of suitable type of CD works. Determination of maximum flood discharge and waterway for drain, fluming of canal - uplift pressure on underside of barrel roof and at the floor of the culvert; transitional structures - design of bank connections	

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3. Lectures

Course Contents	Hrs
12. Delivery Network – Check structures and outlets, Automation	2
- Necessity of flow and head regulation; Basic principles – position of cross and head regulators **- Structures for scheduled irrigation.** Check structures – sluice gate, LCWs, AMIL gates, others - Offtakes (Outlets) – sluice gates, Metergates, CHO, Baffle regulators **-Structures for On-demand irrigation.** AVIS and AVIO gates, Flap gates;etc.	
13. Other Structures: Settling basins; **Regulating reservoirs;** Canal escapes- types of escapes.	1
14. Pressurized distribution networks	2
- layout and elements - **arranged schedule irrigation.** Concept of irrigation sector; Determination of design flow rates; Pipe sizing; (hydraulic design – head losses and pipe sizing); Hydrants, drains, air valves - **on-demand irrigation.** Determination of design flow rates; hydrant construction	
15. Water Logging.	3
Causes, Measures: surface and sub-surface drains, land reclamation	

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3. Lectures

- Classes

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4. Workshops

- Workshop 1
  - 3 days
  - Hydraulic modelling via HEC-RAS
  - Hydrological modelling via MIKE Basin
- Workshop 2
  - 2 days
  - Work package 1 – Flow in open canals – experiment for obtaining the actual value of the canal bed Manning's roughness
  - Work package 2 – Pressurized flow – experiment for obtaining the uniformity of drip irrigation system (drip lateral)
    - ✓ head distribution along drip lateral
    - ✓drip emitters discharge and its variation

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5. Field Visits

- Luda Yana Dam Construction visit

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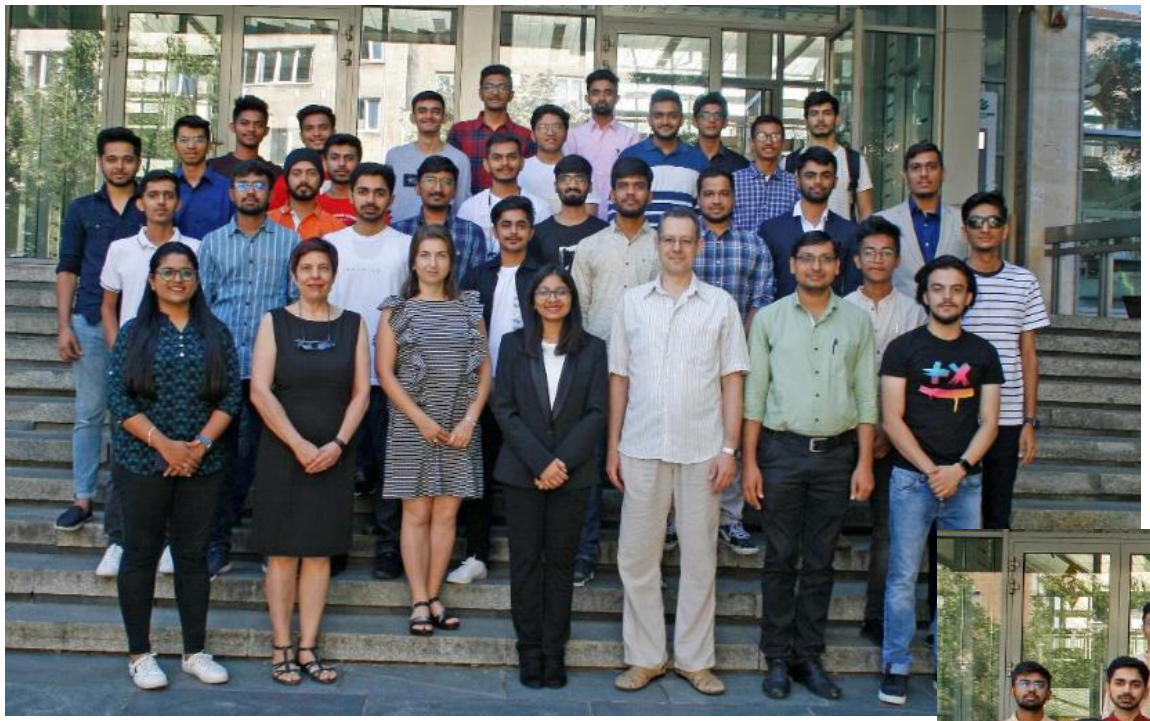
School End



School End

- Certificates issued
  - ➢ to students and
  - ➢ to their tutor – a teacher from Gujarat Technological University
- Marks from the subjects were recognized in Gujarat Technological University

UNIVERSITY OF ARCHITECTURE CIVIL ENGINEERING AND GEODESY

CERTIFICATE OF ATTENDANCE

WE HEREBY CERTIFY THAT

CHAUHAN VIRAJKUMAR RAKESHKUMAR

was participant in the

International Education Program (IEP 2019)

between

University of Architecture, Civil Engineering and Geodesy (UACEG), Bulgaria and ***Gujarat Technological University, India***

for the period 15th of June – 20th of July 2019

and has successfully passed in UACEG the following subjects:

DESIGN OF HYDRAULIC STRUCTURES (lectures and seminars)
IRRIGATION ENGINEERING (lectures and seminars)
HYDRAULIC AND HYDROLOGICAL MODELLING (seminars)
HYDRAULIC STRUCTURES (field practice)

Assoc. Prof. Petar Filkov
Deputy Dean of the
Faculty of Hydraulic Engineering,
UACEG

Assoc. Prof. Boris Tzankov
Vice-Rector
for Development and Information
Technologies, UACEG

20th of July 2019
Sofia

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School End