GoBali Study Abroad

ENGINEERING · NGURAH RAI UNIVERSITY

Course Guide

All engineering courses, learning objectives, weekly topics, exams and grading for your semester at Ngurah Rai University in Bali.

Ngurah Rai University | Bachelor level | Up to 30 ECTS | Taught in English

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About the GoBali program

GoBali Architecture & Engineering is a study abroad program at Ngurah Rai University in Bali, Indonesia, for bachelor (undergraduate) students. You study side by side with Indonesian students.

Program requirements

A full-time course load for regular students is about 30 ECTS per semester. GoBali students take at least 15 ECTS per semester.

Credits

Ngurah Rai University awards Indonesian credit points (SKS). Each course in this guide shows both values, SKS and ECTS, so you can transfer the credits to your home university easily.

How to choose your courses

Before you apply

- Read this course guide and make a pre-selection.
- Don’t choose your courses at random: check the requirements of your home university and your major.
- Discuss your choice with the coordinator or your department / major advisor at your home university.

With your application

Choose your courses with your application. Changes after the end of the regular application period are not possible.

Course management

Every student has an account in Ngurah Rai University’s student self-service system, where you manage your courses yourself within the deadlines.

ARCHITECTURE & ENGINEERING

Engineering · Winter semester

Courses offered in the winter semester (from September).

Indonesian Language	2 SKS · 3 ECTS
Construction Materials Technology	2 SKS · 3 ECTS
Hydrological Engineering	3 SKS · 5 ECTS
Numerical Analysis	2 SKS · 3 ECTS
Drainage and Flood Control	2 SKS · 3 ECTS
Construction Management	2 SKS · 3 ECTS
Earthquake Engineering Dynamics	2 SKS · 3 ECTS
Community Services	3 SKS · 5 ECTS
Project Cost Accounting	2 SKS · 3 ECTS

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Indonesian Language

CREDITS	LANGUAGE
2 SKS · 3 ECTS	English
LECTURER	**EXAMS**
Lab Bahasa UNR	Written midterm and final exam

Description

The Indonesian Language course, a general basic course, emphasizes the skills of using good and correct Indonesian in speaking, listening, reading, and writing. The course also aims to instill a love for the Indonesian language. Students are required to be active in lectures both inside and outside the classroom because the course is student-centered. Teaching methods vary: discussions, presentations, assignments, simulations, and PBL (problem-based learning).

Learning objectives

- Able to know the function of language and can speak both orally and verbally correctly by the language structure that applies in the community and academic environment.
- Able to analyze correctly from various forms and types of scientific writing to provide the ability to be able to produce scientific papers by the field of science studied.

Subjects covered

A positive attitude towards the Indonesian language. A positive attitude can be realized by encouraging students to maintain the national language, prioritize it and use it as a symbol of their national identity, and use it according to the applicable rules.

Weekly topics

1. History and Position of Indonesian Language
2. Concept and Function of Language
3. Language Varieties and Registers
4. Spelling and Punctuation
5. Use of Affixes
6. Use of Conjunctions

7 Effective Sentences

8 Paragraphs

9 Types and Forms of Writing

10 Language in Scientific Works

11 Papers and Scientific Journals

12 Summary, Abstract, and Synthesis

13 Article

Grading

Continuous assessment	50%
Midterm exam	25%
Final exam	25%

Books and other sources

1. Direktorat Jenderal Pendidikan Tinggi, (2013). Bahasa Indonesia. Kemendikbud. Jakarta
2. Eko Kuntarto, (2020). Bahasa Indonesia: Untuk Perguruan Tinggi. Universitas Riau
3. Witari, M. R., & Sariasih, K. (2020). Pengaruh Kegiatan Pariwisata Terhadap Tatanan Spasial di Pura Desa dan Pura Puseh Desa Adat Batuan, Gianyar. Jurnal Anala, 8(2), 43-52.

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Construction Materials Technology

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Ni Kadek Astariani, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

This course studies the properties and characteristics of building materials, introduction to types of building materials, selection of building materials based on utilization, layout, and use of architectural, structural and non-structural building materials; as well as technological innovations in the latest building materials.

Learning objectives

- Able to recognize various types of building materials.
- Able to utilize and apply building materials and knowledge of materials in architectural design.
- Able to configure material technology and be able to make adjustments to improvements and developments in building material technology.

Subjects covered

Introduction to the types of building materials, explaining the definition and function of building materials and techniques for their use; Get to know the characteristics of wood and its growth, parts of wood, types of wood classification, defects in wood, wood preservation, wood standards for buildings, physical and mechanical properties of wood; Get to know the characteristics, life cycle and anatomy of bamboo, bamboo processing, and the use of bamboo in buildings; Ceramic Materials (various uses of ceramics in buildings, glazes and pigments, refractories); Classification of metals, metal alloys. Steel classification (physical and mechanical properties of steel); Natural stone materials (natural stone formation cycle, types and physical properties of natural stone, quality requirements for natural stone for building materials); Aggregate material for construction materials. (classification of aggregates, stockpiling and storage of aggregates, physical properties of aggregates); Hydraulic Adhesive Materials (gypsum, lime, pozzolan/trass, Portland cement); Concrete forming materials: cement, criteria and function of cement, characteristics of cement Aggregate, criteria and function of aggregate, characteristics of aggregate Water, criteria and function of water, characteristics and conditions of water Type and form of writing; Asphalt materials, their properties and functions, types of asphalt and their respective properties. How to use asphalt materials in road buildings, asphalt coatings in buildings; Plastic materials, their properties and functions, types of polymers / plastics and their respective properties Plastic material products for building materials;

Aluminum materials and their functions, types of aluminum and their respective properties. Types of aluminum products in the building sector, their use and implementation techniques.

Weekly topics

1. Introduction to the types of building materials, explaining the definition and function of building materials and techniques for their use
2. Get to know the characteristics of wood and its growth, parts of wood, types of wood classification, defects in wood, wood preservation, wood standards for buildings, physical and mechanical properties of wood
3. Get to know the characteristics, life cycle and anatomy of bamboo, bamboo processing, and the use of bamboo in buildings
4. Ceramic Materials (various uses of ceramics in buildings, glazes and pigments, refractories)
5. Assignment presentations, quiz
6. Classification of metals, metal alloys. Steel classification (physical and mechanical properties of steel)
7. Natural stone materials (natural stone formation cycle, types and physical properties of natural stone, quality requirements for natural stone for building materials)
8. **Midterm exam**
9. Aggregate material for construction materials. (aggregate classification, aggregate collection and storage, aggregate physical properties)
10. Hydraulic Adhesive Materials (gypsum, lime, pozzolan/trass, Portland cement)
11. Concrete forming materials: cement, criteria and functions of cement, characteristics of cement Aggregate, criteria and functions of aggregates, characteristics of aggregates Water, criteria and functions of water, characteristics and conditions of water Types and forms of writing
12. Percentage
13. Asphalt materials, their properties and functions, types of asphalt and their respective properties. How to use asphalt material in road buildings, asphalt coatings in buildings
14. Plastic materials, their properties and functions, types of polymers/plastics and their respective properties. Plastic material products for building materials
15. Aluminum materials and their functions, types of aluminum and their respective property Types of aluminum products in the building sector, their use and implementation techniques
16. **Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Mulyono, T. 2003. Teknologi Beton. Yogyakarta: Andi
2. Samekto, W. 2001. Teknologi Beton. Yogyakarta: Kanisius
3. Latifa EA. 2003. Teknologi Bahan 2. Jakarta: Politeknik Negeri Jakarta
4. Tata Surdia MS. Met. E. 2005. Pengetahuan Bahan Teknik. Pradnya Paramita.
5. Anonim. 1983. Teknologi Bahan 1. Bandung: PEDC
6. Anonim. 1983. Teknologi Bahan 2. Bandung: PEDC
7. Anonim. 1961. Peraturan Konstruksi Kayu Indonesia. Bandung: Yayasan Dana Normalisasi
8. Indonesia DPU

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Hydrological Engineering

CREDITS
3 SKS · 5 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Putu Doddy Heka Ardana, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

This course discusses definitions, physical characteristics, methods of analyzing important hydrological parameters in building planning and water resources management, as well as parameter analysis and drainage planning.

Learning objectives

Students are expected to learn about the meaning and scope of hydrological engineering as well as parameter analysis and drainage planning.

Subjects covered

The magnitude and process of forming hydrological parameters; The cycle mechanism of precipitation, evaporation, infiltration, percolation, run off, transpiration, condensation; DTA, DAS, run off, evaporation, precipitation, infiltration, percolation; Observer station distribution, recording period, interpolation of blank data, merging data between stations, data presentation; Thiessen arithmetic, isohyet and polygon methods; Probabilistic review, normal distribution, log-normal, Pearson, Gumbel; Selection of distribution types, analysis of extreme rainfall using the Chi Square method, Kolmogorov-Smirnov; Analysis of rain intensity, intensity duration curve, sequential rainfall, infiltration, groundwater discharge; Rational method, Haspers, Melchior, Weduwen, Mononobe; Unit and synthetic hydrographs, Alexeyev, Snyder, SCS; Clark Method, Santa Barbara, Hydrograph Convolution; Water requirement, water availability, mass curve; Management parameters, drainage load, control building; Regional drainage system, flood control system, flood warning system.

Weekly topics

1. Introduction (semester learning plan and lecture contract); The magnitude and process of forming hydrological parameters
2. The cycle mechanism of precipitation, evaporation, infiltration, percolation, run off, transpiration, condensation

3	DTA, DAS, run off, evaporation, precipitation, infiltration, percolation
4	Distribution of observing stations, recording period, interpolation of blank data, merging data between stations, data presentation
5	Arithmetic methods, isohyets, and Thiessen polygons
6	Review of probabilistic, normal distribution, log-normal, Pearson, Gumbel
7	Selection of distribution type, extreme rainfall analysis Chi Square method, Kolmogorov-Smirnov; Task 1
8	**Midterm exam**
9	Analysis of rain intensity, duration curve intensity, sequential rainfall, infiltration, groundwater discharge
10	Rational method, Haspers, Melchior, Weduwen, Mononobe
11	Unit and synthetic hydrographs, Alexeyev, Snyder, SCS
12	Clark, Santa Barbara, Hydrograph Convolution Method
13	Water requirement, water availability, mass curve
14	Management parameters, drainage load, control building
15	Regional drainage system, flood control system, flood warning system; Task 2
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Bambang Triatmojo. 2008. Hidrologi Terapan.
2. Suyono Sosrodarsono. 1978. Hidrologi Untuk Pengairan. Jakarta: Pradnya Paramita
3. Dr.Eng. Donny Harisuseno, ST., MT. 2012. Materi kuliah Hidrologi Teknik Terapan. Jurusan Teknik Pengairan, Fakultas Teknik Universitas Brawijaya.
4. Dian Noorvy Khaerudin, ST., MT. 2013. Materi kuliah Rekayasa Hidrologi. Fakultas Teknik Sipil, Universitas Tribhuana Tunggadewi.
5. Chow, Ven Te. 1997. Hidrolika Saluran Terbuka. Jakarta: Erlangga
6. Limantara, Lily Montarcih. 2010. Hidrologi Praktis. Bandung: Lubuk Agung.
7. Soemarto, C. D. 1987. Hidrologi Teknik. Surabaya: Usaha Nasional.

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Numerical Analysis

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ida Bagus Gede Indramanik, ST., MT.

EXAMS
Written midterm and final exam

Description

The Numerical Analysis course is one of the fundamental courses in the Civil Engineering Study Program. Numerical analysis course material includes the concept of error, numerical solutions of linear and nonlinear equations, curve fitting, numerical integrals, numerical derivatives, and solutions of ordinary differential equations. In this lecture, students will be provided with how to solve a problem using numerical approximations.

Learning objectives

- Can differentiate between ways of solving mathematical problems using analytical methods and numerical methods.
- Able to solve mathematical problems using numerical approaches or methods.

Subjects covered

Definition of numerical methods and numerical analysis, Errors, Absolute & Relative Errors, Taylor Series; Numerical Differentiation; Half Interval Method, Linear Interpolation Method; Newton-Raphson Method, Secant Method, Iteration Method; Types of matrices, Matrix Operations, Gaussian Elimination; Gauss Jordan Elimination, Inversion Matrix; Jacobi iteration, Gauss-Seidel iteration; Principles of statistics, Least Squares Method, Least Squares Method for Linear Curves; Least Squares Method for Non-Linear Curves; Polynomial Regression; Linear Interpolation, Quadratic Interpolation, Polynomial Interpolation, Lagrange Polynomial Interpolation; Trapezoid Method, Composite Trapezoid Method, Simpson Method; Euler's Method, Higher Order Taylor Series, Heun's Method, Polygon Method; Ralston Method, Runge-Kutta Method.

Weekly topics

1. Definition of numerical methods and numerical analysis, Errors, Absolute & Relative Errors, Taylor Series
2. Numerical Differentiation

3	Half Interval Method, Linear Interpolation Method
4	Newton-Raphson Method, Secant Method, Iteration Method
5	Types of matrices, Matrix Operations, Gaussian Elimination
6	Gauss Jordan Elimination, Inversion Matrix
7	Jacobi iteration, Gauss-Seidel iteration
8	**Midterm exam**
9	Principles of statistics, Least Squares Method, Least Squares Method for Linear Curves
10	Least Squares Method for Non-Linear Curves
11	Polynomial Regression
12	Linear Interpolation, Quadratic Interpolation, Polynomial Interpolation, Lagrange Polynomial Interpolation
13	Trapezoid Method, Composite Trapezoid Method, Simpson Method
14	Euler's Method, Higher Order Taylor Series, Heun's Method, Polygon Method
15	Ralston Method, Runge-Kutta Method
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Triatmodjo, Bambang. Metode Numerik, Penerbit Beta Offset, Cetakan ke-8, Jakarta 2010
2. Luknanto, Djoko., Metode Numerik, Bahan Kuliah Jurusan T.Sipil FT UGM, 2001
3. Subakti, Irfan. Metode Numerik, Modul Kuliah, Jurusan T.Informatika FTI ITS, 2006
4. Suryadi, D.H.S. Pengantar Metode Numerik, Diktat, Penerbit Gunadarma
5. Sudiasi., Rizani. Metode Numerik, Diktat, STIMIK Global Informatika-MDP, 20

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Drainage and Flood Control

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Putu Doddy Heka Ardana, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

In this Drainage and Flood Control lecture, the definition of drainage, basic concepts and design criteria for drainage planning, hydrological analysis related to drainage design, hydraulic channels and complementary buildings, flow coefficients of various materials and land cover, urban drainage network planning, network planning are discussed. drainage of roads, airports and sports fields as well as operation and maintenance of drainage networks.

Learning objectives

- Able to understand the meaning of drainage, basic concepts and design criteria for drainage planning, hydrological analysis related to drainage design, hydraulic channels and complementary buildings, flow coefficients of various materials and land cover.
- Able to carry out planning of urban drainage systems, airports, highways, and sports fields.

Subjects covered

General understanding of drainage infrastructure, background, purpose and benefits of drainage, types of drainage; Drainage problems in urban areas, determining the objectives of the sustainable drainage concept, Task 1: Review material regarding introductory drainage material; Basic concepts and design criteria for drainage planning, stages of planning, implementation, operation and maintenance, evaluation and monitoring; Hydrological analysis related to drainage design, rain measurement, rain analysis, frequency and probability analysis; Fit test, average daily maximum rainfall, rainfall intensity analysis; Run-off analysis, estimating peak flow rates using rational methods, hydrographs, unit hydrographs and synthetic unit hydrographs; Flow coefficient of various materials and land cover, Task 2: Hydrological analysis to obtain planned flood discharge; Basic concepts of flow, Classification of flow (permanent and non-permanent flow; uniform and changing flow; laminar and turbulent flow; sub-critical, critical and super-critical flow); The laws of conservation of mass, conservation of energy, and conservation of momentum, The most economical form of channel; Drainage channel planning; Highway drainage (surface and subsurface drainage); Types of matrices, Matrix Operations, Gaussian Elimination Airfield drainage (surface and subsurface drainage), Football sports field drainage (surface and subsurface drainage); Shallow infiltration wells, deep infiltration wells; Biopore system, rainwater harvesting system.

Weekly topics

1. Introduction (semester learning plan and lecture contract), Introductory material regarding general understanding of drainage infrastructure, background, objectives and benefits of drainage, types of drainage
2. Explain drainage problems in urban areas, determine the objectives of the sustainable drainage concept, Task 1: Review material regarding introductory drainage material
3. Basic concepts and design criteria for drainage planning, stages of planning, implementation, operation and maintenance, evaluation, and monitoring
4. Hydrological analysis related to drainage design, rain measurement, rain analysis, frequency, and probability analysis
5. Fit test, average daily maximum rainfall, rain intensity analysis
6. Run-off analysis, estimating peak flow rates using rational methods, hydrographs, unit hydrographs and synthetic unit hydrographs
7. Flow coefficient of various materials and land cover, Task 2: Hydrological analysis to obtain planned flood discharge
8. **Midterm exam**
9. Basic concepts of flow, Classification of flow (permanent and non-permanent flow; uniform and changing flow; laminar and turbulent flow; sub-critical, critical and super critical flow)
10. Laws of conservation of mass, conservation of energy, and conservation of momentum, The most economical form of channel
11. Drainage channel planning, Quiz: Drainage channel planning
12. Highway drainage (surface and subsurface drainage)
13. Types of matrices, Matrix Operations, Gaussian Elimination Airfield drainage (surface and subsurface drainage), Football sports field drainage (surface and subsurface drainage)
14. Shallow infiltration wells, deep infiltration wells
15. Biopore system, rainwater harvesting system, Task 3: Journal review of groundwater recharge models
16. **Final exam**

Grading

Continuous assessment	**35%**
Midterm exam	**30%**
Final exam	**35%**

Books and other sources

1. Castel D.A., McCunnall, J., Trung, I.M., 1984, Field Drainage Principles and Studio works
2. Batsford Academic and Educational, London, England

3. Anonim, 1974, “Drainage Principles and Aplications”, International Institute for Land Reclamation and Improvement, Wageningen, The Netherland
4. Brown S.A., J.D. Schall J.D., Morris J.L., Doherty C.L. Stein S.M., Warner J.C., 2013, Urban Drainage Design Manual Hydraulic Engineering Circular, Third Edition, Federal Highway Administration, Washington DC.
5. Metcalf and Eddy Inc, Tchobanoglous G., 1981, “Wastewater Engineering: Collection and Pumping of Wastewater”, Mac Graw Hill Inc., New York
6. Chow, V.T., Maidment, D.R. and Mays, L.W., 1988, Applied Hydrology, MC-Graw-Hill Book Company, New York
7. Suripin., 2003, Sistem Drainase Yang Berkelanjutan, Penerbit Andi, Yogyakarta.
8. Triatmodjo, B., 2008, Hidrologi Terapan, Penerbit Beta Offset, Yogyakarta
9. Harto, S., 1993, Analisis Hidrologi, Penerbit PT. Gramedia Pustaka Utama, Jakarta
10. Soemarto, C.D., 1999, Hidrologi Teknik, Penerbit Erlangga, Jakarta
11. Anonim, 2012, Sistem Drainase Perkotaan, Kementerian Pekerjaan Umum Direktorat Jenderal Cipta Karya

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Construction Management

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ida Bagus Gede Indramanik, ST., MT.

EXAMS
Written midterm and final exam

Description

This Project Management course explains to students the meaning and characteristics of projects as well as an understanding of the basic principles of project management.

Learning objectives

- Students understand and master project management theory.
- Students can apply project management theory to project planning/implementation.

Subjects covered

Introduction to project management in construction services; General description of project implementation; Basic understanding of management; POAC functions in project management; Basic/general knowledge of the organization; Types of organizational structures; Working relationships between each organization; Project management concept; Duties of the project manager at each stage of the project; Techniques, methods and analysis of resource use in construction projects; General project financing estimates; Project cost budget plan; List of unit price analysis; Direct and indirect costs; Introduction and time scheduling methods for construction project implementation; Line diagram method, barchat diagram, precedence, CPM method, arrow diagram; Time, cost and quality control in project management; Types of administration; Project reporting type; Preliminary auction; Types of auctions; Auction procedures and processes; Introduction to contract; Types of contracts; Advantages and disadvantages of each type of contract.

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction to project management in construction services; General description of project implementation
2. Basic understanding of management; POAC functions in project management; Task I (Project analysis)

3	Basic/general knowledge of the organization; Types of organizational structures; Working relationships between each organization
4	Project management concept; Duties of the project manager at each stage of the project; Assignment II (literature review)
5	Techniques, methods, and analysis of resource use in construction projects
6	General project financing estimates
7	Project cost budget plan; List of unit price analysis; Direct and indirect costs; Task III (Project Cost Budget Plan)
8	**Midterm exam**
9	Introduction and time scheduling methods for construction project implementation
10	Line diagram method, barchat diagram, precedence, CPM method, arrow diagram
11	Task IV (Project implementation schedule)
12	Time, cost and quality control in project management
13	Types of administration; Project reporting type
14	Preliminary auction; Types of auctions; Auction procedures and processes
15	Introduction to contract; Types of contracts; Advantages and disadvantages of each type of contract
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Nugraha, P., Natan, I., Sutjipto, R. Manajemen Proyek Konstruksi Jilid 1 & 2. Penerbit Kartika Yudha, 1985.
2. Dipohusodo, I. Manajemen Proyek & Konstruksi Jilid 1. Yogyakarta: Penerbit Kanisius, 1996.
3. Husen, A. Manajemen Proyek: Perencanaan, Penjadwalan, & Pengendalian Proyek. Yogyakarta: ANDI, 2011.
4. Soedrajat. Analisa (Cara Modern) Anggaran Biaya Pelaksanaan Lanjutan.Bandung: NOVA, 1994.

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Earthquake Engineering Dynamics

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Ni Kadek Astariani, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

The Earthquake Engineering Dynamics course discusses the following topics, namely introduction to seismology and empirical experience of earthquakes; analysis of dynamic loads due to earthquakes on SDOF and MDOF system structures; analysis of structural response to earthquake loads which includes modal analysis, spectrum response analysis, equivalent static analysis according to SNI 1726-2012

Learning objectives

- Mastery in calculating earthquake forces including the requirements that must be met by earthquake resistant building regulations.
- Designing earthquake-resistant building structures using static and dynamic analysis according to current earthquake regulations

Subjects covered

Introduction to the causes of earthquakes; Seismology and earthquake empirical; The effect of an earthquake on a structure; Elastic and ultimate structural failure; SNI 2012 earthquake regulations; Equivalent Static Method; Vibration theory; Dynamic analysis; SDOF System; MDOF system; Identify types of earthquake resistant structures; Discussion of earthquake resistant regulations; Application of earthquake resistant structural design in Frame Systems; Special Moment Bearers (SRPMK); Earthquake resistant building planning and capacity design concepts.

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction to the causes of earthquakes
2. Seismology and earthquake empirics
3. The effect of an earthquake on a structure

4	Elastic and ultimate structural failure (Task 1)
5	SNI 2012 earthquake regulations
6	Equivalent Static Method
7	Vibration theory
8	**Midterm exam**
9	Dynamic analysis; Task 2
10	SDOF system
11	MDOF system
12	Identify types of earthquake resistant structures
13	Discussion of earthquake resistant regulations
14	Application of earthquake resistant structural design in Frame Systems; Special Moment-Resisting Frames (SRPMK)
15	Earthquake resistant building planning and capacity design concepts; Task 3
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Reinforced Concrete Mechanics and Design, third Edition 1997 James G. Mac Gregor
2. Reinforced Concrete Structures, Park, R. & T. Paulay
3. Seismic design of reinforced concrete and masonry buildings by T.Paulay & Mjn. Priestly
4. Seismic design of building structures by Micheal R Lindeburg.P.E & Majid Baradar P.E.
5. Perencanaan struktur beton bertulang tahan gempa by Prof Ir. Rachmat Purwono M.Sc.
6. Tata cara perencanaan ketahanan gempa untuk struktur bangunan gedung dan non gedung sni 1726-2012
7. Spesifikasi Untuk Bangunan Gedung Baja Struktural (SNI 1729:2015)
8. Seismic Design Manual 2nd Edition
9. Ductile Design of Steel Structures-Michel Bruneau Chia, Ming Uang, Rafael Sabelly
10. Ketentuan seismik untuk struktur baja bangunan gedung (ANSI/AISC 341-10) SNI 7860:2015

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Community Services

CREDITS	LANGUAGE
3 SKS · 5 ECTS	English
LECTURER	**EXAMS**
LPPMK UNR	Written midterm and final exam

Description

This course includes practical activities outside the classroom that students must master before participating in activities at the community services location. The material provided according to the scientific field will be given in the faculty briefing which includes the competency areas of the study program in dealing with various community problems in the designated community services location. Students are also expected to collaborate with other study programs to create multidisciplinary programs in solving problems in the community. This course utilizes a team- based project learning method where groups are given a real problem that occurs in the community and then given space to create a work plan and collaboration model. Each group also prepares a presentation that is shown to be able to provide constructive feedback. In addition, the supervisor also coaches each group during the activity and encourages students to think critically and creatively in collaboration.

Learning objectives

- Able to cooperate between individuals and multi-disciplines, contributing ideas and ideas according to their respective fields of knowledge to contribute to the resolution of factual problems faced in society.
- Able to analyze ideas and problems and offer solutions related to how to respond to information literacy.
- Students can respond to and create solutions to architectural problems that exist in the KKN / KAT location that are not only appropriate but also right on target.
- Able to present and be accountable for their ideas in the form of reports, reportage, journals, and service seminars.

Subjects covered

The material provided according to the scientific field will be given in the faculty briefing which includes the competency areas of the study program in dealing with various community problems in the designated Community Services location. Students are also expected to collaborate with other study programs to create multidisciplinary programs in solving problems in the community.

Weekly topics

1. The Importance of Community Services (PkM)
2. Purpose and Philosophy of Community Services
3. Survey technique
4. Code of Conduct for Community Services
5. Theory of Activity Report Preparation
6. Mono-discipline and multi-discipline
7. Reportage Report
8. Documentation Reportage
9. Information Literacy
10. Problem Solution
11. Civil Engineering Products
12. Understanding of Architecture for Target Groups
13. Activity Implementation
14. Creation of Civil Products
15. Creation of Reportage

Grading

Continuous assessment	50%
Midterm exam	25%
Final exam	25%

Books and other sources

1. Buku Panduan KKN/ KAT UNR

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Project Cost Accounting

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ida Bagus Gede Indramanik, ST., MT.

EXAMS
Written midterm and final exam

Description

In this course students learn about the principles of cost accounting and reporting in the context of controlling project costs. Students learn the meaning of cost accounting starting from defining the accounting system in construction service companies, designing a cost account framework, understanding debit and credit, procedures for preparing general journals, ledgers, preparing balance reports, adjusting balances, trial balances, worksheet balances, and profit and loss statements. Also learn about income recognition, reporting methods using the value of results method. Students also learn about concepts, systems, methods, and techniques for calculating costs for a cost object with an emphasis on calculating the cost of products at factory companies. Students learn to calculate the cost of products using a traditional approach called volume- or function-based costing (VBC or FBC) and a contemporary approach called Activity-Based Costing (ABC). By studying these two approaches, students understand well the weaknesses of calculating the cost of products using the traditional approach and the advantages of calculating the cost of products using the contemporary approach.

Learning objectives

- Explain the accounting systems of construction service companies and of construction projects.
- Record transactions through the accounting cycle: journals, ledgers, trial balance and financial statements.
- Analyze cost behavior and assign production and overhead costs with volume-based and activity-based costing.
- Calculate job order costs and report project progress with earned value indicators (BCWP, BCWS, ACWP, CV).

Subjects covered

Overview of construction services companies, Definition, Types of construction services companies, Overview of the main accounting systems for construction services companies; Construction Services Company Main Accounting System, Sales accounting system, Purchase accounting system, Fixed asset accounting system, Cash accounting system, Payroll and wage accounting system, Other assets accounting system, Cost accounting system; Construction project accounting system; Basics of accounting, Accounting cycle, Types of financial transaction reports, Financial reports, Balance sheet model, Profit and loss model, Equity change model, Cash flow report, Chart of accounts; How to prepare a transaction journal, types of transaction journals; Debit and

credit rules, Changes in accounts in the journal; Understanding a ledger, how to book (post) transactions from the general journal to the ledger, how to compile a list of account balances in the ledger; Understanding the concept of costs, cost accounting, objectives of cost accounting, differences between cost accounting, financial accounting and management accounting, production costs, production cost flows and cost of production reports; Understanding cost behavior; behavior of fixed costs, variable costs, and semi-variable costs; separation of semi-variable costs into variable costs and fixed costs; cost formula for cost estimation; differences in function- and activity-based cost behavior; Assignment of production costs to products; charging overhead costs using departmental rates; capacity concept; steps for calculating function/volume based cost prices; Analysis of overhead cost differences; factory overhead cost accounting for departmental rates; Activity-based basic cost calculation design; Classification of activities based on hierarchy / level; cost assignment method; the difference between function-based basic price calculations and activity-based basic price calculations; weaknesses in calculating product cost based on function; activity-based basic cost calculation steps; Characteristics of companies that apply the order cost method; characteristics of calculating the cost of orders; function-based order cost cards; calculation of product cost cost using function-based order cost method; Recording transactions using the order cost calculation method; calculation of product cost cost using the activity-based order cost method; Activity-based order cost cards; Project progress report, BCWP, BCWS, ACWP, CV.

Weekly topics

1. Overview of construction services companies, Definition, Types of construction services companies, Overview of the main accounting systems for construction services companies
2. Construction Services Company Main Accounting System, Sales accounting system, Purchase accounting system, Fixed asset accounting system, Cash accounting system, Payroll and wage accounting system, Other assets accounting system, Cost accounting system
3. Construction project accounting system
4. Basics of accounting, accounting cycle, Types of financial transaction reports, financial reports, Balance sheet model, Profit and loss model, Changes in equity model, Cash flow statement, Chart of accounts
5. How to prepare a transaction journal, types of transaction journals
6. Debit and credit rules, Changes in accounts in the journal
7. Understanding a ledger, how to post transactions from the general journal to the ledger, how to compile a list of account balances in the ledger
8. **Midterm exam**
9. Understanding the concept of costs, cost accounting, objectives of cost accounting, differences between cost accounting, financial accounting and management accounting, production costs, production cost flows and cost of production reports
10. Understanding cost behavior; behavior of fixed costs, variable costs, and semi-variable costs; separation of semi-variable costs into variable costs and fixed costs; cost formula for cost estimation; differences in function and activity-based cost behavior
11. Assignment of production costs to products; charging overhead costs using departmental rates; capacity concept; steps for calculating function/volume-based cost prices; Analysis of overhead cost differences; factory overhead cost accounting for departmental rates

12	Activity-based basic cost calculation design; Classification of activities based on hierarchy / level; cost assignment method; the difference between function-based basic price calculations and activity-based basic price calculations; weaknesses in calculating product cost based on function; activity-based basic cost calculation steps
13	Characteristics of companies that apply the order cost method; characteristics of calculating the cost of orders; function-based order cost cards; Calculation of product cost prices using the function-based order cost method
14	Recording transactions using the order cost calculation method; calculation of product cost cost using the activity-based order cost method; Activity-based order cost cards
15	Project progress report, BCWP, BCWS, ACWP, CV
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Holm, Len, Cost Accounting and Financial Management For Construction Project Managers Routledge, 2019
2. Rayburn (R), Cost Accounting, Using a Cost Management Approach, 6th Edition, Richard D. Irwin, Publisher
3. Riwayadi (Rwd) (2016), Akuntansi Biaya: Pendekatan Tradisional dan Kontemporer, Edisi 2, Jakarta, Penerbit
4. Michael R. Kinney, Cecily A. Rayborn, Cost Accounting: Foundations and Evolutions, 8th ed., Thomson Publisher, 2011
5. Horngren, T. Charles et al., Cost Accounting, A Managerial Emphasis, 11th edition, Prentice Hall International, Inc. Englewood Cliffs, NJ, 2003.
6. Hammer, Lawrence H., Carter, William K. & Usry, Milton F., Cost Accounting, 11th ed., South- Western Publishing Co., Cincinnati, Ohio, 1994.
7. Barfield, Jesse T., Rayborn, Cecily A., Kinney, Michael, R., Cost Accounting: Traditions and Innovations, 5th ed., Thomson, 2003.

ENGINEERING · WINTER SEMESTER · ARCHITECTURE & ENGINEERING

Water Resource Management (WRM)

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Putu Doddy Heka Ardana, ST., MT., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

Water Resources Management (WRM) is a course that presents efforts to develop water resources, the balance between water demand and availability, efforts to maintain water quality and the causes of water pollution, water needs and utilization, as well as various types of water structures as an effort to manage water.

Learning objectives

Mastery of Water Resources Management (WRM) material is to be able to understand and explain efforts to develop water resources, the balance between water demand and availability, efforts to maintain water quality and the causes of water pollution, water needs and utilization, as well as various types of water structures as an effort to manage water.

Subjects covered

Introduction to development and management, water resources; Closed and open hydrological cycles, surface water and ground water, world and Indonesian water potential; Water value (domestic and non-domestic); Water quantity Water quality; Water Resources Conservation; Watershed and river conservation; Flood management system; Drought management system; Water infrastructure; Water Resources management patterns and plans; Integrated Water Resources Management (IWRM); Principles of Regional Autonomy in natural resource management.

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introductory material regarding development and management, water resources
2. Closed and open hydrological cycles, surface water and ground water, world and Indonesian water potential

3	Water value (domestic and non-domestic); Assignment 1: Review Journal --- The Value of Water
4	Water quantity
5	Water quality; Assignment 2: Review Journal --- Water Quality
6	Water Resources Conservation
7	Watershed and river conservation; Assignment 3: Review Journal --- Water Resources Conservation
8	**Midterm exam**
9	Flood management system
10	Drought management system; Assignment 4: Review Journal --- Floods and Droughts
11	Water infrastructure
12	Water infrastructure; Assignment 5: Report and Presentation on Water Infrastructure
13	Water Resources management patterns and plans
14	Integrated water resources management (IWRM); Assignment 6: Review Journal --- IWRM
15	Principles of Regional Autonomy in Water Resources Management
16	**Final exam**

Grading

Continuous assessment	**30%**
Midterm exam	**35%**
Final exam	**35%**

Books and other sources

1. Kodoatie, R.J., Sjarief, R., 2008, Pengelolaan Sumber Daya Air Terpadu, Penerbit Andi, Yogyakarta
2. Kodoatie, R.J., Sjarief, R., 2010, Tata Ruang Air, Penerbit Andi, Yogyakarta
3. Asdak, C., 2004, Hidrologi dan Pengelolaan Daerah Aliran Sungai, Gadjah Mada University Press, Yogyakarta
4. Mulyanto, H.R., 2007, Pengembangan Sumber Daya Air Terpadu, Penerbit Graha Ilmu, Yogyakarta
5. Maryono, A., 2008, Eko-Hidraulik – Pengelolaan Sungai Ramah Lingkungan, Gadjah Mada University Press, Yogyakarta
6. Triatmodjo, B., 2008, Hidrologi Terapan, Penerbit Beta Offset, Yogyakarta
7. Dharma Putra, K.G., 2009, Petunjuk Teknis Pemantauan Kualitas Air, Udayana University Press, Denpasar
8. Soewarno, 2014, Hidrometri dan Aolikasi Teknosabo dalam Pengelolaan Sumber Daya Air, Graha
9. Ilmu, Yogyakarta
10. Dit. Bina Program Pengairan Dep. PU, Pedoman Perencanaan Pengembangan Sumber Air
11. Dit. Bina Program Pengairan Dep. PU, Koordinasi dan Sinkronisasi Proyek Pengembangan Wilayah Sungai
12. Kriteria Perencanaan Teknis Irigasi
13. Dit. Bina Program pengairan Dep PU, Optimasi Penataan Sumber-Sumber Air

ARCHITECTURE & ENGINEERING

Engineering · Summer semester

Courses offered in the summer semester (from February).

Indonesian Language	2 SKS · 3 ECTS
Concrete Technology	2 SKS · 3 ECTS
Mapping and Geographical Information Systems	2 SKS · 3 ECTS
Environmental Science	2 SKS · 3 ECTS
Disaster Mitigation	2 SKS · 3 ECTS
Occupational Safety and Health Management System	2 SKS · 3 ECTS
Irrigation and Water Structures	3 SKS · 5 ECTS
Engineering Economics	2 SKS · 3 ECTS
Structural Engineering Computers	2 SKS · 3 ECTS

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Indonesian Language

CREDITS	LANGUAGE
2 SKS · 3 ECTS	English
LECTURER	**EXAMS**
Lab Bahasa UNR	Written midterm and final exam

Description

The Indonesian Language course, a general basic course, emphasizes the skills of using good and correct Indonesian in speaking, listening, reading, and writing. The course also aims to instill a love for the Indonesian language. Students are required to be active in lectures both inside and outside the classroom because the course is student-centered. Teaching methods vary: discussions, presentations, assignments, simulations, and PBL (problem-based learning).

Learning objectives

A. Able to know the function of language and can speak both orally and verbally correctly by the language structure that applies in the community and academic environment. B. Able to analyze correctly from various forms and types of scientific writing to provide the ability to be able to produce scientific papers by the field of science studied.

Subjects covered

A positive attitude towards the Indonesian language. A positive attitude can be realized by encouraging students to maintain the national language, prioritize it and use it as a symbol of their national identity, and use it according to the applicable rules.

Weekly topics

1. History and Position of Indonesian Language
2. Concept and Function of Language
3. Language Varieties and Registers
4. Spelling and Punctuation
5. Use of Affixes
6. Use of Conjunctions

7	Effective Sentences
8	Paragraphs
9	Types and Forms of Writing
10	Language in Scientific Works
11	Papers and Scientific Journals
12	Summary, Abstract, and Synthesis
13	Article

Grading

Continuous assessment	**50%**
Midterm exam	**25%**
Final exam	**25%**

Books and other sources

1. Direktorat Jenderal Pendidikan Tinggi, (2013). Bahasa Indonesia. Kemendikbud. Jakarta
2. Eko Kuntarto, (2020). Bahasa Indonesia: Untuk Perguruan Tinggi. Universitas Riau
3. Witari, M. R., & Sariasih, K. (2020). Pengaruh Kegiatan Pariwisata Terhadap Tatanan Spasial di Pura Desa dan Pura Puseh Desa Adat Batuan, Gianyar. Jurnal Anala, 8(2), 43-52.

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Concrete Technology

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Ni Kadek Astariani, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

Students are also able to recalculate the concrete mix design if the sand and gravel used are not in SSD (Saturated Surface Dry) condition and if plasticisers are used in the concrete mix. Concrete workability testing other than the slump test is also introduced, for example workability testing using Vebe Time, Compaction Test, U-Type Test, and Flow Test. Survey and exploitation of aggregate quarries. Concrete mixer and transport equipment. Various kinds of concrete molding/ formwork equipment systems. Basics of designing and implementing special concrete such as lightweight concrete, mass concrete, concrete in aggressive environments, SCC (Self Compacting Concrete), RCC (Roller Compacted Concrete), Soil Cement, concrete for rigid pavement, precast concrete, and tilt-up concrete.

Learning objectives

Students know and understand how to make concrete based on the latest SNI regulations and which require design and workmanship for special purposes.

Subjects covered

Introduction (semester learning plan and lecture contract); Introduction to the use of concrete as a construction material; Concrete forming materials; Cement forming materials; Additives for concrete; Concrete working procedures; Properties of fresh concrete and its testing; Properties of hardened concrete and its tests; Concrete Quality acceptance criteria; Concrete Quality Evaluation According to SNI 2002 and ACI; Specialty Concrete Evaluation of concrete repairs

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction to the use of concrete as a construction material
2. Concrete forming materials

3	Assignment I: write a paper about concrete forming materials
4	Cement forming materials
5	Additives for concrete
6	Assignment II: write a paper about additives for concrete
7	Concrete working procedures
8	**Midterm Exam**
9	Properties of fresh concrete and its tests
10	Assignment III: write a paper about how to work with concrete (mix design SNI)
11	Properties of hardened concrete and its tests
12	Concrete Quality acceptance criteria
13	Evaluation of Concrete Quality According to SNI 2002 and ACI
14	Special concrete; evaluation of concrete repairs
15	Assignment IV: write a paper about special concrete
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. M. Neville, Properties of Concrete, 5th Edition, Prentice Hall, 2012
2. Steven H. Kosmatka, Beatrix Kerkhoff, William C. Panarese, Design and Control of
3. Concrete Mixtures 14th Edition, Portland Cement Association, 2002
4. Kumar Mehta, Paulo J. M. Monteiro, Concrete: Microstructure, Properties, and Materials 4th Edition, McGraw-Hill Education, 2013
5. John Newman B S Choo, (ed), Advanced Concrete Technology (volume 1 – 4), Butterworth- Heinemann, 2003
6. Chris L. Page M M Page, Durability of Concrete and Cement Composites, 1st Edition, Woodhead Publishing, 2007

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Mapping and Geographical Information Systems

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Tri Hayatining Pamungkas, ST., MT., IPM

EXAMS
Written midterm and final exam

Description

The Mapping and GIS course discusses the definition and basis of mapping science; measurements for mapping; detailed measurements with tachymetry/theodolite; understanding of geographic information systems in terms of meaning, concepts, data models and databases; mapping application program (Arc GIS).

Learning objectives

- Mastery of mapping and GIS material to be able to understand the basic concepts of mapping science; measurements for mapping; detailed measurements with tachymetry/theodolite; understanding of geographic information systems in terms of meaning, concepts, data models and databases; mapping application program (Arc GIS).
- Able to implement calculations and depictions of mapping and GIS in practical activities

Subjects covered

Objectives, Prerequisites; Material coverage; Lecture activities; Assessment and referral; Definition of map; Coordinate system; Azimuth system; Basic calculation of coordinates; Definition of measurement for mapping; How to calculate the mapping angle unit system; How to calculate with polygons (open and closed); Analysis of angular unit systems, coordinate systems and determining position; Analysis of horizontal position determination using polygon measurements (open and closed); Recognize the parts of tachymetry/theodolite as well as drawing contour maps; Definition of GIS; Basic concepts of GIS; GIS Subsystem; The main components of GIS, how it works and GIS capabilities; Spatial data models and databases (UTM); GIS equipment technology; Introduction to GIS-based application programs (ArcGIS applications)

Weekly topics

1	Objectives, Prerequisites; Material coverage; Lecture activities; Assessment and referral
2	Definition of map; Coordinate system; Azimuth system; Basic coordinate calculations
3	Understanding measurements for mapping; How to calculate the mapping angle unit system; How to calculate with polygons (open and closed); TASK 1
4	Analysis of angular unit systems, coordinate systems and determining position
5	Analysis of determining horizontal position using polygon measurements (open or closed)
6	TASK 2
7	Recognize the tachymetry/theodolite section and the depiction of contour maps
8	**Midterm Exam**
9	Definition of GIS; Basic concepts of GIS; GIS Subsystem
10	The main components of GIS, how it works and GIS capabilities
11	Spatial data and database models (UTM); TASK 3
12	GIS equipment technology
13	GIS equipment technology
14	Introduction to GIS-based application programs (ArcGIS applications)
15	TASK 4
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Basuki, S. (2011). Ilmu Ukur Tanah. Yogyakarta, Gadjah Mada University Press.
2. Brinker, R.C., Wolf, P.R., dan Walijatun, D. (2000). Dasar-Dasar Pengukuran Tanah (Surveying). Jakarta, Erlangga
3. Hartanto, J.A. dan Kustarto, D.W.H. (2012). Ilmu Ukur Tanah Metode dan Aplikasi. Malang, Dioma
4. Pambudi, H. (2016). Ilmu Ukur Tanah [Ilmu Ukur Tanah]. Jakarta, Universitas Tarumanagara.
5. Turijan. 2013. Perpetaan dan SIG. Universitas Merdeka Malang.
6. Ilmu dan alat ukur tanah, Ir. Heinz Frick. Kansius. 1979
7. Pengukuran dan pemetaan pekerjaan konstruksi. Ir. Indra Sinaga, M. Surv. Sc. Pustaka Sinar Harapan, 1997.
8. Ilmu Ukur Tanah (Metode dan Aplikasi). J. Andy Hartanto, S.H., M.H., It., M.M.T., Ir. D.W. Hendro Kustanto, M.T. Dioma, 2012

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Environmental Science

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ketut Soriarta, ST., M.Si.

EXAMS
Written midterm and final exam

Description

In this course students learn about the meaning and scope of environmental engineering, drinking water supply and waste water management. Environmentally friendly buildings and signs in environmental management, as well as the basic basis for environmental impact analysis

Learning objectives

Students are expected to learn about the meaning and scope of environmental engineering, drinking water supply and waste water management. Environmentally friendly buildings and signs in environmental management, as well as the basic principles of environmental impact analysis

Subjects covered

Introduction (semester learning plan and lecture contract); Introduction to environmental engineering and its scope; Provision of Drinking Water; Processing method, Quality control; Prevention of drinking water pollution; Household & industrial wastewater management; Waste management; Collection and processing of sewage; Home health; Water pollution; Air pollution; Bio- statistics; How to measure the impact of environmental engineering efforts

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction to environmental engineering and its scope
2. Provision of Drinking Water
3. Processing method, Quality control
4. Prevention of drinking water pollution
5. Management of household & industrial waste water
6. Waste management

7	Task 1
8	**Midterm Exam**
9	Collection and processing of sewage
10	Household sanitation
11	Water pollution
12	Air pollution
13	Bio-statistics
14	How to measure the impact of environmental engineering efforts
15	Task 2
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Dahli, Eli (1990), Environmental Engineering in Developing Countries, Technical University of Denmark, Copenhagen.
2. Kamala &Rao, Environmental Engineering, McGraw-Hill New Delhi.
3. Salvato (1988), Environmental Sanitation, John Wiley & Son Inc., New York Media Pembelajaran Perangkat lunak: Perangkat keras

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Disaster Mitigation

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ida Bagus Gede Indramanik, ST., MT.

EXAMS
Written midterm and final exam

Description

Indonesia as an archipelagic country which is geographically located on the equator, between the continents of Asia and Australia and between the Pacific and Indian Oceans, is at the meeting point of three of the world's main tectonic plates and is a territorial area that is very vulnerable to disasters, both natural and man-made disasters., among others; earthquakes, tsunamis, floods, volcanic eruptions, landslides, hurricanes, forest and land fires and volcanic eruptions. The geographical and geological conditions of this country as mentioned above mean that every citizen must be aware of all the risks they pose and must try to recognize the risks and how to mitigate them.

Learning objectives

This course is given to introduce the characteristics of hazards and disasters that occur in Indonesia as well as disaster mitigation strategies that need to be implemented to reduce the impact of disasters or in other words reduce disaster risk.

Subjects covered

Introduction: Understand the scope of the concept of disaster; Understand the scope and objectives of disaster mitigation (I), (II); Understand Indonesia's geological position and its implications for potential disasters (I), (II); Understand the process of earthquake occurrence and earthquake disaster mitigation (I), (II); Understand the process of tsunami disasters and tsunami disaster mitigation (I), (II); Understand the process of volcanic disasters and volcanic disaster mitigation; Understand the process of flood disasters and flood disaster mitigation; Understand the process of fire disasters and fire disaster mitigation; Understand the process of landslides and landslide disaster mitigation

Weekly topics

1. Introduction: Understand and know the scope of the concept of disaster
2. Understand the scope and objectives of disaster mitigation (I)

3	Understand the scope and objectives of disaster mitigation (II)
4	Understand Indonesia's geological position and its implications for potential disasters (I)
5	Understand Indonesia's geological position and its implications for potential disasters (II)
6	Understand the process of earthquake occurrence and earthquake disaster mitigation (I)
7	Understand the process of earthquake occurrence and earthquake disaster mitigation (II)
8	**Midterm Exam**
9	Understand the process of tsunami disasters and tsunami disaster mitigation (I)
10	Understand the process of tsunami disasters and tsunami disaster mitigation (II)
11	Understand the process of volcanic disasters and volcanic disaster mitigation
12	Understand the process of flood disasters and flood disaster mitigation
13	Understand the process of fire disasters and fire disaster mitigation
14	Understand the process of landslides and landslide disaster mitigation
15	Presentation of disaster case study assignments
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Undang-undang No.24 Tahun 2007, tentang Penanggulangan Bencana
2. Lampiran Peraturan Mendagri No.33/2006, tentang Pedoman Umum Mitigasi Bencana
3. Pengenalan Karakteristik Bencana dan Upaya Mitigasinya di Indonesia, Edisi II, Pelaksana Harian Bakornas PB, 2007
4. Risiko Bencana Indonesia. Badan Nasional Penanggulangan Bencana Nasional (BNPB), 2016
5. Tanjung, R.et.al, Manajemen Mitigasi Bencana, Widina Bhakti Persada Bandung,2020
6. Konsep dan Karakteristik Bencana, Pusat Pendidikan dan Pelatihan SDA dan Konstruksi, 2007
7. Purnama, Sang Gede. Manajemen Bencana, Fak.Kedokteran UNUD, 2017

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Occupational Safety and Health Management System

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. I Komang Alit Astrawan Putra, ST., MT., IPM.

EXAMS
Written midterm and final exam

Description

The Occupational Safety, Health and Environment Management System course, part of the knowledge and planning of occupational safety and health, focuses on skills in and understanding of the work rules set out in the laws and government regulations on occupational safety and health, and how to apply them in business, especially in construction. Students are expected to take an active part in lectures inside and outside the classroom, as the course follows a student-centered learning (SCL) approach. Teaching methods vary: discussions, presentations, assignments, simulations and problem-based learning (PBL).

Learning objectives

- Explain the basic concepts of occupational safety, health and the environment.
- Plan occupational safety, health and environment (K3L) measures and analyze the hazards of work through a risk management system.
- Establish company and workplace hygiene in a structured way and implement it correctly, in line with the relevant knowledge, supervision and work rules.

Subjects covered

Occupational Health and Safety and Environmental Management System; History and Philosophy of Occupational Safety and Health and Occupational Safety and Health Management Systems; Work Environment Control; Resources and Productivity; Occupational Accidents and Occupational Diseases; Workload Risk and Workload Measurement Methods; Planning and Supervision Policy for Occupational Health and Safety and Environmental Management Systems; Occupational Health and Safety and Environmental Management System Planning; Implementation of Occupational Health and Safety and Environmental Management Systems; Implementation of Management and Evaluation Systems; Implementation of Environmental Management and Environmental Impact Analysis; Environmental Management Efforts; Occupational Safety and Health and Environmental Risk Management; Construction Work Rules and Ergonomics

Weekly topics

1. Occupational Health and Safety and Environmental Management System
2. History and Philosophy of Occupational Safety and Health and Occupational Safety and Health Management Systems
3. Work Environment Control
4. Resources and Productivity
5. Occupational Accidents and Occupational Diseases
6. Workload Risk and Workload Measurement Methods
7. Planning and Supervision Policy for Occupational Health and Safety and Environmental Management Systems
8. **Midterm Exam**
9. Occupational Health and Safety and Environmental Management System Planning and Tasks I
10. Implementation of Occupational Health and Safety and Environmental Management Systems
11. Implementation of Management and Evaluation Systems
12. Implementation of Environmental Management and Environmental Impact Analysis
13. Environmental Management Efforts
14. Occupational Safety and Health and Environmental Risk Management (Task II)
15. Construction Work Rules and Ergonomics
16. **Final exam**

Grading

Continuous assessment	**40%**
Midterm exam	**30%**
Final exam	**30%**

Books and other sources

1. Departemen Pekerjaan Umum. 2016. Keselamatan dan Kesehatan Kerja Pelaksanaan Pekerjaan Gedung. Badan Pembinaan Konstruksi dan Sumber Daya Manusia
2. Grandjean E. 1993. Fitting The Task To The Man. 4th ed. Taylor & Francis Ltd. London.
3. Griffin dan Grandjean, 1973. Lingkungan Kerja Fisik. Modul. Laboratorium Analisis Perancangan Kerja dan Ergonomi. Universitas Islam Indonesia, 2010.
4. Kementrian Pekerjaan Umum dan Perumahan Rakyat. 2017. Modul Pemahaman Sistem Manajemen Keselamatan dan Kesehatan Kerja Konstruksi (SMK3K) Pelatihan dan Pengendalian Pengawasan Pekerjaan Konstruksi. Badan Pengembangan Sumber Daya Manusia.

5. PERMENAKER No. Per 01/MEN/1980 tentang Keselamatan dan Kesehatan Kerja Pada Konstruksi Bangunan
6. PERMENAKER No. PER.05/MEN/1996 tentang Sistem Manajemen Keselamatan dan Kesehatan Kerja
7. PERMEN PU No. 05 Tahun 2014 tentang Pedoman SMK3K Bidang Pekerjaan Umum
8. Stranks, Jeremy. 2003. The Handbook of Health and Safety Practice, 6th ed. Great Britain Pearson Education Limited 2003: Prentice Hall.

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Irrigation and Water Structures

CREDITS
3 SKS · 5 ECTS

LANGUAGE
English

LECTURER
Dr. Ir. Putu Doddy Heka Ardana, ST., MT., IPM., ASEAN Eng.

EXAMS
Written midterm and final exam

Description

Irrigation and Water Buildings is a course that contains understanding, learning and training in planning irrigation systems and irrigation buildings. This Irrigation and Water Buildings course is a learning skill in the field of irrigation system planning, irrigation water needs and availability, irrigation water balance, classification and rotation of irrigation water, irrigation efficiency and effectiveness, planning irrigation canals with economical dimensions and irrigation buildings, and building planning weir. The intended learning outcomes are that students are able to carry out network system planning, irrigation water needs, canal planning with economical dimensions and irrigation buildings and weir building planning.

Learning objectives

- Mastery of Irrigation and Water Building material to be able to analyze the need and availability of irrigation water, irrigation water balance, classification and rotation of irrigation water, irrigation efficiency and effectiveness, planning irrigation channels with economical dimensions and irrigation buildings, as well as planning weir buildings.
- Able to carry out network system planning, irrigation water needs, canal planning with economical dimensions and irrigation buildings and weir building planning.

Subjects covered

Introduction (semester learning plan and lecture contract); Introductory material regarding the meaning of irrigation and the history of irrigation; Relationship between climate, soil and plants; Irrigation network schemes, understanding of irrigation networks, simple irrigation networks, semi- technical irrigation networks, technical irrigation networks, overview maps; Irrigation buildings, standard names for irrigation networks, definitions of irrigation areas; Hydrological Analysis: repair of missing rainfall data, data consistency test, regional average rainfall analysis, frequency and probability analysis; Hydrological Analysis: effective rainfall; Analysis of irrigation water availability, calculation of reliable discharge; Analysis of irrigation water requirements for rice and secondary crops; Calculation of NFR and DFR as well as calculation of water requirements in rice fields (IR); Plant classification and rotation; Water balance calculation; Calculation of efficiency and effectiveness of irrigation channels; Determining the location of irrigation buildings and irrigation channels (primary, secondary, tertiary),

carrier and waste channels, pair channels; Channel capacity (hydraulic) and irrigation channel planning; Basic principles of weir building planning; Fixed weir planning; Flow hydraulics through a fixed weir; Stability of the weir building; Stilling Pond Planning.

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction material regarding the meaning of irrigation and the history of irrigation
2. The relationship between climate, soil and plants; Assignment 1: Review Journal
3. Irrigation network scheme, understanding of irrigation networks, simple irrigation networks, semi- technical irrigation networks, technical irrigation networks, overview map
4. Irrigation buildings, standard irrigation network names, definitions of irrigation areas; Task 2: Compare the Irrigation Area (DI) Map with the material that has been explained
5. Hydrological Analysis: repair of missing rainfall data, data consistency test, regional average rainfall analysis, frequency and probability analysis
6. Hydrological Analysis: effective rainfall; Analysis of irrigation water availability, calculation of reliable discharge; Task 3
7. Quiz
8. **Midterm Exam**
9. Analysis of irrigation water needs for rice and secondary crops; Calculation of NFR and DFR as well as calculation of water requirements in rice fields (IR); Plant classification and rotation
10. Calculation of water balance; Calculation of efficiency and effectiveness of irrigation channels; Task 4: NFR, DR, and IR calculations
11. Determining the location of irrigation buildings and irrigation channels (primary, secondary, tertiary), carrying channels and waste channels, pair channels
12. Channel capacity (hydraulic) and irrigation channel planning; Task 5: Calculation of irrigation canal dimensions
13. Quiz
14. Basic principles of dam building planning; Fixed weir planning
15. Hydraulics of flow through a fixed weir; Stability of the weir building; Stilling Pond Planning
16. **Final exam**

Grading

Continuous assessment	**35%**
Midterm exam	**30%**
Final exam	**35%**

Books and other sources

1. Tabuchidan S. Hasegawa, 1995, Paddy Field In The World, JSIDRE
2. H. Cuenca, 1989, Irrigation System Design: an Engineering Approach
3. Anonim, 1982, Design off Small Dam, US Army Corp, Mc Graw Hill, 1982
4. Mawardi, I., 2010, Desain Hidraulik Bangunan Irigasi, Penerbit Alfabeta
5. Anonim, 1997, Irigasi dan Bangunan Air, Penerbit Gunadarma, Jakarta
6. Triatmodjo, B., 2008, Hidrologi Terapan, Penerbit Beta Offset, Yogyakarta
7. Chow, V.T., Maidment, D.R., Mays, L.W., 1988, Applied Hydrology, McGraw-Hill Book Company
8. Harto, S., 1993, Analisis Hidrologi, Penerbit PT. Gramedia Pustaka Utama, Jakarta
9. Soemarto, C.D., 1999, Hidrologi Teknik, Penerbit Erlangga, Jakarta
10. Standar Perencanaan Irigasi (KP-01): Kriteria Perencanaan Bagian Jaringan Irigasi
11. Standar Perencanaan Irigasi (KP-02): Kriteria Perencanaan Bagian Bangunan Utama
12. Standar Perencanaan Irigasi (KP-03): Kriteria Perencanaan Bagian Bangunan
13. Standar Perencanaan Irigasi (KP-04): Kriteria Perencanaan Bagian Petak Tersier
14. Standar Perencanaan Irigasi (KP-05): Kriteria Perencanaan Bagian Petak Tersier
15. Standar Perencanaan Irigasi (KP-06): Kriteria Perencanaan Bagian Parameter Bangunan
16. Standar Perencanaan Irigasi (KP-07): Kriteria Perencanaan Standar Penggambaran
17. PU. Himpunan Peraturan Perundang-undangan tentang pengairan tingkat nasional

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Engineering Economics

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Ida Bagus Gede Indramanik, ST., MT.

EXAMS
Written midterm and final exam

Description

The Engineering Economics course is one of the fundamental courses in the Civil Engineering Study Program. Engineering Economics course material includes the concept of interest, changes in the value of money over time, assessment of the feasibility study of a project which includes Net Present Value Analysis, Net Future Value Analysis, Net Annual Analysis Value, Benefit Cost Ratio, Internal Rate of Return Analysis, and Break Event Points.

Learning objectives

- Understand the concept of Time Value of Money
- Able to analyze and select investments using common investment criteria.

Subjects covered

Introduction: Economic problems in the field of civil engineering; Explain the meaning of the value of money relative to time (Time Value of Money); The concept of interest; Factors forming interest; Nominal Interest; Effective Interest; Single Payment Formulas; Uniform Series Formulas; Arithmetic Gradient; Geometric Gradient; Loan repayment procedures; Present Worth Analysis; Analysis of a Single Alternative; Service Life Is the Same as the Analysis Period; Analysis Periods with Different Lifespans; Infinite Analysis Period; Minimum Attractive Rate of Return (MARR); Payback Period Analysis; Investment Life; Investment Selection; Depreciation and Taxes

Weekly topics

1. Introduction: Economic problems in the field of civil engineering; Explain the meaning of the value of money relative to time (Time Value of Money)
2. The concept of interest; Factors forming interest
3. Nominal Interest; Effective Interest
4. Single Payment Formula; Uniform Series Formulas
5. Arithmetic Gradient; Geometric Gradients

6	Loan repayment procedures
7	Practice Questions
8	**Midterm Exam**
9	Present Worth Analysis; Analysis of a Single Alternative; Service Life Equal to the Analysis Period
10	Analysis Period with Different Lifetimes; Infinite Analysis Period
11	Minimum Attractive Rate of Return (MARR)
12	Payback Period Analysis
13	Investment Life
14	Investment Selection
15	Depreciation and Taxes
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. A. Newman, Donald. G, Engineering Economic Analysys, 11Th Edition, Oxford University Press, 2012
2. Ardalan, Abol. Economic & Financial Analysis for Engineering & Project Management
3. Kodoatie, Robert. Analisis Ekonomim Teknik Offser Yogyakarta, 1994
4. Raharjo, Rerianto. Ekonomi Teknik, Analisis Pengambilan Keputusan. Penerbit Andi Yogyakarta, 2007

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

Structural Engineering Computers

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. I Gusti Made Sudika, MT., IPM.

EXAMS
Written midterm and final exam

Description

The Civil Engineering Computer Applications course is a course that aims to improve students' ability to carry out structural analysis in concrete, steel, aluminum and composite construction, so that at the end of the course students are expected to be able to carry out structural analysis well, quickly and accurately, using the SAP 2000 program

Learning objectives

- Mastery of structural modeling material using SAP 2000 software
- Able to model and analyze civil buildings, especially beams, trusses, frames, moving loads, concrete design, steel design and earthquake resistant building design

Subjects covered

Introduction (semester learning plan and lecture contract); Introduction to Civil Engineering Computer Applications using the SAP 2000 program; Structural modeling with SAP 2000 geometric model stage; Structural modeling with SAP 2000 using static and dynamic analysis; Structural modeling with SAP 2000 to analyze concrete beam construction; Structural modeling with SAP 2000 to analyze concrete column construction; Structural modeling with SAP 2000 for concrete bridge construction; Structural modeling with SAP 2000 to analyze concrete (beam) bridge construction; Structural modeling with SAP 2000 for steel construction

Weekly topics

1. Introduction (semester learning plan and lecture contract); Introduction to Civil Engineering Computer Applications using the SAP 2000 program
2. Structural modeling with SAP 2000 geometric model stage
3. Structure modeling with SAP 2000 with case studies (Task 1)

4 Structural modeling with SAP 2000 using static and dynamic analysis

5 Case studies using dynamic and static analysis (Task 2)

6 Structural modeling with SAP 2000 to analyze concrete beam construction

7 Structural modeling with SAP 2000 to analyze concrete column construction

8 **Midterm exam**

9 Structural modeling with SAP 2000 to analyze portal (beam) construction case studies – Task 3

10 Structural modeling with SAP 2000 to analyze portal (column) construction case studies- Task 4

11 Structural modeling with SAP 2000 for concrete bridge construction

12 Structural modeling with SAP 2000 to analyze concrete (beam) bridge construction

13 Structural modeling with SAP 2000 for steel construction

14 Structural modeling with SAP 2000 to analyze steel construction (frame) case studies-Task 6

15 Structural modeling with SAP 2000 to analyze construction effectively overall-Task 7

16 **Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Analisis Struktur menggunakan SAP 2000 oleh Wiryanto Dewobroto (Elexmedia Komputindo)
2. Standart SK SNI T-15-1991-03: Tata Cara Perhitungan Struktur Beton untuk Bangunan Gedung
3. SNI 1726-2002: Standar Perencanaan Ketahanan Gempa untuk Struktur Bangunan Gedung

ENGINEERING · SUMMER SEMESTER · ARCHITECTURE & ENGINEERING

River Engineering

CREDITS
2 SKS · 3 ECTS

LANGUAGE
English

LECTURER
Ir. Tri Hayatining Pamungkas, ST., MT.

EXAMS
Written midterm and final exam

Description

River Engineering covers the behavior of rivers and the planning of river works. Students learn about river morphology, the hydrology and hydraulics of river flow, sediment transport, erosion and scour, and the design of river training works, embankments and flood control measures, with examples from Bali and Indonesia.

Learning objectives

- Explain river morphology and the hydrological and hydraulic processes in rivers.
- Calculate river flow, water surface profiles and sediment transport.
- Plan river training works, embankments, weirs and flood control measures.
- Evaluate river management measures, including their ecological effects.

Subjects covered

River morphology; Hydrology for river engineering; Open channel hydraulics; Sediment transport; Erosion and scour; River training works; Embankments and weirs; Flood control; River restoration and management.

Weekly topics

1. Introduction (semester learning plan and lecture contract); rivers, river basins and the scope of river engineering
2. River morphology: river types, channel patterns and longitudinal profiles
3. Hydrology for river engineering: rainfall, runoff and design floods
4. Open channel hydraulics: uniform and non-uniform flow
5. Backwater curves and water surface profiles
6. Sediment transport: bed load and suspended load
7. Riverbed scour, bank erosion and sedimentation; Task 1

8	**Midterm exam**
9	River training works: groynes, revetments and bank protection
10	Embankments and dikes
11	Weirs, check dams and drop structures
12	Flood control: retention, diversion and river normalization
13	River mouths and estuaries
14	Eco-hydraulics and river restoration
15	River management and maintenance in Bali and Indonesia; Task 2
16	**Final exam**

Grading

Continuous assessment	**60%**
Midterm exam	**20%**
Final exam	**20%**

Books and other sources

1. Jansen, P. Ph. (ed.). 1979. *Principles of River Engineering: The Non-Tidal Alluvial River*. London: Pitman.
2. Julien, Pierre Y. 2002. *River Mechanics*. Cambridge: Cambridge University Press.
3. Chow, Ven Te. 1959. *Open-Channel Hydraulics*. New York: McGraw-Hill.
4. Sosrodarsono, Suyono and Masateru Tominaga. 1985. *Perbaikan dan Pengaturan Sungai*. Jakarta: Pradnya Paramita.
5. Maryono, Agus. 2005. *Eko-Hidraulik Pembangunan Sungai*. Yogyakarta: Gadjah Mada University Press.
6. Triatmodjo, Bambang. 2008. *Hidrologi Terapan*. Yogyakarta: Beta Offset.

The GoBali grading scale

GoBali uses the European ECTS grading scale.

GRADE	PERCENT	DEFINITION
A+	95–100	Outstanding performance with only minor errors
A	90–94	
B+	85–89	Above the average standard but with some errors
B	80–84	
C+	75–79	Generally sound work with a number of notable errors
C	70–74	
C−	65–69	
D	60–64	Fair but with significant shortcomings
E+	55–59	Performance meets the minimum criteria
E	50–54	
F	0–49	Fail

Calculation of final grades

Your transcript shows the final grade for each course. Each course is graded as described in its course description in this guide.

Transcripts

Transcripts are usually sent to you 6–8 weeks after the exams. We don't convert our grades for international universities: each university converts the grades of its students according to its own criteria. A detailed explanation of the GoBali grading system comes with your transcript.

Re-sit exams

There are no re-sit exams at Ngurah Rai University for the GoBali program.

Ngurah Rai University, International Office, Denpasar, Bali, Indonesia.

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