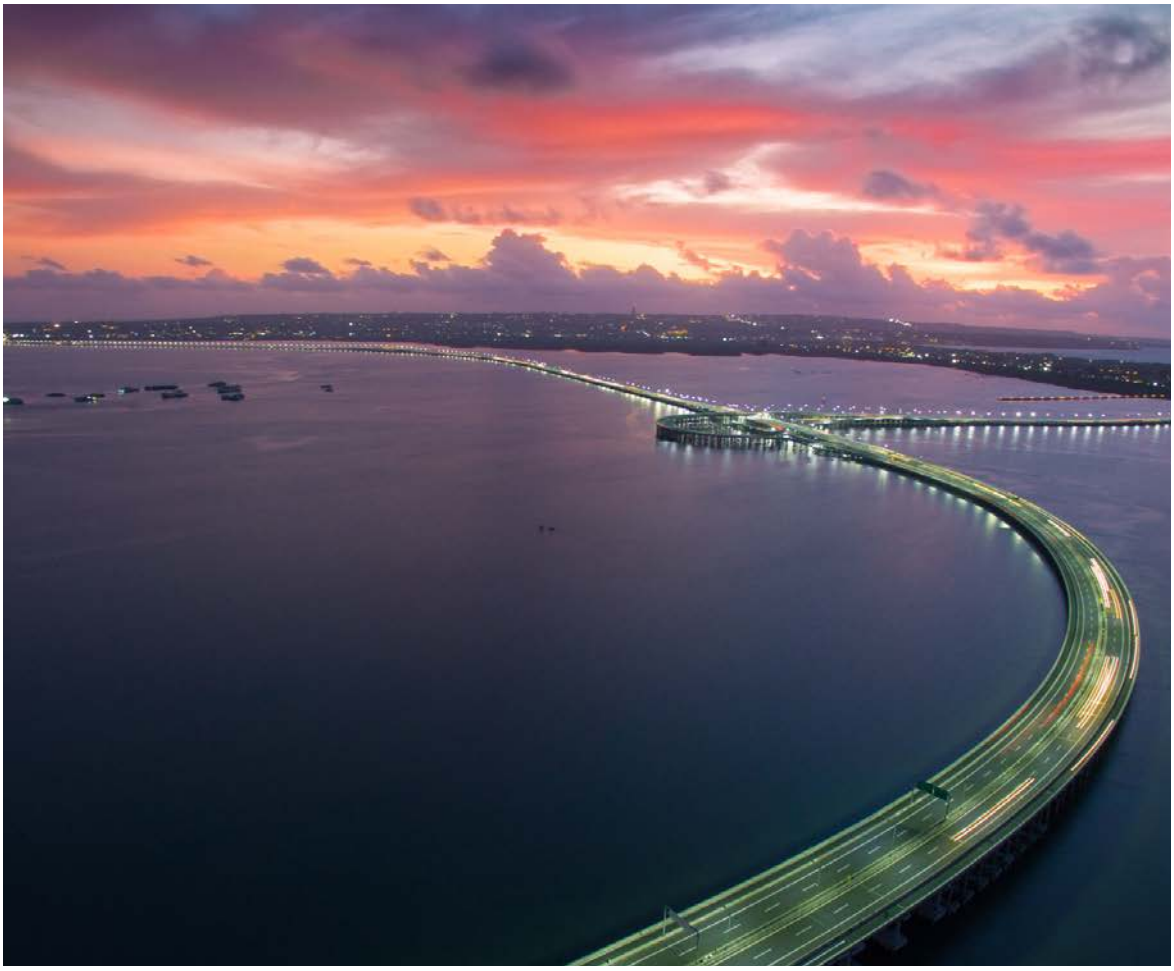
STUDYINBALI

UNIVERSITAS
UDAYANA
BALI INDONESIA



MECHANICAL & ELECTRICAL ENGINEERING

COURSE DESCRIPTION

Mechanical & Electrical Engineering

The 15-week course Mechanical Engineering & Electrical combines elemental basic knowledge of mechanical & electrical engineering subjects with specific topics of Southeast Asian technologies. In addition to industrial technologies and manufacturing processes, the course focuses on the use of materials, especially natural materials, alternative and sustainable processes as well as the range and significance of renewable energies.

The international course is offered every semester. The amount of credits to be earned each semester is max. 30 CP.

MODULES

1. Renewable Energy & Sustainability (5 CP)
2. Industrial Technology (5 CP)
3. Material Science (5 CP)
4. Manufacturing Process (5 CP)
5. Student Project (8 CP)
6. Indonesian Language, History & Culture (2 CP)

ELIGIBILITY

Bachelor students and master students in 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 July (Winter Class)
- Summer Class: April – July; Winter Class: September – December
- Study Fees: 1,850 Euros to be paid by the latest on: 22nd January (Summer Class); 22nd July (Winter Class)
- The study fees cover lectures, workshops, academic and cultural excursions and other student services
- The study fees EXCLUDE living costs, visa costs, accommodation, travel costs and transportation

Mechanical & Electrical Engineering

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 CP 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).

Mechanical & Electrical Engineering

WORKLOAD

CODE	MODULE	CLASS		CONSULTATION		GUEST LECTURING	WORKSHOP	EXCURSION	SELF STUDY		PAPERS & EXAMINATION	TOTAL WORKLOAD	CREDITS
		WEEKLY	TOTAL	WEEKLY	TOTAL				WEEKLY	TOTAL			
ME.01	**RENEWABLE ENERGY & SUSTAINABILITY**	2	24			2	5	14	5	75	30	150	**5**
ME.02	**INDUSTRIAL TECHNOLOGY**	2	24					20	5	75	30	149	**5**
ME.03	**MATERIAL SCIENCE**	2	24			2	4	16	5	75	30	150	**5**
ME.04	**MANUFACTURING PROCESS**	2	24					20	5	75	30	149	**5**
ME.05	**STUDENT PROJECT**	2	24	2	24	4		8	10	150	32	240	**8**
BI.01	**INDONESIAN LANGUAGE, HISTORY & CULTURE**	2	24				4	4	2	30	6	68	**2**

1. Renewable Energy & Sustainability

Lecturing Team	Prof. I Nyoman Suprapta Winaya (coordinator) Dr. Eng Made Sucipta I Nyoman Satya Kumara, Ph.D Prof. Ida Ayu Dwi Giriantari
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 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 ratios of various alternative energy sources, in order to see what is feasible on a 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 calculations regarding the cost of energy usage and the required infrastructure to deliver a certain amount of power

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)

REFERENCES

1. Volker Quaschning, Understanding Renewable Energy Systems, Earthscan, UK, 2005
2. Martin Kaltschmitt, Wolfgang Streicher, Andreas Wiese, Renewable Energy: Technology , Economics and Environment, Springer-Verlag Berlin Heidelberg, 2007.
3. German Solar Energy Society (DGS) and Ecofys, Planning and installing bioenergy systems : a guide for installers, architects and engineers, James & James, UK, 2005

COURSE CONTENT

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

3. **Renewable energy from biomass II:** Biomass thermal technology conversion and policy; pyrolysis, gasification and combustion; environmental issues.

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

5. **Renewable energy 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. **Renewable energy 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. **Renewable energy from wind:** Wind turbine design, design-related efficiency, system elements, power control, wind parks (farms), off-grid applications, wind power mathematics, Socioeconomic factors.

8. **Renewable energy from geothermal resources:** Geothermal design, design-related efficiency, system elements, geothermal power mathematics, socioeconomic, environmental and policy factors

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

10. **Fieldwork:** RE plant visits.

11. **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.

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

2. 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

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

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

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

4. **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.

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

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

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

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

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

10. **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

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

12. **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.

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

3. MATERIAL SCIENCE

Lecturing Team	Prof. Ngakan Putu Gede Suardana I Made Widyarta, PhD.
Time	weekly
Duration	150 hours in total
Credit Points	5 CP
Department	Faculty of Engineering, University of Udayana
Location	Sudirman Campus

COURSE DESCRIPTION

Natural Materials is a compulsory subject taught in all Engineering departments, including Mechanical and Electrical Engineering. 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

REFERENCES

1. Ashby, Michael F., Engineering Material; An Introduction to their Properties and Applications, 2002
2. Higgins, Raymond A., Materials for Engineers and Technicians, 2006

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. **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 form.

4. 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.

5. STUDENT PROJECT I INDIVIDUAL RESEARCH

Lecturing Team	Wayan Gede Ariastina, Ph.D
	I Dewa Gede Ary Subagia, Ph.D
Time	weekly
Duration	240 hours in total
Credit Points	8 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 (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.

6. BAHASA INDONESIA

Lecturing Team	Gusti Ayu Made Suartika, PhD.
	Ni Made Swanendri, MT.
	Dr. Yenni Ciawi
Time	weekly
Duration	60 hours in total
Credit Points	2 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%