



TEACHING PLAN
BUILDING ENGINEERING VOCATIONAL EDUCATION (BEVE) STUDY PROGRAM
CIVIL ENGINEERING DEPARTMENT, FACULTY OF ENGINEERING, UNIVERSITAS NEGERI PADANG

COURSE	CODE	COURSE CLUSTER	CREDITS		SEM	VERSION
			Theory	Practice		
IRRIGATION AND DRAINAGE	SIP1.61.6301		2		6	1
Lecturer in Charge			Lecturer in Charge Totoh Andayono, S.T., M.T NIP.197307272005011003			
Remarks	Dean of Faculty of Engineering	Head of Civil Engineering Department	Coordinator of BEVE			
	<u>Dr. Fahmi Rizal, M.Pd., M.T</u> NIP. 195912041985031004	<u>Faisal Ashar, Ph.D.</u> NIP. 19750103 200312 1001	<u>Drs. Revian Body, MSA.</u> NIP. 19600103 198503 1003			
Program Learning Outcomes	Program Learning Outcomes (PLO)					
	At the time of graduation, students from Building Engineering Vocational Education study program are expected to have: <ol style="list-style-type: none"> 1. The ability to apply basic knowledge of science (mathematics, natural sciences) and other multidisciplinary knowledges which are the basis of Building Engineering Vocational Education field in carrying out its professional work (Knowledge and Understanding). <ol style="list-style-type: none"> 1.1. Able to show good understanding and to implement the basic concept of mathematics to solve various problems in building engineering field. 1.2. Have a high understanding and able to implement the basic concept of Physics and Chemistry (natural sciences) in building engineering field. 1.3. Have a high understanding and able to implement the basic concept of basic engineering 					

(Mechanics, Engineering Drawings) in building engineering field.

2. The ability to think critically and creatively in identifying, formulating, problem solving, and evaluating various problems in building engineering vocational education field by using the most appropriate and effective scientific method (Engineering analysis, investigations and assessment).
 - 2.1. Able to identify various technical problems in building engineering field.
 - 2.2. Able to analyze various technical problems in building engineering field.
 - 2.3. Able to evaluate various technical problems in building engineering field.
3. The reliable ability to plan, implement, and supervise the works in building engineering field. (Engineering design).
 - 3.1. Able to implement shop drawings in collaboration with various related parties.
 - 3.2. Able to manage building engineering works by paying attention to environmental, social, health and safety aspects.
 - 3.3. Able to supervise the implementation of building engineering works.
4. The reliable ability to plan, implement, and evaluate the learning process in Building Engineering Vocational Education study program (Education design).
 - 4.1. Able to plan the curriculum and learning process in building engineering field.
 - 4.2. Able to carry out, control, evaluate and improve the quality of the learning process.
 - 4.3. Able to develop an effective, efficient and interesting teaching media.
5. The ability to adapt to and innovate towards the development of science and technology and implement it into educational and professional work goals by considering non-technical risks that may occur (Engineering practice).
 - 5.1. Able to innovate and develop the technology in the field of building engineering by considering social, economic and environmental aspects.
 - 5.2. Able to analyze environmental conditions in the planning, implementation and supervision of buildings.
 - 5.3. Implement information technology and computers into the planning, implementation, and supervision processes of buildings.
6. Social and managerial competencies, collaboration and effective communication skills, entrepreneurial character, environmental insight, and awareness of the importance of lifelong

learning (Transferable and softskill).

- 6.1. Able to work creatively, innovatively, collaboratively, carefully, responsibly, and responsive to environmental change.
- 6.2. Have curiosity and critical thinking, open-minded, and objective.
- 6.3. Able to communicate effectively, and to collaborate in a team work.

Course Learning Outcomes

Course Learning Outcomes (CLO): Irrigation and Drainage

Course LO	PLO
1. Understand and master the concepts of irrigation and drainage engineering	1.3, 2.1, 2.4
2. Able to get data, measurement methods and investigations in irrigation planning	1.1, 1.2, 1.3, 2.1
3. Able to calculate and analyze irrigation water needs	1.1, 1.2, 1.3, 2.1, 2.2, 2.4, 3.4, 6.1, 6.2, 6.3
4. Able to plan an irrigation network (planning irrigation network maps, planning irrigation channels and planning of buildings in irrigation channels)	1.1, 1.2, 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 3.4, 5.2, 6.1, 6.2, 6.3
5. Able to plan the main irrigation building	1.1, 1.2, 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 3.4, 5.2, 6.1, 6.2, 6.3
6. Provides basics in understanding and planning drainage	1.1, 1.2, 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 3.4, 5.2, 6.1, 6.2, 6.3

Course Description

This course provides understanding and mastering theoretical concepts in the field of Irrigation and Drainage in general, being able to calculate irrigation water needs, planning irrigation networks (channels and structures in irrigation canals), planning main irrigation buildings and planning drainage structures.

Literature

Main:

1. Bambang Triatmodjo., 1996, "*Hidraulika IF*", Beta Offset, Yogyakarta.
2. Bambang Triatmodjo., 2014, "*Hidrologi Terapan*", Beta Offset, Yogyakarta
3. Chow, V.T, 1959, "*Open Channel Hydraulics*", Mc Graw Hill Book Company, New York.
4. Chow, V.T., 1988, "*Applied Hydology*", McGraw Hill Book Company, Singapore.
5. Direktorat Perguruan Tinggi Swasta.,

	6. Purwanti. S.P. dkk., 2017, “ <i>Rekayasa Irigasi dan Bangunan Air</i> ”, Muhammadiyah University Press, Yogyakarta 7. Standar Perencanaan Irigasi, 2013, “ <i>Kriteria Perencanaan (KP)</i> ”, Kementerian Pekerjaan Umum: KP – 01 Perencanaan Jaringan Irigasi KP – 02 Bangunan Utama (<i>Head Works</i>) KP – 03 Saluran KP – 04 Bangunan KP – 05 Petak Tersier KP – 06 Parameter Bangunan KP – 07 Standar Penggambaran KP – 08 Standar Pintu Pengatur Air Irigasi: Perencanaan, Pemasangan, Operasi dan Pemeliharaan KP – 09 Standar Pintu Pengatur Air Irigasi: Spesifikasi Teknis 8. Strum, T.W., 2001, “ <i>Open Channel Hydraulics</i> ”, Mc Graw Hill, USA 9. Suripin, 2003, “ <i>Sistem Drainase Perkotaan yang Berkelanjutan</i> ”, Andi Offset, Yogyakarta. 10. Waller, Peter, Yitayew, Muluneh, 2015, “ <i>Irrigation and Drainage Engineering</i> ”, Springer	
	Supporting:	
	1. Journal of Irrigation and Drainage Engineering, ASCE Journal, https://ascelibrary.org/journal/ 2. Jurnal Irigasi, Balitbang Kementerian PUPR http://jurnalirigasi_pusair.pu.go.id/index.php/jurnal_irigasi	
Teaching Media	Software:	Hardware:
	Office Word dan Excell	Computer, LCD Projector and White Board
Team Teaching	Totoh Andayono, S.T., M.T	
Assessment	Mid-Semester Exam, Final Exam, Individual and Group Assignment, Group Presentation	
Prerequisite	Hydrology, Hydraulics	

TEACHING MATERIAL

Week	Expected Competency	Study Material	Teaching Method and Strategy	Assignment	Assessment Criteria/ Indicator	Reference
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(1)	<p>Understanding and theoretical concepts of:</p> <ol style="list-style-type: none"> 1. Definition of Irrigation and Drainage 2. Facts, purposes and objectives of irrigation 3. Irrigation systems and types 4. Effects of climate, water cycle and topography 5. Irrigation water quality 	Introduction to Irrigation and Drainage	Lectures and discussion.	Observe carefully	1. N/A	4,5,9,10
(2)	<p>Knowledge and understanding of: collection, characteristics and accuracy of data for irrigation planning (hydrometeorology, topographic data, geological data and soil mechanics data)</p>	Data, measurement and investigation in Irrigation planning	Lectures and discussion.	Summarize	1. Studiosness Information completeness	5,6,7
(3)	<p>Calculate and analyze irrigation water requirements:</p> <ol style="list-style-type: none"> 1. Factors affecting irrigation water requirements 2. Methods for determining water requirements for plants 	Irrigation Water needs	Lectures and discussion.	quiz	Studiosness Activeness in lectures Tidiness Completeness	5,6,7,10
(4)	<ol style="list-style-type: none"> 3. Efficiency of irrigation networks 4. Calculation of irrigation water needs 5. Analysis of irrigation water needs 					

(5)	Planning irrigation networks (planning irrigation network maps, planning irrigation channels and planning of buildings in irrigation channels / cross structures)	Irrigation Network	Lectures and discussion.	quiz	Studiousness Activeness in lectures Tidiness Completeness	1,2,3,4,5,6,7,8,10
(6)						
(7)						
(8)	Mid-Semester Exam					
(9)	Planning the main building for irrigation: 1. Irrigation weir technology 2. Planning a permanent irrigation weir 3. Analysis of the stability of the weir: seismic force, mud force, water hydrostatic pressure, foundation soil pressure, uplift pressure 4. intake building 5. Planning of settling buildings and sand trape Planning of measuring buildings and building discharge controls.	Main Irrigation Building	Lectures and discussion.	quiz	Studiousness Activeness in lectures Tidiness Completeness	1,2,3,4,5,6,7,8,10
(10)						
(11)						
(12)						
(13)						

(14)	Provides a foundation for understanding and planning drainage: 1. Definition, development, function, purpose and benefits of drainage 2. urban drainage concept. 3. Hydrological and hydraulic aspects in drainage analysis.	Drainage Planning	Lectures and discussion.	quiz	Studiosness Activeness in lectures Tidiness Completeness	1,2,3,4,8,9,10
(15)	4. Planning criteria for network layout, channels and drainage structures 5. Detailed design and technical calculation of drainage.					
(16)	Final exam					

Notes:

Correlation between CLO, PLO and Assessment Methods

	Assesment	Bobot (%)	CPL-1			CPL-2				CPL-3				CPL-4			CPL-5			CPL-6			
			1	2	3	1	2	3	4	1	2	3	4	1	2	3	1	2	3	1	2	3	
CLO 1	Mid-test (Question 1 and 2)	3																					
CLO 2	Mid-test (Question 4)	1																					
CLO 3	Mid-test (Question 3)	6																					
CLO 4	Mid-test (Question	10																					

	5)																			
CLO 5	Final Exam (Question 1)	8																		
CLO 6	Final Exam (Question 2)	32																		
CLO 4	Assignment	40																		
CLO 5																				
CLO 6																				
TOTAL		100																		

Komponen Penilaian

Mid-Semester Exam : 20%

Final Exam : 40%

Assignment : 40%

Total : 100%

Description of Assessment Level

	Excellent	Good	Satisfy	Fail
Description	90-100	70-89	51-69	<50
Formulation	-	-	-	-
Calculation	90-100	70-89	51-69	<50
Analysis	90-100	70-89	51-69	<50

Assessment System

Score Range	Grade Letter	Grade Point	Notes	Score Range	Grade Letter	Grade Point	Notes
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85 – 100	A	4.0	Exceptional	55 – 59	C	2.0	Quite Satisfactory
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor
75 – 79	B+	3.3	Very Good	40 – 49	D	1.0	Very Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Fairly Good	-	T	-	Delayed
60 – 64	C+	2.3	Satisfactory				



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MID-SEMESTER EXAM

Course : Irrigation and Drainage
Code / Credits : SIP1.61.6301 / 2
Type of Exam : Open Book
Lecturer : Team
Time Allocation : 120 minutes
Maximum Grade : 100

1. What are the considerations in choosing the method of providing irrigation water (10%)
2. What parameters determine the quality of irrigation water and what is the effect (5%)
3. Calculate the water requirement for plants in an irrigated area if it is known that the average rainfall is 190 mm, the evaporation rate is 121 mm / day, the percolation requirement is 30 mm and the soil treatment needs 105 mm. (30%)
4. What data should be provided in making irrigation networks (5%)
5. Plan irrigation cross structures in primary canals, with planning data: irrigation area of 7000 ha, evapotranspiration that occurs 4 mm / day, crop coefficient of 0.95, silty sand soil type, effective rainfall of 7.15 mm / day, channel base elevation + 143.60, highway elevation + 142.00 and water loss in each channel: (50%)
 - ✓ Primary Channel 9%,
 - ✓ Secondary 1X%,
 - ✓ Tertiary 18%



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FINAL EXAM

Course	: Irrigation and Drainage
Code / Credits	: SIP1.61.6301 / 2
Type of Exam	: Open Book
Lecturer	: Team
Time Allocation	: 120 minutes
Maximum Grade	: 100

1. Draw an example on the main network system. What buildings are in a tertiary network system (20%)
2. In planning the permanent irrigation weir, data is known: (80%)
 - a) Average river width at the weir design location = 35 meters
 - b) Height of water above the weir = 2.5 meters
 - c) Elevation of the weir lighthouse = +150.00
 - d) River bed elevation = +145.50

The river plan flood discharge was determined using the Rational method with the following data: Catchment area 175 km², river length 37.5 km and upstream river bed elevation + 910 meters. Calculate: The height of the water before there is a weir, the effective width of the weir (the end of the round pillar is planned, the end of the round wall is 45 angled) and the building of the corresponding energy damper