

Syllabus Environmental Engineering Department



SEMESTER 1



	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING				
Course	Code	Credits	Semester	Date of last revision	
Introduction to Citizen Ethics (Pancasila)	In accordance to respective department	2	1	August 31, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 1: Demonstrate God-fearing attitude, love of homeland and nationalism, and ethical practice to accomplish environmental engineering projects				
	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances				
Course Learning	CLO				
Outcomes (CLO)	 Students are able to apply Pancasila values in the society, nation and state, and have competitiveness, discipline, participation in creating a peaceful life based on Pancasila values. Students are able to adapt to their surroundings and find roles in the society 				
Course short description	This course discusses Pancasila constitutional life, and as a parage	during the history of Indone digm for the development c	sian nation, philosophy of Pa of science and technology ar	ancasila, Pancasila in Indonesian Id globalisation	



	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING			
Course	Code	Credits	Semester	Date of last revision
Citizen Ethics	TLB-103	2	1	August 31, 2023
Program learning	PLO			
outcomes (PLO)	PLO 1: Demonstrate God-fearing attitude, love of homeland and nationalism, and ethical practice to accomplish environmental engineering projects			
	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances.			
Course Learning	CLO			
Outcomes (CLO)	Students are able to develop a positive attitude and display behavior that supports the spirit of nationalism, motherland, supports civilized democracy, supports legal awareness and diversity			
Course short description	This course discusses nation Indonesian democracy, law	onal identity, the state and the const w enforcement, insight into the arch	titution, the relationship ipelago as Indonesian geo	between the state and citize opolitics, Indonesian nationa

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INSTITUT TEKNOLOGI NASIONAL

FACULTY OF CIVIL ENGINEERING AND PLANNING

BACHELOR OF ENVIRONMENTAL ENGINEERING

Course	Code	Credits	Semester	Date of last revision		
Introduction to Digital						
Transformation		2	1	August 31, 2023		
Program learning outcomes	PLO					
(PLO)	PLO 1: Demonstrate God-fearing attitude, lo engineering projects.	ve of homeland and nationali	sm, and ethical practice to a	accomplish environmental		
	PLO 2: Ability to work in teams, demonstrate	e social sensitivity, and value s	social diversity and circumst	ances.		
	PLO 3: Ability to apply the knowledge of national environmental engineering.	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the field of environmental engineering.				
	CLO					
Course Learning Outcomes (CLO)	1. Able to reflect digital culture in the era of industry 4.0/society 5.0 in current and future life such as in aspects: social communication, collaboration, information security, ethics and privacy					
	2. Able to explain principles, concepts, pro Cyber-Physical Systems, Artificial Intellige	ocesses, methods, technolog ence, Machine Learning, Big D	ies, and tools for key techr Data and their fitness in solvi	nologies that cause disruption: IoT and ing (environmental) problems		
Course short description	Introduction Digital transformation is the use of technology to transform analog processes into digital. Starting with an introduction to the forms of transformation and disruption that are occurring today. Digitalization is in all areas of our lives, from smart watches to artificial intelligence-enabled household assistants. Introduction Digital transformation refers more to the way technology revolutionizes business with new areas of technology such as machine learning, big data, cloud computing and IoT.					
	Students are introduced to social communication, collaboration, information security, ethics and privacy as important elements in digital culture, and also are asked to reflect and analyze their digital cultural behavior. Further, students are invited to apply the knowledge in the real issues and are exposed to problems typical of the digital era. Equipped with system thinking and critical thinking as tools, they are asked to come up with ideas for solutions to these problems.					

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BACHELOR OF ENVIRONMENTAL ENGINEERING

Course	Code	Credits	Semester	Date of last revision		
Earth Science	TLB-107	2	1	August 31, 2023		
Program learning	PLO					
outcomes (PLO)	PLO 2: Ability to work i	n teams, demonstrate social sensitivity, and v	value social diversity and	circumstances.		
	PLO 3: Ability to apply field of environmental	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the field of environmental engineering.				
	PLO 4: Ability to design environmental probler	and conduct laboratory and field experimen	ts to analyze and interpre	et data for solutions to		
Course Learning	CLO					
Outcomes (CLO)	1. Understand the basics of earth science and its role in various aspects related to environmental management					
	2. Understand the basic principles of earth science and engineering principles related to earth aspects					
	3. Able to recognise the branches of earth science disciplines and know the basic principles of application of this science					
	4. Able to analyse or interpret data related to earth sciences					
	5. Able to prepare enginee	ring plans by utilising the results of analysis o	or interpretation of data r	elated to earth science		
Course short						
description	This course provides basic knowledge and understanding of matters related to the earth as a whole, including land, sea, water and air. Apart from that, this course also covers technological aspects related to the basics of this science, and examples of implementation in the industrial world.					

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		BACHELOR OF EN	IVIRONME
Course	Code	Credits	Seme
Mathematics 1	TLB-109	2	1
Program learning	PLO		
outcomes (PLO)	PLO 3: Ability to apply the knowledge of environmental engineering.	f natural sciences, i	mathemati
Course Learning	CLO		
Outcomes (CLO)	Able to related and apply basic principl	es of mathematics	in environr
Course short description	This course discusses basic mathematic real numbers and functions, inequalitie the basic principles of formation of der implicit derivatives, differentials and Ta	cal sciences that car es and absolute valu ivatives, derivatives aylor's approximatic	n be used ir ies, limits o s of trigono on and use



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ester Date of last revision

August 31, 2023

ics, engineering, and environmental health in the field of

mental problems

n environmental engineering, which includes: system of of functions, continuity of functions, derivatives covering ometric functions, chain rule, high order derivatives, of derivatives.

Course	Code	Credits	Semester	Date of last revision		
Physics	TLB 111	2	1	August 31, 2023		
Program learning	PLO					
outcomes (PLO)	PLO 2: Ability to work in teams, demo	onstrate social sensitivity, and	value social dive	rsity and circumstances.		
	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental heal of environmental engineering.					
	PLO 4: Ability to design and conduct environmental problems	laboratory and field experime	nts to analyze and	d interpret data for solution		
Course Learning						
Outcomes (CLO)	1. Able to discuss, work together to com and offer solutions.	plete group assignments, ana	lyse aspects of ph	ysics problems in various		
	2. Able to think scientifically and systematically in understanding each theory, able to compile a verified engineer solving framework					
	3. Be able to prepare and carry out phys	ics experiments, and be able t	o analyse and inte	erpret the results of these		
Course short description						
	This course provides further understanding	ng of basic physics concepts, e	especially for lectu	ire purposes in the Depar		
	Environmental Engineering, thus, student	ts can have the ability to think	systematically ar	nd logically in solving prob		

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		BACHELOR OF EN	IVIRONMENTAL ENGINE	EERING	
Course	Code	Credits	Semester	Date of last revision	
Chemistry 1 + Laboratory	TLB-113	2	1	August 31, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 2: Ability to work in	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances.			
	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the				
	field of environmental engineering.				
	PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems				
Course Learning	CLO				
Outcomes (CLO)	1. Able to work together by applying the principles of chemistry in formulating problems of chemistry in the work environment and showing sensitivity to social problems in the working environment.				
	2. Be able to apply basic chemistry principles in solving the problems given				
	3. Able to prepare and carry out basic chemistry experiments, and able to analyse and interpret the results of basic chemistry experiments				
Course short					
description	This course discusses the m	ain topics consisting of Atomic	Structure, Periodic Arra	ngement, Molecular Structure,	
	Stoichiometry, Thermochemistry, Chemical Equilibrium in Gas Systems, Solutions, Electrolyte Solutions, Electrochemistry, Electrolysis, Chemical Kinetics				

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FACULTY OF CIVIL ENGINEERING

BACHELOR OF ENVIRONMENTA

Course	Code	Credits
Engineering Drawing	TLB-115	2
Program learning	PLO PLO 3: Ability to apply the knowledge	of natural sciences, mathema
outcomes (PLO)	PLO 7: Ability to use suitable environmental	nental technology methods, s
Course Learning Outcomes (CLO)	 CLO 1. Able to understand the basic skil 2. Able to make simple technical dr 3. Able to understand the function 4. Able to master technical drawing in the field of environmental engineer 	lls of technical drawing rawings properly and correctly of CAD-based technology and gs and their application prope ring
Course short description	This course discusses the basics and m skills to assist the planning and design	nain principles in Engineering I process.
	Students are expected to be able to master theoretical and technica objects or buildings, which are then applied to gain empirical experi (CAD) drawings.	



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Semester	Date of last revision			
1	August 31, 2023			
atics, engineerin	g, and environmental health in the			
kills and tools				
/				
l software in env	vironmental engineering drawings			
rly and correctly	y manually or by use digital technology			
Drawing with th	e aim of understanding and mastering			
al concepts in m ence through m	aking technical drawings of simple nanual drafting and digital technology			

SEMESTER 2



			STITUT TEKNOLOGI NASIONAL		
	BACHELOR OF ENVIRONMENTAL ENGINEERING				
Course	Code	Credit	Semester	Date of last revision	
Environmental Quality Measurement and Analysis I	TLB-116	3	2	January15, 2023	
Program Learning Outcomes	PLO				
(PLO)	PLO 2: Ability to work in teams, o	lemonstrate social sensitiv	vity, and value social diversity and	l circumstances.	
	PLO 4: Ability to design and cond	uct laboratory and field ex	xperiments to analyze and interp	ret data for solutions to environmental problems	
	PLO 5: Ability to analyze and solve environmental problems by applying the principles of sustainable environmental management based on resource recovery				
	PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English				
Course Learning Outcomes	CLO				
(CLO)	 Able to explain the role of environmental quality measurement and analysis in the field of environmental engineering and to improve environmental quality 				
	 Able to prepare management plans and environmental quality analysis by designing sampling activities in the field, determining methods of data analysis, conducting analysis, and interpreting the results. 				
	3. Able to analyze environmental problems related to drinking water and wastewater and their impact on environmental health and environmental quality based on regulations and standardized methods for key parameters (color, turbidity, DHL, pH, Asidity-alkalinity, CO aggressive, residual chlorine, hardness, organic parameters such as COD, DO, BOD), as well as determine optimum dose for coagulation an flocculation process.				
	4. Able to make presentations on analysis of laboratory experimental results				
Course short description	Students learn about environm Discussions were conducted rela knowledge to analyze the physi conductivity, pH, acidity and alka the optimal dose for coagulation	ental quality measuremental quality measuremented to sampling methods cal and chemical charact linity, hardness, chlorine, and flocculation units.	ent and analysis which includes for water analysis, quantitative eristics of drinking water and w residual chlorine, chloride bindin	s their roles in the field of Environmental Engineering methods, measurement procedures and instrumentatio astewater for key parameters: color, turbidity, electrica og capacity, DO, BOD and COD, as well as determination o	

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING					
Course	Code	Credit	Semester	Dateoflastrevision		
Hydrogeology	TLB-110	2	2			
Program Learning Outcomes	PLO:					
(PLO)	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the field of environmental engineering. PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems					
Course Learning Outcomes	CLO:					
(CLO)	1. Able to apply the principles and concepts of natural and engineering sciences, engineering mathematics and / or environmental health to identify, analyze, interpret, and provide recommendations for solving problems in the field of drinking water and wastewater using hydrological and hydrogeological concepts for sustainable management of water resources.					
	2. Able to design and carry out hydrology data measurements in the field to obtain water resources data in existing conditions and conduct analysis, interpretation, and evaluation to provide recommendations for the sustainability of water resources management in a particular area.					
Course short description	This course provides students the main factors that control evapotranspiration, runoff wa evaporation and evapotransp groundwater, as well as the c	with the ability to understand t the hydrological cycle process (s ater), types of rain, rain data pro iration data, types of aquifers, t alculation of the water balance.	hat hydrogeology as part o such as precipitation, intere ocessing techniques, measu ne concept of the relations	f hydrological science, understand ception, infiltration, irement and processing of hip between surface water and		

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Course	Code	Credit	Sem
Chemistry 2	TLB-106	3	
Program	PLO		
Learning	PLO 3: Ability to apply the kno	wledge of natural sci	ences, mathem
Outcomes (PLO)	in the field of environmental e	engineering.	
Course Learning	CLO		
Outcomes (CLO)	Able to understand the basic	principles of analytica	l chemistry
Course short description	This course provides basic kno	owledge of chemical a	nalysis quantita



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January 28, 2023

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	FAC	ULIY OF CIVIL ENGINEERING			
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Course	Code	Credit	Semester	Date of last revision	
Mathematics II	TLB-109	3	2	February 3, 2023	
Program Learning	PLO				
Outcomes (PLO)	PLO 1: Demonstrate God-fearing at environmental engineering projects.	ttitude, love of homeland an	d nationalism, and ethica	l practice to accomplish	
Course Learning	CLO				
Outcomes (CLO)	1. Students are able to understand the concept of derivatives and integrals				
	2. Students are able to understand the	e concept of transcendent fur	nctions (log, Ln, Exponenti	ial)	
	3. Students are able to understand the	e concept of derivatives and i	integrals of two variables ((with square borders)	
	 Students are able to understand the (Integrals to infinity) 	e concepts of integration tech	nniques, imfixed forms and	d unnatural integrals	
Course short description	This course discusses basic knowledge and logarithmic), derivatives and integ unnatural.	e regarding integral technic grals of two variables, inte	ques, integral transcend egration techniques and	dent functions (exponent d indeterminate forms a	



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Course	Code	Credit	Semester	Date of last revision	
Statistics I	TLB- 104	2	2	February 3, 2023	
Program Learning	PLO				
Outcomes (PLO)	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the field of environmental engineering. PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems				
	PLO 7: Ability to use suitable environmental technology methods, skills and tools				
Course Learning	CLO				
Outcomes (CLO)	1. Able to understand the ba	asic principles of mather	natics, well to help proc	ess and interpret data	
	2. Able to obtain, process ar	nd interpret data to be a	nalyzed as a basis for pr	oblem solving	
	3. Able to select technology	tools such as excel and	SPSS for analyzing and in	nterpreting data	
Course short	This course provides students v	vith basic knowledge of s	statistics to analyze deso	criptively (data and data display,	
description	frequency distribution and cent	tral values; deviation and	d ascension), probability	y and conduct sampling	



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		FACULTY OF CIVIL ENGI	NEERING AND PLANNING	G	
		BACHELOR OF ENVIRON	IMENTAL ENGINEERING		
Course	Code	Credit	Semester	Date of last revision	
Fluid Mechanics I	TLB-108	3	2	February 6, 2023	
Program Learning	PLO				
Outcomes (PLO)	PLO 2: Ability to work in teams, demor	nstrate social sensitivity,	and value social diversit	y and circumstances.	
	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the of environmental engineering.				
	PLO 4: Ability to design and conduct la environmental problems	boratory and field expe	riments to analyze and ir	nterpret data for solutions to	
Course Learning	CLO				
Outcomes (CLO)	1. Able to work in teams to solve basic problems of Fluid Mechanics				
	Able to understand the basic principles of fluid properties, the influence of pressure in fluids, fluid types, conservation of energy and bernaouli equations in flow (pipes, branches, loops, & combinations)				
	3. Able to formulate problems and	objectives of laboratory	and / or field experimen	ts.	
Course short description	This course provides definition and pro- field. The concept of flow fluid under pressure, the concept of in hydrostatic pressure, laminar flow, tur Hardy-Cross method, the impact of char channel flow measuring instruments	operties of fluids, differe pressure, the nature of t compressible flow and i bulent, pressure loss du anges in water pressure	ent types of fluids related he fluid, the law of conso ncompressible flow thro e to shear stress and dim and discharge on the en	d to the environmental engine ervation of mass and moment ugh pipes, Bernaulli's energy nensions, branching flow, and ergy system in closed flow, cl	

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FACULTY OF CIVIL ENGINEER
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Course	Code	Credit	Semester	Date of last revision
Introduction to				
Environmental	TID 11/	Э	2	Echrupry 2 2022
Engineering &;		Z	Z	rediuary 2, 2025
Resource Recovery				
Program Learning	PLO			
Outcomes (PLO)	PLO 3: Ability to apply the knowled environmental engineering.PLO 5: Ability to analyze and solve management based on resource res	lge of natural sciences, mather environmental problems by ap ecovery	matics, engineering	, and environmental health in the field of es of sustainable environmental
Course Learning	CLO			
Outcomes (CLO)	 Able to apply the basic princip provide recommendations for resource recovery Able to analyze environmentations environmental health well. 	oles & concepts of natural scien r solving problems in the fields al problems related to drinking	nces and mathemat of drinking water, water, wastewater	tics to identify, analyze, interpret, and wastewater, waste, and air based on , waste, and air and their impact on
Course short description	This course introduces students to that are the subject of study includ environmental problem-solving ba	environmental problems and e e drinking water, wastewater, sed on resource recovery appr	efforts to overcome solid waste, and air oach.	these problems. Environmental problems . This course also introduces students to the



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SEMESTER 3



Course	Code	Credits	Semester	Date of last revision	
Environmental Health	TLB-213	2	3	August 20, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 2: Ability to work in teams, demo	onstrate social sensitivity, a	and value social diversity an	d circumstances	
	PLO 3: Ability to apply the knowledge	of natural sciences, math	ematics, engineering, and e	nvironmental health in the field of	
	environmental engineering				
	PLO 8 : Ability to make prompt and a	opropriate decisions based	l on sustainability developm	nent principles and manage tasks under given	
	constraints.				
Course Learning	CLO				
Outcomes (CLO)	1. Students as a group are able to describe basic principles, theoretical science concepts, make decisions with consideration of				
	humanity, local socio-economic conditions, remember SDGs, and communicate well on topics of public health and environmental				
	health, interactions between humans and the environment, the environment prenatal, air, water, soil, biological, and social environment				
	2. Students are able to describe basic principles, theoretical science concepts related to public health and environmental health,				
	interactions between humans ar	nd the environment, prena	tal environment, air, water	, soil, biology, and social environment	
	3. Students are able to make the righ	nt decisions regarding envi	ronmental health efforts w	ith consideration of humanity, local socio-	
	economic conditions, and SDGs.				
Course short description	The Environmental Health course prov	ides knowledge about the	basic principles and scienti	fic concepts of public health and environmental	
	health, various environments (prenata	l, hydrosphere, atmosphe	re, lithosphere, biosphere a	nd Socio-sphere), the interaction between	
	humans and the environment, as well	as various environmental	health efforts with consider	ation of humanity, local socio-economic	
	conditions, and sustainable developme	ent goals (SDG)			

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Course	Code	Credits	Semester	Date of last revision	
Geographical Information System	TLB-209	2	3	August 20, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems PLO 5: Ability to analyze and solve environmental problems by applying the principles of sustainable environmental management based or resource recovery PLO 7: Ability to use suitable environmental technology methods, skills and tools				
Course Learning	CLO				
Outcomes (CLO)	 CLO) 1. Able to design and complete tasks/projects on environmental issues using geographic information systems 2. Able to use methods in geographic information systems in solving environmental problem 3. Able to solve environmental problems using geographic information systems 4. Able to analyze the results of data processing based on geographic information in environmental solutions. 				
Course short description	Geographic Information Systems (GIS) concepts and understanding of GIS, ge provides basic GIS skills in processing v end of the lecture can apply basic GIS r field of Environmental Engineering.	course focuses on applicat ographic data/information various data/information re methods/software to proce	ions in the field of Environ , methods and software fo elevant to the field of Envir ess geographical data, and	mental Engineering. Course materials include or processing geographic data. This course also conmental Engineering, so that students at the are able to analyze the results as needed in the	

Course	Code	Credits	Sem
Fluid mechanic II	TLB-205	2	3
Program learning outcomes (PLO)	PLO PLO 2: Ability to work in teams, dem PLO 3: Ability to apply the knowledg environmental engineering PLO 4: Ability to design and conduct	onstrate social sensitivity e of natural sciences, ma laboratory and field expe	, and valu thematics eriments t
Course Learning	CLO		
Outcomes (CLO)	 Able to formulate problems in principles of open channel flow Able to formulate problems an basis for solutions to environm 	the field of engineering a / d use experimental result ental problems.	nd the en ts to analy
Course short description	Fluid Mechanics II discusses the char and flow energy and its application planning and several waterworks as which is accompanied by laborator	aracteristics of water flow in open channel planning s well as introducing non- y practical experiments o	/ in open o g in the fie -uniform f n the basi

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August 22, 2023

ue social diversity and circumstances s, engineering, and environmental health in the field of

to analyze and interpret data for solutions to

vironment that require handling fluids using the

yze and interpret data on open channel fluid flow as a

channels based on the concept of conservation of mass eld of Environmental Engineering, especially drainage flow and critical flow and its application in the field, ics and flow measuring devices.

Course	Code	Credits	Sem		
Biology 1	TLB-201	2	3		
Program learning	PLO				
outcomes (PLO)	PLO 3: Ability to apply the knowledge of natural sciences, mathematics environmental engineering PLO 4: Ability to design and conduct laboratory and field experiments t environmental problems.				
Course Learning	CLO				
Outcomes (CLO)	 Students are able to understand Ecosystems, Biomonitoring, Bio Students are able to apply calcu analysis Able to design field activities to biomonitoring activities 	I the basic principles of B indicators and Biomarke lations related to biomo analyze and interpret da	Biology 1 r rs) nitoring a ata as a ba		
Course short description	This course studies ecology and ecos that they affect the life of biota in a bioindicators in biomonitoring is cru environmental degradation not only	ystems that are affected n ecosystem which in tur icial in addition to condu for physicochemical but	l by pollut rn can be cting mor t also biolo		

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August 20, 2023

s, engineering, and environmental health in the field of

to analyze and interpret data for solutions to

related to environmental pollution such as Ecology,

ind bioindicator related to environmental quality

asis for solutions to environmental problems related to

tants from both natural and anthropogenic sources so analyzed using the biomonitoring method. The use of nitoring to protect public health and prevent ogical parameters.

Course	Code	Credits	Sem
Management and Environmental Conservation	TLB-215	2	
Program learning	PLO		
outcomes (PLO)	PLO 2: Ability to work in teams, dem PLO 3: Ability to apply the knowledg environmental engineering.	onstrate social sensitivity, e of natural sciences, mat	and valu hematic
Course Learning	CLO		
Outcomes (CLO)	CLO 1: Students are able to work tog conservation & environmental mana CLO 2: Students are able to apply the conservation & management CLO 3: Students are able to apply en environmental conservation & mana	ether in a group to show e gement principles & concepts of gineering principles & con gement.	empathy natural s
Course short description	Environmental Management and Co management and quality; identifica conservation & management techn	onservation course discuss tion of environmental pro iques that can support the	ses the n blems; a e achieve

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ue social diversity and circumstances s, engineering, and environmental health in the field of

y to social and environmental problems well, in the

sciences and mathematics in environmental

engineering mathematics and/or environmental health in

main principles of environmental assessment and selection of types of environmental ement of sustainable development.

Course	Code	Credits	Sem
Statistics II	TLB- 203	2	3
Program learning	PLO		
outcomes (PLO)	PLO 3: Ability to apply the knowledge environmental engineering PLO 4: Ability to design and conduct I environmental problems.	e of natural sciences, ma aboratory and field expe	thematics eriments t
Course Learning	CLO		
Outcomes (CLO)	 Students are able to apply the p environmental engineering field Students are able to choose the analyzing and interpreting data 	rinciples and concepts c l most suitable statistical with the help of statistic	of statistic I method f cal tests.
Course short description	Statistics II course is a second level c analysis of variance in inferential sta providing solutions for problems end	ourse that aim to analyz tistics, regression and co countered in the field of	e and interest in the second s



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s, engineering, and environmental health in the field of

to analyze and interpret data for solutions to

cal data engineering to solve problems in the

for planning and designing experimental data, and

erpret qualitative data, hypothesis testing and analysis as well as multiple regression as a basis for conmental engineering

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Course	Code	Credits	Sem
Urban Eco-drainage System Planning	TLB-211	3	3
Program learning	PLO		
outcomes (PLO)	LO 5: Ability to analyze and solve er management based on resource red PLO 6: Ability to design an environ PLO 9: Ability to communicate well	nvironmental problems by a covery mental engineering through I, orally and in writing in Bał	pplying a resou nasa Ind
Course Learning	CLO		
Outcomes (CLO)	 Students are able to analyze fl Students are able to plan/desi Students are able to interpret 	ood and inundation problen gn eco-drainage systems for the results of planning/desi	ns that o r urban igning re
Course short description	This course offers subjects to ident channel hydraulics, and environme developments in urban drainage e equipped with the task of planning have skills on how to conduct desig	tify rainwater distribution sy entally sound drainage syste ngineering technology to tag g a drainage system in an en gn of urban drainage facilitie	/stems, em infra ckle floc vironme es.

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the principles of sustainable environmental

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occur in urban areas areas egarding eco-drainage systems for urban areas

hydrological calculations of rain discharge, drainage istructure. Additional information on the latest oding and the latest case studies to develop knowledge entally sound environment. Students are expected to

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PL/ BACHELOR OF ENVIRONMENTAL ENGINE			, ANNING EERING	
Course	Code	Credits	Semester	Date of last revision	
Environmental quality measurement and analysis II + laboratory	TLB-207	3	3	August 24, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 2: Ability to work in teams, demor PLO 3: Ability to apply the knowledge engineering PLO 4: Ability to design and conduct la	nstrate social sensitivity, and of natural sciences, mathem boratory and field experime	d value social diversity and c natics, engineering, and envi ents to analyze and interpret	circumstances ironmental health in the field of environmental t data for solutions to environmental problems.	
Course Learning	CLO				
Outcomes (CLO)	 Able to work in a group to preparent environmental quality parameter Able to analyze the occurrence of and observations in the field and Able to perform sampling plans, required solutions. 	re sampling plans based on rs, analyze and interpret me f environmental pollution a be able to identify the imp perform parameter measur	environmental conditions a easurement data nd identify alternative solut act of the pollution that occ ements, analyze environme	ind community characteristics, measure tions based on the results of measurements turs intal quality as a basis for designing the	
Course short description	This course offers the knowledge on to quantitative measurements in the fie measurement methods for the enviro instrumentation knowledge to analyst water parameters discussed are relate Ambient air parameters include parti	the importance of Environm Id of environmental engine onmental sector as well as o se the physical and chemica ted to the parameters of nit culate matter and gaseous	nental Quality Measurement ering. Discussion regarding i quantitative methods, meas I characteristics of ambient rogen, phosphate and sulfat pollutants.	t and Analysis and the importance of international standard sampling and urement procedures and air and water and waste, are given. The te, iron and manganese, and solids.	

		INSTITUT TEK FACULTY OF CIVIL EN BACHELOR OF ENVIR
Course	Code	Credits
Environmental quality measurement and analysis II + laboratory	TLB-207	3
Program learning outcomes	PLO	
(PLO)	PLO 2: Ability to work in teams, demons PLO 3: Ability to apply the knowledge of PLO 4: Ability to design and conduct lab	trate social sensitivity, and value soci natural sciences, mathematics, engi oratory and field experiments to ana
Course Learning Outcomes	CLO	
course rearining outcomes		
(CLO)	 Able to work in a group to prepare quality parameters, analyze and in Able to analyze the occurrence of observations in the field and be ab Able to perform sampling plans, perform sampling plansampling plans, perform sampling plansampling plansampling pla	sampling plans based on environment terpret measurement data environmental pollution and identify le to identify the impact of the polluter form parameter measurements, an

OGI NASIONAL ERING AND PLANNING ENTAL ENGINEERING

 nester
 Date of last revision

 3
 August 24, 2023

 ersity and circumstances
 Image: Second Sec

onditions and community characteristics, measure environmental

ative solutions based on the results of measurements and lat occurs

environmental quality as a basis for designing the required solutions.

asurement and Analysis and the importance of quantitative ernational standard sampling and measurement methods for the and instrumentation knowledge to analyze the physical and chemical ers discussed are related to the parameters of nitrogen, phosphate and , TSP and noise level. Waste parameters include waste generation, sults based on the field sampling and experiments at the end of course.

SEMESTER 4



		INST	ITUT TEKNOLOGI NA	ASIONAL
		FACULTY OF	CIVIL ENGINEERING	AND PLANNING
		BACHELOR O	F ENVIRONMENTA	LENGINEERING
Courses	Code	Credit	Semester	Date of Last Revision
Mathematics III		2	4	January 20, 2023
Program Learning	PLO			
Outcomes	PLO 3 Able to apply the basic principle environmental health	es of natural sciences	, mathematics, engi	neering mathematics, engineering and
Course Learning	CLO			
Outcomes	1. Able to understand the basic prin	nciples of study mate	rials in mathematics	5 3
	Students are able to use the prin mathematics 3.	ciples of mathematic	s to be able to solve	e problems related to study materials in
Course short description	Mathematics course 3 teaches studen polynomial interpolation equations, n functions using several variables, itera	nts to explore the unc on-linear equations a ative integration, secc	lerstanding and con and roots of equatio and-order differentia	cepts of parametric equations and curves, ns, vector principles in space, differentiation al equations, and vector calculus concept.

	INSTITUT TEKNOLOGI NASIONAL					
		FACULTY OF CIVIL ENGIN	EERING AND PLANNIN	IG		
		BACHELOR OF ENVIRON	MENTAL ENGINEERIN	G		
Courses	Code	Credit	Semester	Date of Last Revision		
Management of Hazardous and Toxic Materials and Waste	TLB-210	2	4	February 4, 2023		
Program Learning Outcomes	PLO					
	PLO 2: Able to work together, have s	ocial sensitivity, and care f	or the diversity of soci	ety and the environment		
	PLO 4: Able to design and carry out	aboratory and / or field ex	periments to obtain da	ata that will be analyzed and interpreted as a basis for		
	solving environmental problems					
	PLO 5: Able to analyze and solve environmental problems and their impact on environmental health by applying the basic principles of					
	environmental management based on resource recovery PLO 6: Able to design infrastructure in the field of Environmental Engineering (water, air, soil and waste) through a resource recovery					
	approach to realize a healthy society	/				
Course Learning Outcomes	CLO					
	1. Able to explain Hazardous and Toxic Materials and Waste management issues, including impacts on the environment and health, along with regulations/standards/technology available to manage these problems					
	 Able to choose methods and procedures for laboratory / field experiments and analyze laboratory / field data well as a basis for solving Hazardous and Toxic Materials and Waste management problems 					
	 Able to formulate, analyze, and environment, health, and regul 	I solve Hazardous and Toxi latory compliance	c Materials and Waste	e management problems and their impact on the		
	4. Able to design Hazardous and regulations	Toxic Materials and Waste	management infrastr	ructure in accordance with applicable standards and		
Course short description	This Hazardous and Toxic Materials	and Waste Management co	ourse discusses the de	finition, nature, characteristics of Hazardous and		
	Toxic Materials and Waste, along wi	th relevant regulations, sta	ndards, and available	technology. Its management includes identification,		
	reduction, packaging, storage, trans	portation, collection, proce	essing, utilization, stoc	kpiling, and dumping. Medical Hazardous and Toxic		
	Materials and Waste waste and othe	er types of Hazardous and	Toxic Materials and W	aste will also be studied, including non-Hazardous		
	and Toxic Materials and Waste.					

		INSTITU FACULTY OF CIV BACHELOR OF I	T TEKNOLOGI I IL ENGINEERIN ENVIRONMENT
Courses	Code	Credit	S
Biology II	TLB 202	3	
Program Learning	PLO		
Outcomes	PLO2: Able to work together PLO3: Able to apply the basi environmental health PLO4: Able to design and car interpreted as a basis for sol	, have social sensitiv ic principles of natur ry out laboratory ar ving environmental	vity, and care for ral sciences, ma nd / or field exp problems
Course Learning	CLO		-
Outcomes	 Able to collaborate in reseand Able to show sensitivity to environmental engineering Understand the basic pr Able to formulate problems water and liquid waste. 	arch in the field of e social problems, co inciples of microorg and objectives of la	nvironmental e mmunity divers anisms, classifie boratory and /
Course short description	Through this course, students le microorganisms, prokaryotic and application of the basics of micro	arn about the histor d eukaryotic prostist obiology and molec	ry and progress ts, biochemical ular biology in t



NASIONAL IG AND PLANNING FAL ENGINEERING

Semester Date of Last Revision

February 4, 2023

or the diversity of society and the environment athematics, engineering mathematics, engineering and

periments to obtain data that will be analyzed and

engineering. sity and the environment for research in the field of

cation of naming and characteristics of microorganisms ' or field experiments properly related to drinking

s of microbiology, classification and characterization of cellular processes in microorganism metabolism, and the the Field of Environmental Engineering

			INSTITUT TEKNO
			BACHELOR OF ENVIRON
Courses	Code	Credit	
Mathematics III		2	
Program Learning	PLO		
Outcomes	PLO 3 Able to apply the ba	sic principles o	of natural sciences, mathe
	environmental health		
Course Learning	CLO		
Outcomes	1. Able to understand the	ie basic princi	ples of study materials in
	 Students are able to u mathematics 3. 	ise the princip	oles of mathematics to be
Course short description	Mathematics course 3 teac	hes students	to explore the understand
	polynomial interpolation e	quations, non	-linear equations and root
	functions using several vari calculus	iables, iterativ	e integration, second-ord



OLOGI NASIONAL NEERING AND PLANNING NMENTAL ENGINEERING

Semester

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ematics, engineering mathematics, engineering and

mathematics 3 able to solve problems related to study materials in

ding and concepts of parametric equations and curves, ts of equations, vector principles in space, differentiation der differential equations, and applications of vector

Courses	Code	Credit
Drinking Water Supply Techniques	TLB 208	3
Program Learning	PLO	
Outcomes	PLO 1: Able to show piety to God Almighty PLO 3: Able to apply the basic principles of health PLO 4: Able to design and carry out labors	y, moral and ethical, as well as lo f natural sciences, mathematics,
	for solving environmental problems	atory and / or new experiments
	PLO 6: Able to design infrastructure in the approach to realize a healthy society	he field of Environmental Engine
	PLO 7 : Able to apply basic knowledge me problems	thods, and skilled in using the la
Course Learning	CLO	
Outcomes	 Students are able to show obedience drinking water supply techniques 	e to the rules and norms that app
	Able to design and carry out field ex appropriate to field conditions	periments to obtain an overview
	 Able to design drinking water piping Able to use tools for mapping, and pi 	systems along with complement pe diameter optimization to des
Course short description	In this course, the following basic concept requirements include quality, quantity, co transmission reservoir, transmission syste	s of the Drinking Water Supply S Intinuity and affordability (QQCA m, distribution system, and distr
	dimensionering DWSS; and regulations an	d standards relating to DWSS.

RЛ

Semester

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February 1st, 2023

ove for the motherland

engineering mathematics, engineering and environmental

to obtain data that will be analyzed and interpreted as a basis

eering (water, air, soil and waste) through a resource recovery

test environmental technology tools to solve environmental

ply in the Institute and the community to complete the task of

v of the study location so as to determine design criteria that are

tary buildings and accessories appropriately and optimally sign drinking water distribution networks

System (DWSS) are discussed; water supply system A); DWSS components include: source system, intake, ribution reservoir. This course also discusses how to optimize

Courses	Code	Credit	Semester	Date of Last Revision	
Waste Management	TLB 299	3	4	February 1st, 2023	
Program	PLO				
Learning	1. Able to work together, have	e social sensitivity, and care for t	he diversity of socie	ety and the environment (PLO2)	
Outcomes (PLO)	2. Able to apply the basic prin health (PLO3)	ciples of natural sciences, mathe	ematics, engineerin	ng mathematics, engineering and environmental	
	3. Able to design and carry out laboratory and / or field experiments to obtain data that will be analyzed and interpreted as a basis for solving environmental problems (PLO4).				
	4. Able to analyze and solve e environmental managemer	nvironmental problems and thein It based on resource recovery (P	r impact on enviro LO5).	nmental health by applying the basic principles of	
	5. Able to communicate well,	orally and in writing in Indonesia	an and English (PLO	9)	
	CLO				
	1. Able to identify diversity of	social, community and environn	nental conditions for	or waste planning. (CLO 2)	
	2. Able to compile recommen	dations for solving waste proble	ms at the study site	e (CLO 3)	
	 Able to compile waste man identification and evaluation (CLO 4) 	agement system directions by d n of existing waste managemen	esigning waste gen t systems and inter	eration measurements, determining methods of preting and analyzing measurement and field data	
	4. Able to identify waste prob	lems both technical and non-tec	hnical in the field (CLO 5)	
	5. Able to make papers and /	or able to present waste manage	ement plans in one	study area (CLO 9)	
Course short	In this Solid Waste Managem	nent course, basic concepts of	waste manageme	nt will be discussed, waste characteristics, waste	
description	generation, operational and no	on-operational techniques of wa	ste management a	nd waste management system planning	

		INSTITUT TEK FACULTY OF CIVIL ENG BACHELOR OF ENVIRG	NOLOGI NA SINEERING DNMENTAI
Courses	Code	Credit	Seme
Mathematics III	TLB 204	3	
Program	PLO		
Learning	PLO 3: Able to apply the basic pri	nciples of natural sciences	, applicatio
Outcomes (PLO)	engineering principles		
Course	CLO		
Learning	1. Students are able to comple	ete assignments both in gro	oups and ir
Outcomes	2. Students are able to use the	e principles of mathematic	s to be able
(CLO)			
Course short description	Mathematics course 3 teaches st polynomial interpolation equation functions using several variables,	udents to explore the und ons, non-linear equations a iterative integration, seco	erstanding and roots o and-order d



ASIONAL 6 AND PLANNING L ENGINEERING

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January 26, 2023

ons of engineering mathematics and

ndividually well and on time related to mathematics 3 e to solve problems related to advanced mathematics.

g and concepts of parametric equations and curves, of equations, vector principles in space, differentiation differential equations, and applications of vector calculus

SEMESTER 5



	INS	TITUT TEKNOLOGI NASIONAI		
	FACULTY O	F CIVIL ENGINEERING AND PL	ANNING	
	BACHELOR	OF ENVIRONMENTAL ENGINI	EERING	
Course	Code	Credits	Semester	Date of last revision
English	TLB-303	2	5	August 25, 2022
Program learning	PLO			
outcomes (PLO)	PLO 9: Ability to communicate well, orally and in	writing in Bahasa Indonesia ar	nd English.	
	PLO 11: Ability to work innovatively and continual	ly update with the developme	ent of science and tech	hnology, and engage in li
	learning			
Course Learning	CLO			
Outcomes (CLO)	1. Able to produce simple sentences in English	with appropriate grammar ru	es	



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FACULTY OF CIVIL ENGINEERING AND PLANNING

BACHELOR OF ENVIRONMENTAL ENGINEERING

Course	Code	Credits	Semester	Date of last revision	
Air Pollution	TLB 311	3	5	August 29, 2022	
Program learning	PLO				
outcomes (PLO)	PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in t environmental engineering.				
	PLO 4: Ability to design and conduct laboratory environmental problems	y and field experiments to	analyze and interpret	data for solutions to	
	PLO 7: Ability to use suitable environmental te	chnology methods, skills a	nd tools		
	PLO 11: Ability to work innovatively and continuity lifelong learning	nually update with the dev	elopment of science a	nd technology, and engage ir	
Course Learning Outcome	s CLO				
(CLO)	1. Students are able to apply basic principles understanding the process of air pollution	s of natural science, and pr n and its causes	rinciples of engineering	g mathematics in	
	2. Students are able to conduct laboratory e recommendations for its improvement	experiments to determine t	the quality status of ai	r pollution and formulate	
	3. Students are able to identify and utilise ai pollution and air pollution control techno	ir quality modelling tools/s logy	oftware to predict the	impact of emissions on air	
	4. Students are able to learn the latest deve science, engineering mathematics, and the	lopments on air pollution pole latest information techn	problems by integratin lology from various so	ng basic knowledge of natural urces.	
Course short description	Air pollution course provides the ability to understanding basic knowledge of various asp	o understand and solve pects of air pollution to be o	air pollution problem developed for further	ns in general by examining advanced air pollution course	

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	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING					
Course	Code	Credits	Semester	Date of last revision		
Sewerage Design	TLB - 307	3	5	August 26, 2022		
Program learning	PLO					
outcomes (PLO)	 PLO 4: Ability to design and conduct laborate environmental problems PLO 6: Ability to design an environmental of PLO 7: Ability to use suitable environmental 	tory and field experiments to engineering through a resourc l technology methods, skills a	analyze and interpret dat ce recovery approach nd tools	ta for solutions to		
Course Learning	CLO					
Outcomes (CLO)	 Students are able to understand the existing conditions, to design sewerage and to calculate the wastewater for each period of design Students are able to design waste water distribution according to regulations technical guidelines and to determine 					
	pipe layouts					
	3. Students are able to use software in sewe	erage design				
Course short description	Sewerage Design course examines the distribution of resource and recovery. Subjects learned distribution pattern, channel type and maintenance of sewerage design	oution of domestic wastewate ed about wastewater classif material, accessory facilitie	er and waste water distri ication, wastewater pro s, channel hydraulic cl	bution to support the conce blems, domestic wastewate haracteristics, operation a		

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING				
Course	Code	Credits	Semester	Date of last revision	
Bahasa Indonesia	TLB-301	2	5	August 26, 2022	
Program learning	PLO				
outcomes (PLO)	 PLO 7: Ability to use suitable environment PLO 9: Ability to communicate well, ora PLO 11: Ability to work innovatively an lifelong learning 	ntal technology method Ily and in writing in Baha nd continually update w	s, skills and tools asa Indonesia and Engl ith the development o	ish of science and technology, and engage in	
Course Learning	CLO				
Outcomes (CLO)	1. Students are able to apply Bahasa I	ndonesia in the area of e	environmental enginee	ering	
	2. Students are able to apply Bahasa I	ndonesia with appropria	ate stucture in oral and	d in writing for scientific writing	
	5. Students are able to complie citatio	ons and references in SCI	entific writing.		



Course short description This course provides students with the competence to use Bahasa Indonesia properly and correctly orally and in writing for scientific writing. The material of this course is composed of: Spelling, Word Forms, Sentences, Paragraph Scientific Writing, Citation Procedures and Writing References,

		INSTITUT TEKNOLO FACULTY OF CIVIL ENGINER BACHELOR OF ENVIRONM
Course	Code	Credits
Physic Chemical Treatment		
Process II	TLB 305	3
Program learning outcomes	PLO	
(PLO)	PLO 4: Ability to design and conduct laborate PLO 5: Ability to analyze and solve environm resource recovery PLO 6: Ability to design an environmental e	ory and field experiments to an nental problems by applying the engineering through a resource
Course Learning Outcomes	CLO	
CLO)	 Students are able to define the problem and to analyse the quality and quantity Students are able to implement engine formulation and principle prosedur of e recovery to maintain the quality of the Students are able to design the operation treatment level and design wastewater 	ns and the purpose of water and of water to be treatment and ering principles in determining each operation and process uni environment and public health on unit and process of drinking utilisation units and by-produc
Course short description	This course provides the basic principles of wastewater, covering physical and chemica purpose of the treatment is to protect publ	f unit operations and unit proc al processes in secondary and t ic health and prevent environm

DGI NASIONAL ERING AND PLANNING IENTAL ENGINEERING

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5	August 26, 2022

alyze and interpret data for solutions to environmental problems e principles of sustainable environmental management based on

recovery approach

nd wastewater treatment according to the quality standards to identify the type of treatment required the type of unit treatment, and able to analyse the t for secondary and tertiary treatment including resource and

water and wastewater treatment at the second and tertiary cts of water treatment to realise a healthy society cesses implemented in the water treatment, domestic/industrial tertiary treatment, as well as resource and recovery efforts. The nental degradation.

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Course	Code	Credits	Semester	Date of last revision		
Biological Treatment Design	TLB-309	3	5	August 2, 2022		
Program learning outcomes	PLO					
(PLO)	PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental p					
	PLO 5: Ability to analyze and solve environmental problems by applying the principles of sustainable environmental management based on					
	resource recovery					
	PLO 6: Ability to design an environm	ental engineering through	a resource recovery approa	ach		
Course Learning Outcomes	CLO					
(CLO)	1. Students are able to identify the content of wastewater that related to biological and to compare it to the quality standards, and also					
	to analyse the content of wastewater that related to biological that does not meet the quality standards which could cause problems to					
	humans and the environment					
	2. Students are able to design a biological treatment experiment considering problems, objectives, methods, proper procedures and able					
	to choose methods of data analysis and interpretation in conducting biological treatment design					
	3. Students are able to contribute solutions	to environmental proble	ms according to the basic	principles of environmental control		
	technology based on resource recover	ery				
	4. Students are able to design biological tr	reatment units (suspended	and attached reactors, slu	dge settler) in sufficient detail consisting		
	of operating and processing units, cor	nplying with design criteria	a and the regulations based	on the concept of resource recovery.		
Course short description	This course provides students with a compr	ehensive study of biologi	cal wastewater treatment,	which includes wastewater characteristics		
	mass balance, process selection, design, and	d implementation, introdu	ction to biological wastew	ater treatment, suspended growth process,		
	batch system, continuous system, mass balar	nce, attached growth proc	ess, anaerobic treatment p	rocess, anaerobic sludge treatment process,		
	and resource recovery through nutrient recovery	very (phosphate and amm	onium recovery).			

OLOGI NASIONAL NEERING AND PLANNING NMENTAL ENGINEERING

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING					
Course	Code	Credits	Semester	Date of last revision		
Noise Control	TLB-353	2	5	August 2, 2022		
Program learning	PLO					
outcomes (PLO)	 PLO 3: Ability to apply the knowledge of natural sciences, mathematics, engineering, and environmental health in the field of environmental engineering. PLO 5: Ability to analyze and solve environmental problems by applying the principles of sustainable environmental management based on resource recovery PLO 8: Ability to make prompt and appropriate decisions based on sustainability development principles and manage tasks under given constraints. 					
Course Learning	CLO					
Outcomes (CLO)	 Able to explain the b Able to explain the b Able to explain the set Able to explain noise Able to explain mana Able to develop a no 	asics of acoustics asics of indoor/outdoor noi ources, characteristics, expo measurement instruments gement and programme of ise control programme base	se and its evaluation osure, and impacts of procedures f noise control ed on the identificatio	noise, and the principles of its management on of noise sources and measurements.	t	
Course short description	This course provides a basic environmental noise probler	understanding of acoustic a ns.	nalysis as a fundamei	ntal concept in determining policies to addre	255	

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING				
Course	Code	Credits	Semester	Date of last revision	
Techniques for Collection					
and Transport of Solid	TLB-359	2	5	August 24, 2022	
Waste					
Program learning outcomes	s PLO				
	PLO 5: Ability to analyze and solve en management based on resource reco PLO 8: Ability to make prompt and ap under given constraints.	vironmental problems by ap overy propriate decisions based or	plying the principles of sun n sustainability developm	ustainable environmental nent principles and manage tasks	
Course Learning Outcomes	CLO				
(CLO)	 Able to explain the engineerin area Able to identify the constra Able to develop effective ar 	g principles of waste collection ints that are exist in the was nd efficient waste collection	on and waste transportat te collection and transport and transport systems	tion and implement in a service rt system	
Course short description	This course provides review topics c composition, technical aspects of ope design of equipment and other fac transport systems	on the basic concepts of verations: level of service, service, service, service, service, service, non-operational tech	vaste management, mea vice area, collection syste nniques of planning and	asurement of waste generation a em, transfer system, transport syste evaluation of waste collection a	

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING			
Course	Code	Credits	Semester	Date of last revision
Environmental Economics and Valuation	TLB-361	2	5	August 31, 2022
	 PLO 3: Ability to apply the know field of environmental enginee PLO 5: Ability to analyze and so management based on resource PLO 8: Ability to make prompt tasks under given constraints. 	wledge of natural sciences, ma ring. olve environmental problems b ce recovery and appropriate decisions bas	athematics, engineering by applying the principle sed on sustainability de	g, and environmental health in the es of sustainable environmental evelopment principles and manage
Course Learning Outcomes (CLO)	CLO Students are able to expla Students are able to expla Students are able to analy Students are able to expla Students are able to expla Students are able to expla 	in the reasons due to the occu in the basic concepts of enviro se the mechanisms of the mar in the role of valuation in envir in and apply valuation methoo ms	irrence of environment onmental economics ket system in generally ronmental problems ds in the implementatic	cal economics
Course short description	This course provides students economic valuation of environ	with the ability to understar mental aspects, as well as to ir	nd the basic principles	of environmental economics and development.

SEMESTER 6



Basic Designing of Research and Design TLB- 312 2 6 January 17, 2023 Program learning outcomes (PLO) PLO PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English. PLO 11: Ability to work innovatively and continually update with the development of science and technology, and engage lifelong learning. Image: Communicate well of the development of science and technology, and engage lifelong learning.					
Research and Design January 17, 2023 Program learning PLO outcomes (PLO) PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English. PLO 11: Ability to work innovatively and continually update with the development of science and technology, and engage lifelong learning.					
Program learning PLO outcomes (PLO) PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English. PLO 11: Ability to work innovatively and continually update with the development of science and technology, and engage lifelong learning.					
 outcomes (PLO) PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English. PLO 11: Ability to work innovatively and continually update with the development of science and technology, and engag lifelong learning. 					
	 PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English. PLO 11: Ability to work innovatively and continually update with the development of science and technology, and engage in lifelong learning. 				
Course Learning CLO					
Outcomes (CLO) 1. Students are able to explain the types of research and design					
2. Students are able to explain the stage of research					
3. Students are able to understand the procedure of scientific writing					
4. Students are able to make scientific presentations					

Course short description

on The course provides knowledge regarding types of research, the stages of research, how to write scientifically and make presentations in scientific forums.



	FACU BACH	INSTITUT TEKNOLOG LTY OF CIVIL ENGINEER ELOR OF ENVIRONMEN
Course	Code	Credits
Drinking Water Treatment Plant Design Project	TLB-314	3
Program learning outcomes (PLO)	PLO	
	PLO 1: Demonstrate God-fearing attitude, lov engineering projects.	ve of homeland and nat
	PLO 2: Ability to work in teams, demonstrate	social sensitivity, and v
	PLO 5: Ability to analyze and solve environme on resource recovery.	ental problems by apply
	PLO 6: Ability to design an environmental eng PLO 9: Ability to communicate well, orally an	gineering through a reso d in writing in Bahasa Ir
Course Learning Outcomes (CLO)	CLO	
	1. Able to demonstrate compliance with the designing Drinking Water Treatment Pla	ne rules and norms that nts
	 Able to work in teams to the design of D Able to analyze environmental problems Able to produce assignments in good and 	Prinking Water Treatme s related to drinking wa nd correct Indonesian.
Course short description	This course discusses the basic concepts of Dr	rinking Water Treatmer
	(bar screen, grit chamber; primary treatment	(sludge processing)

GI NASIONAL SING AND PLANNING NTAL ENGINEERING

Semester	Date of last revision
6	February 18, 2023

ionalism, and ethical practice to accomplish environmental

alue social diversity and circumstances.

ing the principles of sustainable environmental management based

ource recovery approach. Indonesia and English

apply at the Institute and the community to complete the task of

nt Plants Iter and their impact on environmental health. community

nt Systems based on the principles of drinking water security plans; ater supply process; preliminary treatment edimentation and filtration); secondary treatment (coagulation,

Course	Code	BACHELOR OF ENV Credits	Semesto
Epidemiology	TLB - 306	2	6
Program learning outcomes (PLO)	PLO 2: Ability to work in teams, de PLO 3: Ability to apply the knowled environmental engineering. PLO 5: Ability to analyze and solved on resource recovery. PLO 8: Ability to make prompt and constraints.	emonstrate social sensit edge of natural sciences, e environmental probler d appropriate decisions	ivity, and va , mathemati ms by applyi based on su
Course Learning Outcomes	CLO		
(CLO)	 Students as a group are able to emanagement, the occurrence of effects/responses quantitatively epidemiological research Students are able to explain the band the relationship between epimethods of identifying agents, here Students are able to explain the relation the relation	explain the basic principle disease and outbreaks, and qualitatively, contro basic principles of epider idemics and environmer osts and the environmer measurement of exposu	es of epiden how to iden olling and pr miology, nar ntal manage nt. ire and effec
Course short description	The course provides knowledge about environments (prenatal, hydrosphere, environment, as well as various enviro sustainable development goals (SDG)	the basic principles and , atmosphere, lithosphere , nmental health efforts w	d concepts o re, biospher with humani

NASIONAL G AND PLANNING AL ENGINEERING

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lue social diversity and circumstances. cs, engineering, and environmental health in the field of

ng the principles of sustainable environmental management based

stainability development principles and manage tasks under given

niology, the relationship between epidemics and environmental tify agents, hosts and the environment, measuring exposure and reventing epidemics, as well as various basic models of

nely the definition of endemic, epidemic, pandemic, epidemiology, ment, the occurrence of diseases and outbreaks, definitions and

t/response quantitatively and qualitatively.

of public health science and environmental health, various re and sociosphere), interactions between humans and the itarian considerations, conditions local socio-economic, and

	INSTITUT TEKNOLOGI NASIONAL FACULTY OF CIVIL ENGINEERING AND PLANNING BACHELOR OF ENVIRONMENTAL ENGINEERING				
Course	Code	Credits	Semester	Date of last revision	
Entrepreneurship	TLB-304	3	6		
	PLO				
Program learning outcomes (PLO)	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances. PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English PLO 10: Ability to develop entrepreneurial efforts in environmental engineering field.				
Course Learning	CLO				
Outcomes (CLO)	Able to demonstrate sensitivity to social problems, community diversity and the environment in the field of environmental engineering.CLO 2: Able to express opinions and discuss in presenting tasks and results of planning, implementation and evaluation in the field of environmental engineering.CLO 3: Able to identify and understand entrepreneurial opportunities in the field of Environmental Engineering.				
Course short description	The course discusses preparing a business plan by formulating a business idea to answer market opportunities and building a business model as a first step for implementation.				



SEMESTER 7



Course	Code	Credits	Sen	
Wastewater Treatment Plant Design Project	TLB-403	3		
Program learning	PLO			
outcomes (PLO)	PLO 2 Ability to work in teams, demonstrate social sensitivity, and valu PLO 5 Ability to analyze and solve environmental problems by applying based on resource recovery			
	PLO 6 Ability to design an environmenta PLO 9 Ability to communicate well, oral	al engineering through a really and in writing in Bahasa	sour Indo	
Course Learning	CLO			
Outcomes (CLO)	 Students as a group are able to de Students are able to describe basis health, in wastewater treatment Students are able to design wastewatewatewatewatewatewatewatewatewatewa	esign wastewater treatment c principles, theoretical scie units design water treatment plants in d	t pla ence etail	
	4. Students are able to make design i	report regarding wastewate	er tre	
Course short description	This course enables students work i domestic wastewater treatment (WW of WWT processes were designed, treatment; sludge processing.	n groups to conduct was /T) capacity and wastewat such as preliminary tre	tewa ter c eatm	



nester	Date of last revision	
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e social diversity and circumstances the principles of sustainable environmental management

ce recovery approach onesia and English .

nts

concepts related to public health and environmental

eatment plants.

ater treatment plant design projects. The service area, characteristics are determined based on city data. A series nent; primary treatment; secondary treatment; tertiary

	Course	Code	Credits	
	Internship	TLB 490	2	
	Program learning	PLO		
	outcomes (PLO) and	PLO 3 Ability to apply the knowledge of natural s	ciences, mathematics, engine	er
	Course Learning	engineering		
	Outcomes (CLO)	PLO 5 Ability to analyze and solve environmental	problems by applying the prin	າດ
		recovery		
		PLO 7 Ability to use suitable environmental tech	nology methods, skills and too	ls
		PLO 8 Ability to make prompt and appropriate de	ecisions based on sustainabilit	y (
		PLO 9 Ability to communicate well, orally and in	writing in Bahasa Indonesia ar	۱d
		CLO		
		1. Ability to apply the knowledge of natural so	iences, mathematics, enginee	ri
		engineering according to the topic and field	d of work practice	
		2. Ability to analyze and solve environmental	problems by applying the prin	ci
		resource recovery according to the topic ar	nd field of work practice	
		3. Ability to use suitable environmental techn	ology methods, skills and tool	S á
		4. Ability to communicate well, and make rep	ort after field of work pracyice	e (
		5. Ability to make prompt and appropriate de	cisions based on sustainability	' d
		according to the topic and field of work pra	ctice.	
	Course short	This course is a compulsory course, can be taken	by students after fullfill at lea) 1 C I
)	description	nractical experience and deepening insight into t	by students after runninat lea	in
		solve various technical and non-technical proble	ms that occur in the field and	, n n
		coordination and collaboration	ins that occur in the new, and	Ч

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ring, and environmental health in the field of environmental

iples of sustainable environmental management based on resource

development principles and manage tasks under given constraints. I English

ing, and environmental health in the field of environmental

ples of sustainable environmental management based on

according to the topic and field of work practice (PLO 9)

development principles and manage tasks under given constraints

t 75 credits with a GPA> 2. This course provides technical field neering work, provides the opportunity to apply the knowledge to provides a clearer picture of the need for interdisciplinary

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	Course	Code	Credits	Semeste		
	Waste Final Processing / Landfill Design	TLB-401	3	7		
	Program Learning	PLO				
	Outcomes (PLO)	PLO 2 Ability to work in teams, demonstrate social sensitivity, and va PLO 6 Ability to design an environmental engineering through a reso PLO 7 Ability to use suitable environmental technology methods, ski PLO 9 Ability to communicate well, orally and in writing in Bahasa In				
	Course Learning Outcomes	CLO				
	(CLO)	1. Ability to work in teams, de final processing site	monstrate social sens	itivity, and		
		 Able to design the final proc Able to plan resource recove Able to make reports, preser 	essing site using appli ery from landfill activing nt and discuss the resu	icable des ties using ults of land		
	Course short description	The Waste Final Processing Design co Selection, Site Selection Procedures, and Leachate Generation, Liner Syste Cover Soil Application, External drain	ourse discusses the Sa Stockpiling Scenarios, ems, Leachate Collecting age system, and land	nitary Lar , Arranger ion Systen fill manag		

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value social diversity and circumstances (21%)

ource recovery approach (36%)

ills and tools (28%)

ndonesia and English (15%)

d value social diversity and circumstances in planning the

sign standards and criteria. existing applications / software dfill planning

ndfill Concept, Projection of Landfill area, Principles of Site ment of Landfill Cells, Projection and Characterization of Gas ms, Leachate Processing System, Gas Collection System, gement system.

SEMESTER 8



Course	Code	Credits	Semester	Date of last revision		
Appropriate Environmental Technology	TLB 499	3	8	August 20, 2023		
Program learning	PLO					
outcomes (PLO)	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems PLO 5: Ability to analyze and solve environmental problems by applying the principles of sustainable environmental management based on resource recovery PLO 9: Ability to communicate well, orally and in writing in Bahasa Indonesia and English					
Course Learning	CLO					
Outcomes (CLO)	 Able to work together, have social sensitivity, and high concern for the diversity of society, and the environment for evaluating the implementation of appropriate environmental technology in an area Able to design a field experiment using indicators based on basic principles & concepts of natural science and engineering for evaluating the implementation of appropriate environmental technology in an area Able to recommend solution to environmental problems and their impact on environmental health properly by applying appropriate environmental technology principles and based on resource recovery paradigm Able to conduct and produce appropriate writing in Indonesian and/or English 					
Course short description	This course ellaborates various aspe- matters. Alternative technology, inst- gravity flow, rainwater catchment, composting, stabilisation ponds, aqua	ects related to the most ap itutional aspects, participati ventilated tubules, gees culture, are among of the im	opropriate enviro on, waterborne o se lava, seption oportant scopes co	nmental technologies and other supporting diseases, health education, wells and pumps, tanks, technology selection, biogas, overed in this course.		

Course	Code	Credits	Semester	Date of last revision		
Occupational Health, and Safety	COME 311	2	8	August 22, 2023		
Program learning	PLO					
outcomes (PLO)	PLO 2: Ability to work in teams, demonstrate social sensitivity, and value social diversity and circumstances PLO 4: Ability to design and conduct laboratory and field experiments to analyze and interpret data for solutions to environmental problems PLO 8: Ability to make prompt and appropriate decisions based on sustainability development principles and manage tasks under given constraints.					
Course Learning	CLO					
Outcomes (CLO)	1. Able to work in a tea to identify the diversity of social conditions, the diversity of communities and the environment to identify, evaluate and control hazard factors in occupational health and safety management planning					
	 Able to apply the principles & concepts of various engineering and engineering sciences as well as the basic concepts of Occupational Health and Safety in identifying hazard factors in the work environment and their effects on worker safety and health to provide recommendations of to solve problems in the relevant field 					
	 Able to determine work environment measurement methods, hazard and risk quantification, perform data analysis and formulate interpretations in assessing the hazardous conditions of the work environment 					
	4. Able to identify and make quick and appropriate decisions in controlling occupational health and safety hazards and risks, and evaluate them in accordance with sustainable development goals in planning, implementing, and evaluating occupational health and safety performance in a timely manner.					
Course short description Occupational health and safety course provides students the ability to know the history of development, regulation occupational health and safety/industrial hygiene, solvents, industrial dust, Occupational Skin Diseases, basic concepts electromagnetic radiation, temperature and pressure extremes, ergonomics, work accidents, mechanical safety and prevention, industrial ventilation, respirators, occupational toxicology and emergency management systems. These are a competences required in the working environment relevant to the occupational health and safety.			velopment, regulations, basic concepts o eases, basic concepts of ionizing radiation mechanical safety and industrial acciden t systems. These are among the importan			

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	Course	Code	Credits	Semester	Date of last revision		
	Environmental Impact Assessment (EIA)	TLA-402	3	8	January 26, 2023		
	Program learning outcomes	PLO					
		 PLO 2: Ability to work in teams, de PLO 4: Ability to design and conduct problems PLO 5: Ability to analyze and solve based on resource recovery PLO 9: Ability to communicate we PLO 11: Ability to work innovative learning. 	emonstrate social sensitive act laboratory and field ex e environmental problem ell, orally and in writing in ely and continually update	vity, and value social diversity operiments to analyze and int s by applying the principles of Bahasa Indonesia and Englis with the development of sci	and circumstances cerpret data for solutions to environmental f sustainable environmental management h ience and technology, and engage in lifelong		
	Course Learning Outcomes (CLO)	CLO					
		1. Able to cooperate in formula	ne field of Environmental Engineering				
		2. Able to interpret data properly utilized for design solutions based on resource recovey paradigm					
		3. Able to analyze environmental quality based on relevant regulations					
		4. Able to make assignments and/or reports/papers for implementation, planning and evaluation related to the field of Environmental Engineering in a timely manner					
		5. Able to express opinions and discuss in presenting tasks and results of planning, implementation and evaluation in the field of environmental engineering					
		6. Able to provide directions on novelty recommendations (ideas for implementation, methods and implementation in both technical and non-technical both for management and recovery efforts.					
	Course short description	This course studies the importance of an environmental impact (EIA) assessment study on planned activities that exploit the environmen					
59		principles of significant impact assessment, Application of EIA laws and regulations in Indonesia, arrangement of Terms of Reference of EI					
		documents, and Environmental Impact Analysis (Andal) documents. Other important documents such as environmental management pla					
		implementation of the EIA Study in Indonesia are given and show cased in the class.					

Course	Code	Credits	Semester	Date of last revision	
Bachelor final project		6	8	August 22, 2023	
Program learning	PLO				
outcomes (PLO)	PLO 3: Ability to apply the knowl engineering PLO 4: Ability to design and conc	ledge of natural sciences, mathem duct laboratory and field experime	atics, engineering, and environment nts to analyze and interpret data for	al health in the field of environmental solutions to environmental problems	
	PLO 5: Ability to analyze and solv recovery PLO 9: Ability to communicate w	ve environmental problems by app vell, orally and in writing in Bahasa	lying the principles of sustainable er Indonesia and English.	nvironmental management based on reso	
Course Learning	CLO				
Outcomes (CLO)	1. Able to apply the basic principles of natural sciences, mathematics, engineering mathematics, engineering and environmental health in accordance with the topic and field of the bachelor final project				
	2. Students are able to design a laboratory or field experiment by considering appropriate problems, objectives, methods, procedures and a to choose methods of analysis and interpretation of data, solutions, and activities according to topics and fields of the bachelor final projectives.				
	3. Students are able to analyze, formulate, and solve environmental problems and their impact on environmental health properly by applyin basic principles of environmental management based on resource recovery according to the topics covered in the bachelor final project				
	4. Students are able to identified development and are able	fy the purpose of making decisions to plan, implement, and evaluate a	a, make decisions and evaluate them assignments in accordance with the	appropriately which refers to sustainab given period for conducting the project	
	5. Students are able to comm answer questions correctly	unicate ideas in Indonesian and Er using proper writing/reporting in	nglish and are able to prepare TA pre bahasa, progress seminars, and fina	esentation materials, discuss, express opi Il project defense session	
	6. Students are able to work i	nnovatively and learn for life to fa	ce tough challenges in implementing	g and completing the project.	
Course short description	This course provides deep insight and non-technical problems that Technology, Management, Wate the ITENAS academic writing gu	nt into the field of Environmental E It occur in the laboratory and in the er and Waste Based on Resource R idance.	Engineering, the opportunity to apple e field. The topic of the Final Project ecovery. The arrangement of all proc	y existing knowledge to solve various tec is research, planning and design, Proces ducts of this bachelor final project should	



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