

Anan College		Year	2024	Course Title	Hydraulics
Course Information					
Course Code	1813E01		Course Category	Specialized / Compulsory	
Class Format	Lecture		Credits	School Credit: 2	
Department	Course of Civil Engineering		Student Grade	3rd	
Term	Year-round		Classes per Week	前期:2 後期:2	
Textbook and/or Teaching Materials	PEL水理学 実教出版				
Instructor	Osada Kengo				
Course Objectives					
1. Able to explain important technical terms in Hydraulics (Laminar flow, Turbulent flow, Subcritical flow, Supercritical flow, and so on). 2. Able to understand and calculate hydrostatic pressure, pressure application point, and buoyancy. 3. Able to understand the continuity equation, Bernoulli equation, and equation of momentum and perform calculations using these equations. 4. Able to understand the Bernoulli equation considering energy loss in the pipeline and calculate pipe flow under various conditions.					
Rubric					
	Ideal Level		Standard Level		Minimum Level
Course Objective 1	Able to thoroughly explain the important technical terms in Hydraulics (Laminar flow, Turbulent flow, Subcritical flow, Supercritical flow, and so on).		Able to explain the important technical terms in Hydraulics (Laminar flow, Turbulent flow, Subcritical flow, Supercritical flow, and so on).		Able to explain some important technical terms in Hydraulics.
Course Objective 2	Able to thoroughly understand and calculate hydrostatic pressure, pressure application point, and buoyancy.		Able to understand and calculate hydrostatic pressure, pressure application point, and buoyancy.		Able to have some ability to calculate hydrostatic pressure, pressure application point, and buoyancy.
Course Objective 3	Able to thoroughly understand the continuity equation, Bernoulli equation, and equation of momentum and perform calculations using these equations.		Able to understand the continuity equation, Bernoulli equation, and equation of momentum and perform calculations using these equations.		Able to have some ability to calculate using the continuity equation, Bernoulli equation, and equation of momentum.
Course Objective 4	Able to thoroughly understand the Bernoulli equation considering energy loss in the pipeline and calculate pipe flow under various conditions.		Able to understand the Bernoulli equation considering energy loss in the pipeline and calculate pipe flow under various conditions.		Able to slightly understand the Bernoulli equation considering energy loss in the pipeline and calculate pipe flow under various conditions.
Assigned Department Objectives					
学習・教育到達度目標 B-2 学習・教育到達度目標 B-3 学習・教育到達度目標 D-1					
Teaching Method					
Outline	In this class, students learn the basic properties of water, the hydrostatic pressure, the continuity equation, the equation of motion, the theory of pipe flow, and the calculation method of pipe flow under various conditions.				
Style	This class conducts many problems to better understand important technical terms and calculation methods in addition to lectures. (The learning time: 60 hours)				
Notice	Please bring a calculator each time to conduct computational problem.				
Characteristics of Class / Division in Learning					
<input type="checkbox"/> Active Learning		<input type="checkbox"/> Aided by ICT		<input checked="" type="checkbox"/> Applicable to Remote Class	<input type="checkbox"/> Instructor Professionally Experienced
Course Plan					
			Theme	Goals	
1st Semester	1st Quarter	1st	Units and dimensions	Able to explain units used in hydraulics.	
		2nd	Basic properties of water	Able to explain basic properties of water.	
		3rd	Hydrostatic pressure Measurement of hydrostatic pressure	Able to explain strength and direction of hydraulics pressure. Able to explain the measurement of hydraulics pressure.	
		4th	Measurement of hydrostatic pressure Water hydraulic equipment	Able to explain the measurement of hydraulics pressure. Able to explain the Pascal's principle.	
		5th	Hydrostatic pressure that acts on a plane surface	Able to calculate strength and application point of hydraulics pressure that acts on a plane surface.	
		6th	Hydrostatic pressure that acts on a curved surface	Able to calculate strength and application point of hydraulics pressure that acts on a curved surface.	
		7th	Hydrostatic pressure that acts on a curved surface	Able to calculate strength and application point of hydraulics pressure that acts on a curved surface.	
		8th	Midterm examination		
	2nd Quarter	9th	Buoyancy	Able to understand the Archimedes' principle. Able to calculate the buoyancy.	
		10th	Stability of floating body	Able to calculate the stability of floating body.	
		11th	Stability of floating body	Able to calculate the stability of floating body.	

2nd Semester		12th	Basic of flow	Able to understand important words and types of flow.
		13th	Basic of flow Continuity equation	Able to explain laminar and turbulent flows. Able to understand the continuity equation.
		14th	Bernoulli's theorem	Able to understand the Bernoulli's theorem.
		15th	Bernoulli's theorem Euler's momentum equation	Able to understand the Bernoulli's theorem. Able to understand the Euler's momentum equation.
		16th	Return of final examination	
	3rd Quarter	1st	Application of Bernoulli's theorem	Able to calculate using the Bernoulli's theorem.
		2nd	Application of Bernoulli's theorem	Able to calculate using the Bernoulli's theorem.
		3rd	Momentum equation	Able to understand the momentum equation.
		4th	Application of momentum equation	Able to calculate using the momentum equation.
		5th	Application of momentum equation	Able to calculate using the momentum equation.
		6th	Orifice Weir	Able to understand various weirs.
		7th	Orifice Weir	Able to understand various weirs.
		8th	Midterm examination	
	4th Quarter	9th	Shear stress Velocity distribution of laminar flow	Able to understand the velocity distribution of laminar flow.
		10th	Velocity distribution of turbulent flow	Able to understand the velocity distribution of turbulent flow.
		11th	Friction loss of pipeline flow Mean velocity formula	Able to understand friction loss of pipeline flow and Moody chart. Able to understand the mean velocity formulas.
		12th	Form loss of pipeline flow	Able to explain the form loss of pipeline flow.
		13th	Calculation of various pipeline flows	Able to calculate various pipeline flows.
		14th	Calculation of various pipeline flows	Able to calculate various pipeline flows.
		15th	Calculation of various pipeline flows	Able to calculate various pipeline flows.
		16th	Return of final examination	

Evaluation Method and Weight (%)

	Midterm/Final Exam	Quiz	Portfolio	Presentation/Attitude	Other	Total
Subtotal	70	0	30	0	0	100
Basic Proficiency	10	0	10	0	0	20
Specialized Proficiency	60	0	20	0	0	80
Cross Area Proficiency	0	0	0	0	0	0