STUDYINBALI

UNIVERSITAS
UDAYANA
BALI INDONESIA

SOUTHEAST ASIAN ENGINEERING

COURSE DESCRIPTION

Southeast Asian Engineering

Apart from the classic technical and constructive tasks, engineers in Indonesia have to deal with special challenges: due to their location along the so called „Pacific Ring of Fire“, the Indonesian islands are exposed to frequent earth movements. One of the most important components of the engineer’s work is the development and implementation of earthquake-resistant buildings and constructions. The 15-week course combines elemental basic knowledge of civil, mechanical & electrical engineering subjects with specific topics of Southeast Asian constructions and technologies.

Particular attention is also given to sustainability & sustainable processes as well as the range and significance of renewable energies, natural materials, solutions for urban traffic in Asian countries, industrial technologies and manufacturing processes. The 15-week class "Southeast Asian Engineering" combines lectures and excursions. It reveals the special challenges in the tropics and teaches how to develop individual concepts for these particular requirements. The international course is offered every semester. The amount of credits to be earned each semester is max. 30 CP.

MODULES

1. SEA Renewable Energy & Sustainability (5 CP)
2. Material Science I Natural Materials & Materials of the Tropics (5 CP)
3. Student Project (5 CP)
4. Indonesian Language, History & Culture (5 CP)

Civil Engineering

5. Earthquake Science (5 CP)
6. Urban Transportation (5 CP)

Mechanical & Electrical Engineering

7. Manufacturing Process (5 CP)
8. Industrial Technology (5 CP)

The amount of credits to be earned each semester is max. 30 CP.

ELIGIBILITY

Bachelor students and master students in Civil Engineering, Urban Studies, Mechanical Engineering, Mechanics, Mechatronics, Electrical Technology, Renewable Energies, Environmental Engineering and related faculties are eligible to join the study abroad program. Professionals are also welcome to participate in this course.

IMPORTANT ISSUES

- Application deadline: 15 January (Summer Class); 15 June (Winter Class)
- Summer Class: April – July; Winter Class: September – December
- Study Fees: 1,850 Euros
  The study fees cover lectures, workshops, weekly academic and cultural excursions and selected student services. The study fees EXCLUDE living costs, visa costs, accommodation, meals, travel costs, insurance and transportation

ASSESSMENT & MARKING

Students have to meet all assessment criteria to be eligible for the final markings. The criteria include:

- Minimum of 75% of the class, workshop and excursion attendance. (Students have to sign the attendance list every time participating in class/excursions.)
- Submit all required assignments
- Attend exam
- Show active participation and ability in soft skills

GRADING AND CURRICULUM

Academic systems differ from country to country. In Indonesia, tertiary education is administered directly under the Ministry of Higher Education & Research. The full semester study abroad program does not grant a degree, but the courses provide students a maximum of 30 credit points, which are transferable to home universities. For the full amount of 30 ECTS Students have to participate in class, case studies, guest lectures, academic excursions/site visits and student's project.

An attendance of at least 75% is a prerequisite for admission to the exams. An absence of more than 3 weeks at a time leads to a deregistration. Compulsory attendance starts from the first day of orientation week.

WEEKLY EXCURSION

An academic excursion is organized once a week, i.e. every Thursday/Friday. The weekly excursions are the integral part of the study abroad program at Udayana University. Participation during the excursion is essential and also included in the 75 % attendance.

At the end of every excursion, students will be asked to submit a report paper to the class coordinator. The report must include the description of activities, a critical review on the topics related to study background and recommendation. Two excursion reports are compulsory to be submitted.

CERTIFICATES

Students will receive their official certificates from Udayana University personally at the graduation event or in digital form approximately 4 weeks after the final exams by email. At the end of the program, students who satisfactorily have completed all course requirements will be awarded with certificates as follows:

- A certificate stating that the student has attended the course for fully 15 weeks.
- An Academic Transcript showing the student performance on the program. The grades in the transcript are the final marks.
- A certificate stating that the student has participated in the workshop or certain academic excursions (on request).

WORKLOAD

CODE	MODULE	CLASS		CONSULTATION		GUEST LECTURING	WORKSHOP	EXCURSION	SELF STUDY		PAPERS & EXAMINATION	TOTAL WORKLOAD	CREDITS
		WEEKLY	TOTAL	WEEKLY	TOTAL				WEEKLY	TOTAL			
E.01	**RENEWABLE ENERGY & SUSTAINABILITY**	2	24			2	5	14	5	75	30	150	**5**
E.02	**MATERIAL SCIENCE**	2	24			1		20	5	75	30	150	**5**
E.03	**STUDENT PROJECT**	2	24			1		20	5	75	30	150	**5**
BI.01	**INDONESIAN LANGUAGE, HISTORY & CULTURE**	2	24					20	5	75	30	149	**5**
CE.01	**EARTHQUAKE SCIENCE**	2	24				6	12	5	75	30	148	**5**
CE.02	**URBAN TRANSPORTATION**	2	24			2	4	15	5	75	30	150	**5**
ME.01	**INDUSTRIAL TECHNOLOGY**	2	24					20	5	75	30	149	**5**
ME.02	**MANUFACTURING PROCESS**	2	24					20	5	75	30	149	**5**

The number of credits per semester is max. 30 CP. Students can choose according to their needs. Not all listed modules need to be taken.

1. RENEWABLE ENERGY & SUSTAINABILITY

Lecturing Team	Prof. I Nyoman Suprapta Winaya (coordinator)
	Dr. Eng Made Sucipta,
	I Nyoman Satya Kumara, Ph.D
Time	weekly
Duration	150 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

The course aims to introduce the basic concepts, principles, uses and challenges of various renewable energy sources and devices including bio-energy, solar energy, wind energy, micro-hydro, wave and tidal power, geothermal and fuel cells. Students will develop the ability to identify, formulate and solve simple to complex problems of renewable energy conversion. Students will know and understand contemporary issues pertaining to the energy, environment and society from global perspectives.

LEARNING OBJECTIVES

The main goals of this class are:

- To gain an understanding of the practical use and challenges as well as cost-benefit ratio of various alternative energy sources, to see what is feasible on the large scale and what is not.
- To understand some of the various obstacles associated with actual implementation of production line alternative energy facilities.
- To do simple calculations regarding the cost of energy usage and the required infrastructure to deliver a certain amount of power.

ASSESSMENT

Indoor and outdoor lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

1. Active participation (no less than 75% attendance)
2. 30% from short assignments (individual)
3. 35% from Student Project presentation (group)
4. 35% from final examination or Student Project presentation (individual)

COURSE CONTENT

1. **Renewable energy – an introduction:** Overview of energy consumption and renewable energy in general: why renewables (RE)?; methods of analysis for RE technologies; renewables: cost and performance; energy policy.

2. **RE from biomass I:** Overview of RE systems for energy from biomass, non-thermal technology conversion.

3. **RE from Biomass I:** Biomass thermal technology conversion and policy; pyrolysis, gasification and combustion; environmental issues.

4. **RE from tidal and wave power:** Design related efficiency, system elements, socioeconomic and policy factors

5. **RE from collector solar energy:** Solar thermal plant design – collector & plant types, design-related efficiency, system elements, solar thermal power plant mathematics, socioeconomic factors, environmental factors

6. **RE from PV solar energy:** Photovoltaic system design, design-related efficiency, system elements,grid-tied systems – off-grid systems, photovoltaic systems mathematics, socioeconomic factors, environmental factors

7. **RE from hydro:** Hydro turbine design, design-related efficiency, system elements, hydro power mathematics, socioeconomic factors

8. **RE from wind:** Wind turbine design, design-related efficiency, system elements, power control, wind parks (farms), off-grid applications, wind power mathematics, socioeconomic factors

9. **RE from geothermal resources:** Geothermal design, design related efficiency, system elements, geothermal power mathematics, socioeconomic, environmental and policy factors

10. **RE from fuel cell:** Fuel characteristic, design-related efficiency, system elements, fuel-cell power mathematics, socioeconomic, environmental and policy factors

11. **Fieldwork:** RE plant visits

12. **Class seminar and case studies (1):** Class presentation from the final work of RE project, followed by class discussion. The presentation will include audiences from local students and all lecturers and tutors of the RE course.

13. **Class seminar and case studies (2)**

2. MATERIAL SCIENCE I NATURAL MATERIALS & MATERIALS OF THE TROPICS

Lecturing Team	D.M Priyantha Wedagama, ST., MT., MSc., Ph.D
	Dr. Ari Subagja
	Ir. I Gusti Putu Suparsa, MT
Time	weekly
Duration	150 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

The objective of the course is to introduce students to the natural materials available and being used in tropical countries such as Indonesia and to provide them with knowledge on the properties (mechanical, electrical and structural characteristics) of these materials. Students are encouraged to actively participate in the main discussion on green & sustainable concepts of materials, as well as in developing innovative applications.

LEARNING OBJECTIVES

Upon completion of the course, students are expected:

- to have gained a general understanding of the concept, philosophy, challenges and practical use of natural materials in tropical countries
- to be able to design or propose innovative materials to be used for engineering or industrial purposes

ASSESSMENT

Indoor and outdoor lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

1. Active participation (no less than 75% attendance)
2. 30% from short assignments (individual)
3. 35% from Student Project presentation (group)
4. 35% from final examination or Student Project presentation (individual)

COURSE CONTENT

1. **Natural Materials in Indonesia and other South East Asia Countries:** Overview and history of materials used for building design, interior, infrastructure and industries in Indonesia and neighbouring countries.

2. **Geographical Tropical Factor, Socio-culture and Philosophy:** How natural materials are used in different manners and concepts according to the geography, culture, technology.

3. **Green and Sustainable Development in Tropical Countries:** Pros and cons, challenges and practices of green concepts for the use of materials in Indonesia. Discussion includes political issues, technological and cultural barriers. Properties of materials: Including mechanical (stress & strain, elastic/plastic deformation), electrical (magnetic, optical and wave), physical (durability, strength, etc.) characteristics and other related material science.

4. **Conservation and Traditional Technology:** Discussion on differences of methods and approaches being used in developing countries in processing raw materials for industries or construction.

5. **Forestry materials:** Characters, classification, use, constructions method, trends and the traditional technology. Environmental challenge versus industrial demands.

6. **Forestry Materials: Wood & Bamboo:** Green concept of Bamboo; implementation, modern uses and challenges.

7. **Recycling and Reuse** Including trends, designs, technology, availability and potentials.

8. **Ground Materials; stones, minerals and metals:** Material properties, characteristics, classification, use, construction methods, trends and traditional technologies. Environmental challenge versus industrial demands.

9. **Innovative materials for Engineering and industry:** Bio-materials, seashells, coconut wood, water hyacinth, etc.

10. **Innovative materials: Student Assignment:** Students work in groups conducting a small research on available natural materials and design an innovative concept for use of the proposed materials for engineering or industrial purposes.

11. **Ecology and Environmental issue**: Group presentations and discussion of each assignment, presented in Class Seminar.

3. STUDENT PROJECT I INDIVIDUAL RESEARCH

Lecturing Team	Prof. Winaya Suprapta
	Prof. ngakan Suardana
	Prof. Arya Tenaya
Time	weekly
Duration	150 hours in total
Credit Points	5 ECTS
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

Course Description

Students will be given a specific ongoing project/program/task related to their study background (Civil, Electrical or Mechanical Engineering). Students who prefer to conduct the subject through research must select a particular research topic independently. The project in both approaches (by project or research) has to be agreed with a professor. Each student will be guided by professor or experts related to their study. If possible, the selected project/topic/research should use a case study of Bali's present condition taken from different sectors and angles in comparison to the student's home country development.

Upon completion of the research, students are expected to submit a research paper of minimum 20 pages and to present their research progress or findings during the class seminars.

Students must discuss the progress of their research project with the relevant professors every week. The project progress must meet the weekly target agreed at the beginning of the course.

4. BAHASA INDONESIA

Lecturing Team	Gusti Ayu Made Suartika, ST., MEngSc. ,PhD. M Swanendri, ST., MT
Time	weekly
Duration	149 hours in total
Credit Points	5 ECTS
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE CONTENT

1. Indonesian greetings, self-introduction, family members
2. Indonesian alphabet, Indonesian numbers
3. Indonesian pronouns
4. Questions & Answers
5. Positive, negative & interrogative statements
6. Dates, Holidays
7. Midterm test
8. Future tense
9. Colours, Exercise on rearranging colours and characters
10. Human characters
11. Shopping dialogue, Making requests
12. Imperatives
13. Text with various inclusive Indonesian verbs

ASSESSMENT

1. Assignments 20%
2. Project 40%
3. Oral presentation 15%
4. Final exam 25%

5. Earthquake Science

Lecturing Team	I Ketut Sudarsana, ST, Ph.D Ir. Ida Ayu Made Budiwati, MSc, Ph.D I Gede Adi Susila, ST, MSc, Ph.D
Time	weekly
Duration	148 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

Indonesia is located at the so-called "Pacific Ring of Fire", a volcanic belt that encircles the Pacific Ocean on three sides. Along this belt slight or heavy earthquakes can occur. Architecture and structures have to be able to respond to earth movements. The course "Earthquake Science and Engineering " analyses different types of earthquakes, shows solutions for building structures and develops site-specific architectural principles. All is based on seismic hazard analyses and their evaluation.

LEARNING OBJECTIVES

- Understand the nature of ground shaking due to earthquakes
- Analyse seismic hazards
- Design structures that respond to earthquake forces.

ASSESSMENT

Indoor and outdoor lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

5. Active participation (no less than 75% attendance)
6. 30% from short assignments (individual)
7. 35% from Student Project presentation (group)
8. 35% from final examination or Student Project presentation (individual)

REFERENCES

1. Chopra, A.K, 2012, Dynamics of Structures: Theory and Applications to Earthquake Engineering, 4th edition, Prentice Hall.
2. Clough,R.W. and Penzien,J., 2003, Dynamic of Structures, 3rd ed, McGraw-Hill, 649p.
3. Humar,J.L, 1990, Dynamics of Structures, Prentice Hall, 780p.
4. Mario Paz, Dynamic of Structures
5. Naem, F (Editor), 2000, The Seismic Design Handbook, 2nd edition, Chapman & Hall.
6. Sucuoğlu, H. and Akkar, S., 2014, Basic Earthquake Engineering: From Seismology to Analysis and Design, Springer International Publishing, Switzerland.

COURSE CONTENT

1. **Nature of Earthquakes**. This topic describes the structure of earth, causes of EQ, theory of tectonic plates, EQ waves, fault mechanisms, Reid's Elastic Rebound Theory, distance of EQ epicentre, measurement of earthquake sizes based on energy releases, Richter Scale, seismic moment, earthquake intensity, modified Merchali Intensity, evolution of magnitude scales, relationships between magnitude scales, lesson learned from big EQ events.

2. **Free-Field Surface Ground Motion.** This topic discusses Fourier and response spectra, seismic parameters influencing structural responses, design response spectra, design accelerograms, attenuation relationships, elastic seismic wave model, directivity pulse phenomenon and near-field ground motions.

3. **Seismic Hazard Analysis:** Definition of earthquakes, seismicity model, attenuation model, Deterministic Seismic Hazard Analysis (DSHA), Probabilistic Seismic Hazard Analysis Procedure (PSHA), USGS seismic hazard maps. River

4. **Seismic Response Analysis of Single Degree of Freedom (SDOF) System/Structure**. Equation of motion, damped and undamped free vibration response, forced vibration response due to harmonic, periodic and arbitrary excitations,

5. **Numerical Evaluation of Seismic Responses**, time-stepping methods, methods based on interpolation of excitation, Central Difference Method, Newmark's Method, Theta's Wilson Method, nonlinear systems: Central Difference Method, nonlinear systems: Newmark's Method.

6. **Earthquake Response of Linear and Nonlinear structures.** Response Spectrum Concept, Deformation, Pseudo-velocity, and Pseudo-acceleration, Response Spectra, Peak Structural Response from the Response, Spectrum, Response Spectrum Characteristics, Force–Deformation Relations, Normalized Yield Strength, Yield Strength Reduction Factor, and Ductility Factor, Equation of Motion and Controlling Parameters, Effects of Yielding, Response Spectrum for Yield Deformation and Yield Strength, Yield Strength and Deformation from the Response Spectrum.

7. **Seismic Response Analysis of Multi Degree of Freedom (MDOF) System/Structure.** Equation of motion, undamped free vibration response, Analysis of eigenvalue and eigenvector using method of determinant, iteration method and Rayleigh-Ritz method. Forced vibration response due to harmonic, periodic and arbitrary excitations.

8. **Earthquake analysis Modules;** Incremental Nonlinear Static Monotonic Analysis, Incremental Nonlinear Static-Adaptive (Pushover) Analysis, Nonlinear Quasi-static Analysis, Eigenvalue Analysis, Nonlinear Dynamic Analysis, Incremental Nonlinear Dynamic Analysis

9. **Seismic Design of Building Codes;** Seismic Design Criteria of ASCE 7-10 and Eurocode-8, Seismic Design Requirements of ASCE 7-10 and Eurocode-8 for Building Structures and Nonstructural elements, architecture principles, Performance-Based Earthquake Engineering, Direct Displacement-Based Seismic Design Procedure

6. URBAN TRANSPORTATION

Lecturing Team	Prof. Ir. I Nyoman Arya Thanaya, ME., Ph.D (coordinator) Ir. I Gusti Putu Suparsa, MT Putu Alit Suthanaya, ST., MSc., Ph.D D.M Priyantha Wedagama, ST., MT., MSc., Ph.D
Time	weekly
Duration	150 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

The course is intended to acquaint students with relevant issues, challenges, and future prospects of urban transport in South East Asian countries for which Bali is considered as the case study area.

LEARNING OBJECTIVES

Upon completion of the course, the students should be able to identify, analyse and explain the issues, challenges and future prospects of the urban transport in developing countries

REFERENCES

1. Manheim, M.L, (1979), Fundamentals of Transportation System Analysis Volume I: Basic Concepts, The MIT Press, Massachusetts.
2. Meyer, M.D., Miller, E.J, (2001), Urban Transportation Planning 2nd Edition, McGraw-Hill, New York.
3. The Institution of Highways and Transportation, (1997), Transport in The Urban Environment, The IHT, London.
4. AASHTO, (1990), A Policy on Geometric Design of Highways and Streets.
5. NAASRA, (1980), Interim Guide to Geometric Design of Rural Roads.
6. Asphalt Institute, (1995), Mix Design Methods for Asphalt Concrete and Other Hot Mix Types. Manual Series No. 2 (MS-2), Sixth Edition.
7. Asphalt Institute, (1977), A Brief Introduction to Asphalt and Some of Its Uses. Manual Series No. 5 (MS-5), Seventh Edition.
8. Krebs, R.D. and Walker, R.D., (1971), Highway Materials, McGraw-Hill Book Company.

ASSESSMENT

Indoor and outdoor lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

5. Active participation (no less than 75% attendance)
6. 30% from short assignments (individual)
7. 35% from Student Project presentation (group)
8. 35% from final examination or Student Project presentation (individual)

COURSE CONTENT

1. **Urban Structure**. This topic describes the concepts of urban structure development, transit-oriented development and urban structure in Bali Province and Bali's transportation network.

2. **Road network, services, stakeholders, geometry and pavement.** Theory of road geometry and pavement, roles of stakeholders, transport conditions in Bali, pavement conditions in Bali, general properties and availability of road materials, asphalt mixtures, recycling and future challenges.

3. **Urban transport institutions** in Bali (planning, social structure, design, finance, implementation, and enforcement).

4. **Problems and future challenges**. Urban transportation in Bali, comparison among urban transportation in several provinces in Indonesia, and prediction of future condition with do-nothing and do-something scenarios.

5. **Urban transport and tourism**, problems and challenges. Urban transport to support the tourism industry and economic development in Bali. Household expenditures on transport and motor vehicles ownerships. Prominent mode of transport: motorcycles.

6. **Sustainable Development**: Concept and Implementation. The concept of sustainable development and implementation problems.

7. **Public Transport;** Theory of public transport, comparison between public transport in developed and developing countries and future challenges for cities in developing countries.

8. **Public Transport in Bali:** Decline in public transport usage and services. Shift from public to private sector provision of services and facilities. Urban public transport: (mixed on street system: state-owned public transport/Trans Sarbagita and privately-owned public transport).

9. **Relevant issues including taxes, financing, routing**, etc. on both state and privately-owned public transport in Bali. Trend: shift from new road construction to intensive management of urban road networks and improved public transport. Hot issues: Go Jek.

10. **Non-motorised transport systems** (facilities for pedestrians and people-powered vehicles).

11. **Logistic Transportation**; Theory of logistic transportation, logistic transportation in Indonesia and Bali.

12. **Road safety issues**; Education, Engineering and Enforcement to improve the road safety system.

13. **Traffic Management**: Theory and Implementation. Basic theory of traffic management, traffic condition in cities in developing countries, and the implementation problems. Environmental Impact Assessment; The environmental impacts of motorised vehicles, energy consumption, air pollution, road traffic noise, and issues of global warming.

7. INDUSTRIAL TECHNOLOGY

Lecturing Team	NMAE Dewi Wirastuti, Ph.D (coordinator) Linawati, Ph.D Komang Oka Saputra, Ph.D Yoga Divayana, Ph.D
Time	weekly
Duration	149 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

The course aims to introduce various technologies supporting traditional and modern industries. It emphasizes on managing the potentials and challenges in practical uses of electrical, computer, mechanical and construction technologies. Students will gain a general understanding of product styling, computer aided manufacturing, and use of local materials.

LEARNING OBJECTIVES

- Understanding some of the various obstacles associated with using technologies in traditional and modern industries
- Understanding green technology for industries
- Acquiring the ability to design an innovative project / small business using simple technology

ASSESSMENT

Lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

- Active participation (no less than 75% attendance)
- 30% from short assignments (individual)
- 35% from Student Project presentation (group)
- 35% from final examination or Student Project presentation (individual)

REFERENCES

- Gavriel Salvendy Ph.D. 2001. Handbook of Industrial Engineering: Technology and Operations Management, 3rd edition, John Wiley & Sons.
- Peng Zhang. 2010. Advanced Industrial Control Technology, Elsevier.

COURSE CONTENT

12. **Overview of Industrial Technology in Tropical Countries:** Overview of industry, business and technology, how technology can support industrial sector.

13. **Traditional Industries:** Overview traditional industries, technologies to support traditional industries, Balinese traditional industries, logistic, business and supply chain.

14. **Modern Industries:** Overview modern industries, modern technology supported industries, Balinese/Indonesian industries.

15. **Green Technology:** Methods and materials, from techniques for generating energy to non-toxic cleaning products. The goals are sustainability, "cradle to cradle" design, source reduction, innovation, viability. Examples: energy, green ICT, green nanotechnology, green building.

16. **Entrepreneurship and Innovation:** Introduction to entrepreneurship and innovation; the Entrepreneur: an actor in context; networking; social enterprise and innovation; ideas market

17. **Management, Business and Leadership Strategies:** e-business, Innovation Management, Idea Management

18. **Electrical and Computer Technologies for Industry:** Business and industries in electrical, telecommunications and computer fields; technologies to support these industries

19. **Mechanical Technologies for Industry:** Business and industries in the mechanical field; technologies to support these industries

20. **Construction Technologies for Industry:** Business and industries in construction and architecture field; technologies to support these industries

21. **Safety, Health & Environment:** The Safety, Health and Environment course teaches personal protective equipment, hazardous materials, electrical and arc-flash safety as well as a comprehensive review of the current state

22. **Fieldwork:** Traditional industry site visits

23. **Class Seminar and Student Presentation (1):** Class presentation from the final work of the IdT project, followed by class discussion. The presentation will include audiences from local students and all lecturers and tutors of the IdT course.

24. **Class Seminar and Case Studies (2)**

8. MANUFACTURING PROCESS

Lecturing Team	Dr. I Ketut Gede Sugita
	Dr.Eng. I Made Gatot Karohika
Time	weekly
Duration	149 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

In this course students get to know the conventional manufacturing process technology and non-conventional technologies for the manufacture of a gamelan products and how to apply them. Students will learn to understand the metallurgy and heat treatment of gamelan material and how the parameters which influence it are devoted to the metal forming and casting processes.

LEARNING OBJECTIVES

The main goals of this class are:

- To gain an understanding of materials in manufacturing: theory and method of casting processes
- To understand some of the various theories and methods of formation processes
- To learn about the theories and methods for machining processes, cutting materials & product surface qualities
- To gain a general understanding of improvement processes with concepts and methods of manufacturing systems

REFERENCES

1. Casting Design and Performance, ASM International, 2009
2. Kalpakjian, S. and Schmid, S.R., 2014, Manufacturing Engineering and Technology,7th ed., Prentice Hall, Singapore

ASSESSMENT

Lectures or tutorials, guest lectures, group discussions, site visits, case studies and small projects.

1. Active participation (no less than 75% attendance)
2. 30% from short assignments (individual)
3. 35% from Student Project presentation (group)
4. 35% from final examination or Student Project presentation (individual)

COURSE CONTENT

1. **Introduction:** the principle of foundry and types of foundry processes
2. **Types of mold**: sand mold, permanent mold
3. **Pattern, canal system, mold production**, melting and mixing control
4. **Metallurgy of foundry processes**: solidification, segregation, and micro structures
5. **Defect, assessment and quality control**
6. **Heat treatment**
7. **Foundry machineries**
8. **Special foundry methods**
9. **Melting kiln, equipment, and layout of the foundry industry**
10. **Practical standards in foundry processes**
11. **Designing production line**
12. **Economy analysis of foundry process**.
13. **Fieldwork:** Traditional Gamelan manufacture site visit
14. **Class Seminar and Student Presentation:** Class presentation from the final work of the project, followed by class discussion. The presentation will include audiences from local students and all lecturers and tutors of the course.