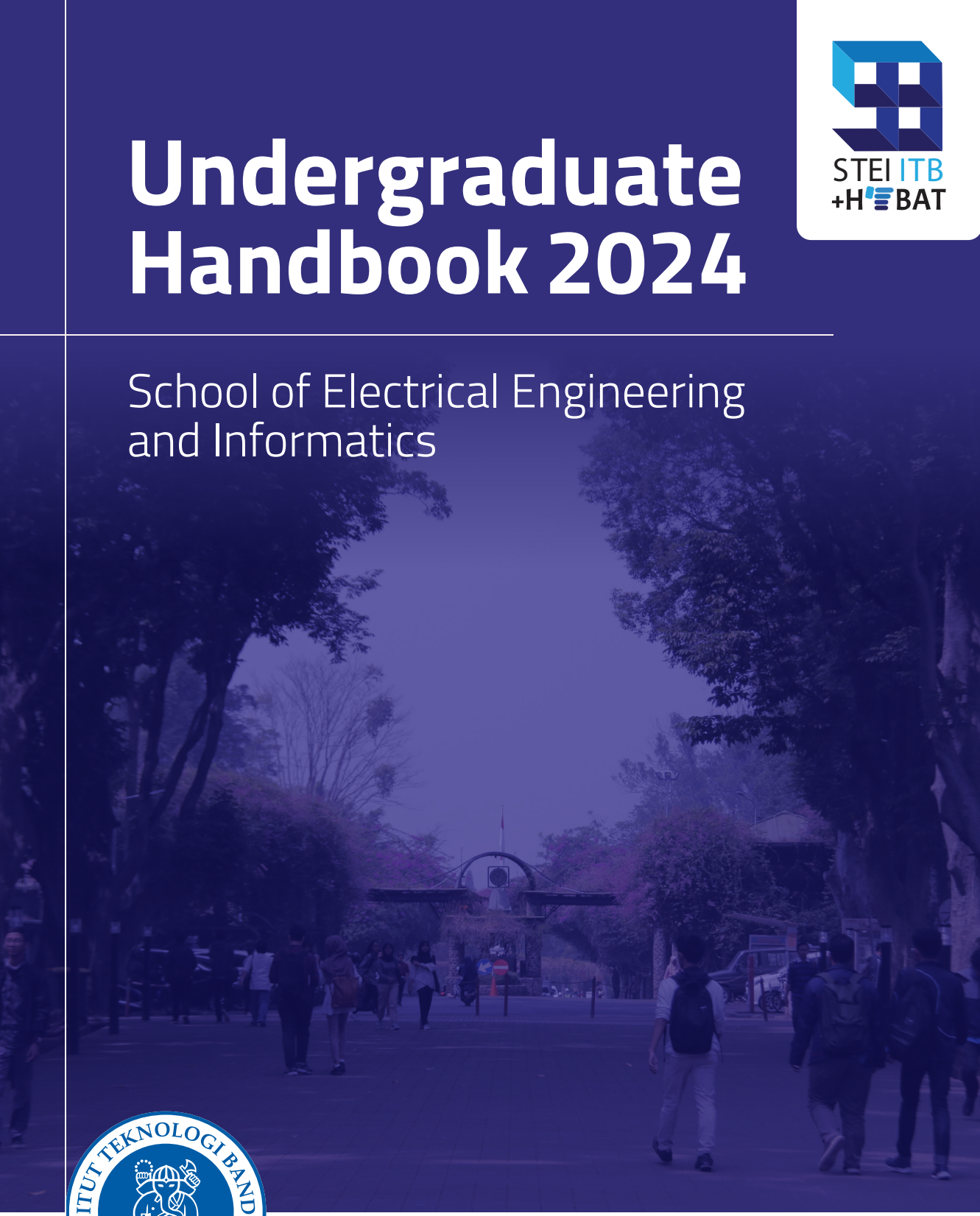
Undergraduate Handbook 2024

School of Electrical Engineering and Informatics



INSTITUT TEKNOLOGI BANDUNG

Undergraduate Handbook 2024

School of Electrical Engineering and Informatics
Institut Teknologi Bandung

Undergraduate Handbook 2024
School of Electrical Engineering and Informatics
Institut Teknologi Bandung

Dean's Office
Achmad Bakrie Building (Labtek VIII)
2nd Floor
(022) 250 2260

Academic Office
Benny Subianto Building (Labtek V)
2nd Floor
(022) 250 8135

Jalan Ganesha 10
Bandung 40132
www.stei.itb.ac.id

Photography: M. Rian Noviansyah
Layout Designer: Ervan Erdiana
Editor: Annida N. S

Established since 2006, School of Electrical Engineering and Informatics has since developed. From a merger of two departments - Electrical Engineering department and Informatics/Computer Science department, SEEI now has six undergraduate programs, two master programs and one doctoral programs, and nine research groups with thriving research projects. This book explains six undergraduate programs of SEEI: curriculum structures, people behind, and details of the programs.


GEDUNG

Dean's Greetings

School of Electrical Engineering and Informatics (SEEI) ITB was established in 2006 as the merger between The Department of Electrical Engineering and The department of Informatics.

The vision of our school is to be an outstanding and competitive higher education in Electrical Engineering and Informatics in Indonesia and well recognized internationally, and has active roles in improvement of national welfare.

To achieve this vision, SEEI puts strong efforts to continuously improve the educational process based on international standard. In this point of view, Electrical Engineering program is the pioneer for enrolling international accreditation conducted by ABET (Accreditation Board on Engineering and Technology). We are proud to announce that Electrical Engineering program, Informatics Undergraduate program, elecommunications Engineering Undergraduate Program, and Electrical Power Engineering Program are ABET accredited.

This undergraduate handbook contains information about vision, mission, undergraduate programs and the 2024 curriculum along with the officers, research groups and laboratories that support the undergraduate programs.

I do hope that this undergraduate handbook will be very useful for students and faculty members as well as for the public. I personally express my gratitude toward all SEEI community.

May Allah bless our efforts!

Dean

Dr. Tutun Juhana, S.T., M.T.

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Vision & Mission
Institut Teknologi Bandung

Vision

ITB shall be an institution of higher education and center of development for science, technology and art, who continuously strives for world excellence, reliability and respectability, and together with other respectable institutions of the nation leads the Indonesian society into unity, sovereignty and prosperity.

Mission

ITB shall guide developments and changes carried out by society through innovative and quality education, research and community service, and be responsive to global development and local challenges.

Goals

To make its vision and mission materialized, ITB sets four interrelated goals:

1. To establish a respected global academic society, who has the expertise and ability to improve its competence globally, and to develop academic value system based on scientific truth.
2. To produce quality graduates who have the ability for self-improvement in the global environment, characterized by high moral quality and integrity, intellectuality, emotional maturity, innovativeness and creativity.
3. To be a research and development university, who takes position in front line of science, technology and art, and plays an active role in the global progress of science and development of knowledge required to improve potential quality and uniqueness of the nation.
4. To be an agent of change for the Indonesian society, through the upholding of moral and ethical values, and quality of community services.

Vision & Mission

School of Electrical Engineering and Informatics

Our Vision

SEEI shall be an outstanding competitive and internationally recognized higher education in Electrical Engineering and Informatics in Indonesia who has active roles in improvement of national welfare.

Our Mission

1. Providing higher education and continuing education in Electrical Engineering and Informatics by using communication and information technology toward creative communities.
2. Maintaining the state-of-the-art-of Electrical Engineering and Informatics through innovative research activities.
3. Disseminating science, technology and knowledge of Electrical Engineering and Informatics through its alumnae, partnership with and through activities of community service program to form knowledgeable and technological society.

School of Electrical Engineering and Informatics is a higher educational institution oriented toward research:

1. To develop and educate graduates who have a high level of integrity, creative, and are able to continuously learn not only to be adaptive in ever changing science and technology but also to apply the knowledge in their profession.
2. To be actively engaged in the development of knowledge in Electrical Engineering and Informatics to support Indonesia's development.
3. To educate graduates so that they can function as the engine of the nation's prosperity.

SEEI Management Team

Dr. Tutun Juhana, S.T., M.T.

School Dean

Dr. techn. Saiful Akbar, S.T., M.T.

Vice Dean of Academic Affairs

Dr. Widyawardana Adiprawita, S.T., M.T.

Vice Dean of Resources Affairs

Chairman of Undergraduate Program

Egi Muhammad Idris Hidayat, S.T, M.Sc., Ph.D.

Electrical Engineering

Dr. Eng. Arwindra Rizqiawan, S.T., M.T.

Electrical Power Engineering

Dr. Ing. Chairunnisa, S.T, M.T.

Telecommunication Engineering

Yudistira Dwi Wardhana Asnar, ST., Ph.D.

Informatics

I Gusti Bagus Baskara Nugraha, S.T., M.T., Ph.D.

Information System and Technology

Donny Danudirdjo, S.T, M.T, Ph.D.

Biomedical Engineering

Electrical Engineering

Academic and Curriculum

- Chair:
- Dr. Muhammad Amin Sulthoni, S.T., M.T.

- Member:

- Ir. Arief Syaichu Rohman, M.Eng.Sc., Ph.D.
- Ir. Mervin Tangguar Hutabarat, M.Sc., Ph.D.
- Arif Sasongko, S.T., M.T., Ph.D.
- Dr. Ary Setijadi Prihatmanto, S.T., M.T.
- Dr. Waskita Adijarto, S.T., M.T.
- Dr. Lenni Yulianti, S.T., M.T.
- Rahmat Mulyawan, S.T., M.T., M.Sc.Dr.

Final Project/Capstone Design

- Chair:
- Ir. Mervin Tangguar Hutabarat, M.Sc., Ph.D.

- Member:

- Muhammad Iqbal Arsyad, S.T., M.T.
- Dr. Kusprasapta Mutijarsa, S.T., M.T.
- Dr. Rahadian Yusuf, S.T., M.T.
- Nana Sutisna, S.T., M.T., Ph.D.
- Anggera Bayuwindra, S.T., M.T., Ph.D.
- Akhmadi Surawijaya, S.T., M.Eng.
- Muhammad Ogin Hasanuddin, S.T., M.T.

MBKM Programs Acceleration

- Nana Sutisna, S.T., M.T. Ph.D. (Chair)
- Dr. Muhammad Amin Sulthoni, S.T., M.T.
- Ir. Arief Syaichu Rohman, M.Eng.Sc., Ph.D.
- Dr. Ary Setijadi Prihatmanto, S.T., M.T.
- Dr. Pranoto Hidaya Rusmin, S.T., M. T.

Lab Courses and Assistant

- Dr. Yusuf Kurniawan, S.T., M.T.

Internship and Co-op

- Elvayandri, S.Si., M.T. (Chair)
- Dr. Reza Darmakusuma, S.T., M.T.

Students

- Dr. Lenni Yulianti, S.T., M.T. (Chair)
- Akhmadi Surawijaya, ST., M.Eng.
- Muhammad Ogin Hasanuddin, S.T., M.T.

Informatics

Academic and Curriculum

- Chair:
- Dr.Techn. Muhammad Zuhri Catur Candra, S.T., M.T
- Member:
- Dessi Puji Lestari, S.T., M.Eng., Ph.D.
- Adi Mulyanto, S.T., M.T.
- Dr. Nur Ulfa Maulidevi, S.T., M.Sc.
- Achmad Imam Kistijantoro, S.T., M.Sc., Ph.D.
- Ir. Windy Gambetta, M.B.A.
- Dr. Ir. Rinaldi, M.T.
- Dicky Prima Satya, S.T., M.T.
- Tricya Esterina Widagdo, S.T., M.Sc.

Final Project/Capstone Design

- Chair:
- Adi Mulyanto, S.T., M.T.
- Member:
- Latifa Dwiyanti, S.T., M.T.
- Dicky Prima Satya, S.T., M.T.
- Robithoh Annur, S.T., M.Eng., Ph.D.
- Nugraha Priya Utama, S.T., M.A., Ph.D.

MBKM Programs Acceleration

- Rizal Dwi Prayogo, S.Si., M.Si., M.Sc. (Chair)
- Fitra Arifiansyah, S.Kom., M.T.

Lab Courses and Assistant

- Anggrahita Bayu Sasmita, M.T. (Chair)
- Dr. Agung Dewandaru, S.T., M.Sc.

Internship and Co-op

- Fitra Arifiansyah, S.Kom., M.T. (Chair)
- Dessi Puji Lestari, S.T., M.Eng., Ph.D.

Students

- Anggrahita Bayu Sasmita, M.T. (Chair)
- Dr. Agung Dewandaru, S.T., M.Sc.

Electrical Power Engineering

Academic and Curriculum

- Chair:
- Pradita Octoviandiningrum Hadi, S.T., M.T., Ph.D.

- Member:
- Dr. Kevin Marojahan Banjar Nahor, S.T., M.T.
- Dr.Eng. Jihad Furqani, S.T., M.T.
- Dr. Fathin Saifur Rahman, S.T., M.T.
- Bryan Denov, S.T., M.T.
- Dr. Arwindra Rizqiawan, S.T., M.T.
- Dr.Eng. Rachmawati, S.T., M.Eng.
- Dr. Umar Khayam, S.T., M.T.
- Dr. Ir. Nanang Hariyanto, M.T.
- Burhanuddin Halimi, S.T., M.T., Ph.D.

Final Project/Capstone Design

- Chair:
- Dr.-Ing. Deny Hamdani, ST., M.Sc.

- Member:
- Dr. Fathin Saifur Rahman, S.T., M.T.
- Rizky Rahmani, S.T., M.T.

MBKM Programs Acceleration

- Pradita Octoviandiningrum Hadi, S.T., M.T., Ph.D. (Chair)
- Dr.Eng. Jihad Furqani, S.T., M.T.
- Bryan Denov, S.T., M.T.

Lab & Courses Assistant

- Bryan Denov, S.T., M.T. (Chair)
- Rizki Rahmani, S.T., M.T.

Internship and Co-op

- Pradita Octoviandiningrum Hadi, S.T., M.T., Ph.D. (Chair)
- Dr.Eng. Jihad Furqani, S.T., M.T.
- Rizki Rahmani, S.T., M.T.

Students

- Dr. Tri Desmana Rachmildha, S.T., M.T. (Chair)
- Dr. Fathin Saifur Rahman, S.T., M.T.

Telecommunication Engineering

Academic and Curriculum

- Chair:
- Dr.-Ing. Chairunnisa, S.T., M.T.
- Member:
- Ir. Hendrawan, M.Sc., Ph.D.
- Effrina Yanti Hamid, S.T., M.T., Ph.D.
- Dr.-Ing. Eueung Mulyana, S.T., M.Sc.
- Dr. Mohammad Sigit Arifianto, S.T., M.Sc.
- Dr. Irma Zakia, S.T., M.Sc.
- Ahmad Izzuddin, S.T., M.T.
- Daniel Wiyogo, S.T., M.T.
- Fadjrianah, S.T., M.T.

Final Project/Capstone Design

- Chair: Dr. Iskandar, S.T., M.T.
- Member:
- Dr. Irma Zakia, S.T., M.Sc.
- Daniel Wiyogo, S.T., M.T.

Students

- Hamonangan Situmorang, S.T., M.T. (Chair)
- Dr. Irma Zakia, S.T., M.Sc.
- Ahmad Izzuddin, S.T., M.T.

MBKM Programs Acceleration

- Ahmad Izzuddin, S.T., M.T. (Chair)
- Hamonangan Situmorang, S.T., M.T.
- Daniel Wiyogo, S.T., M.T.
- Fadjrianah, S.T., M.T.

Lab Courses and Assistant

- Dr.-Ing. Chairunnisa, S.T., M.T. (Chair)
- Daniel Wiyogo, S.T., M.T.
- Fadjrianah, S.T., M.T.

Internship and Co-op

- Chair:
- Effrina Yanti Hamid, S.T., M.T., Ph.D.
- Member:
- Ahmad Izzuddin, S.T., M.T.
- Hamonangan Situmorang, S.T., M.T.
- Fadjrianah, S.T., M.T.

Information System and Technology

Academic and Curriculum

- Chair:
- Dicky Prima Satya, S.T., M.T.

- Member:
- Achmad Imam Kistijantoro, S.T., M.Sc., Ph.D.
- Latifa Dwiyanti, S.T., M.T.
- Dr. Kusprasapta Mutijarsa, S.T., M.T.
- Dr. Fetty Fitriyanti Lubis, S.T., M.T.
- Dr. Fadhil Hidayat, S.Kom., M.T.
- Ir. Windy Gambetta, M.B.A.
- Fitra Arifiansyah, S.Kom., M.T.

Final Project/Capstone Design

- Chair: Dicky Prima Satya, S.T., M.T.

- Member:
- Dr. Fetty Fitriyanti Lubis, S.T., M.T.
- Farrell Yodihartomo, S.T., M.S.Sc.

MBKM Programs Acceleration

- Fitra Arifiansyah, S.Kom., M.T. (Chair)
- Anggrahita Bayu Sasmita, M.T.
- Farrell Yodihartomo, S.T., M.S.Sc.

Lab & Courses Assistant

- Anggrahita Bayu Sasmita, M.T. (Chair)
- Farrell Yodihartomo, S.T., M.S.Sc.

Internship and Co-op

- Dr.tech. Wikan Danar Sunindyo, S.T., M.Sc. (Chair)
- Dr. Fadhil Hidayat, S.Kom., M.T.

Students

- Anggrahita Bayu Sasmita, M.T. (Chair)
- Farrell Yodihartomo, S.T., M.S.Sc.

Biomedical Engineering

Academic and Curriculum

- Chair:
- Astri Handayani, S.T., M.T.
- Member:
- Dr. Widyawardana Adiprawita, S.T., M.T.
- Dr. Agung Wahyu Setiawan, S.T., M.T.
- Isa Anshori, S.T., M.Eng., Ph.D.
- Donny Danudirdjo, S.T., M.T., Ph.D.

Final Project/Capstone Design

- Chair: Astri Handayani, S.T., M.T.
- Member:
- Donny Danudirdjo, S.T., M.T., Ph.D.
- Isa Anshori, S.T., M.Eng., Ph.D.

Students

- Isa Anshori, S.T., M.Eng., Ph.D. (Chair)
- Habibur Muhaimin, S.T., M.Sc.

MBKM Programs Acceleration

- Astri Handayani, S.T., M.T. (Chair)
- Dr. Agung Wahyu Setiawan, S.T., M.T.
- Isa Anshori, S.T., M.Eng., Ph.D.

Lab Courses and Assistant

- Donny Danudirdjo, S.T., M.T., Ph.D.

Internship and Co-op

- Habibur Muhaimin, ST., M.Sc. (Chair)
- Allya Paramita Koesoema, ST., MT., Ph.D.
- Dr. Hasballah Zakaria, ST., M.Sc.

Administration Office

Lilis Teti Nurhayati, A.Md, S.A.P

Head of Office

Dessy Rondang, S.T.

Academic

Indrayadi, S.E.

Finance

Poppy Juhroniah, S.Sos

Human Resources

Aris Triyanto, S.Sn

Infrastructure & Information System

Academic

- Ambarwati Retno W.
- Dede Bagja S.
- Edi Mulyadi
- Lili Sulaeman Yusuf
- Muhammad Mukhlis
- Nina Sulastriah
- M. Rian Noviansyah
- Nurhayati
- Sri Rahayu S
- Sri Wahyuni
- Suranto
- Itsna Hibatullah

Finance

- Aliza Frida Tsaniyah
- Astrid Nurmayangsari
- Mokhamad Gelar Raksagama
- Unnike Cawana B.S.
- Reni Wijayani
- Sofyan Qamaruzzaman
- Rifka Nurul Chasanah

Human Resources

- Lia Juliyanti
- Syafitri Nur Aulia

Infrastructure & Information System

- Abdul Hamid
- Putri Islami
- Ridsan Sambadijaya
- Satrio Adhi P
- Ahmad Ilyasa
- Annida N. S
- Hadiansyah
- Desri Rosana
- Iman Sukirman
- M. Fikri Ramadhan

Advisory Board

Advisory Board in the School of Electrical Engineering and Informatics serves as the School's partners that will provide inputs so that the design and execution of academic programs in the school are of high quality and relevance. In addition, the advisory board facilitates interaction between the school and industry for SEEI development.

Salman Subakat
CEO Paragon Technology and Innovation

Dr. Ir. Arief Yahya, M.Sc.
Minister of Tourism 2014-2019

Emma Sri Martini
Finance Director, Pertamina

Dr. Ir. Hammam Riza, M.Sc.
Chairman of BPPT

Hariyono, ST.
Informatics Alumni Association

Dr. Ir. Herman Darnel Ibrahim, M.Sc.
National Energy Council

Ir. Irawan Purwono
CEO PT Nusantara Compnet Integrator

Ir. Irfan Setiaputra
Director - Garuda Indonesia

Dr. Ir. Ismail, MT.
Director General of Resources and Equipment of Post and Information Technology, Ministry of Communication and Information

Prof. John Choi
Sangmyung University Korea

Eko Prasetyo, ST.,MM.
General Secretary of Electrical Engineering Alumni Association

Ir. Yana Suryana Raharja, MBA
PT UPS

Ir. Yani Panigoro, MM
Commissioner - PT Medco Energy
Chair of MWA ITB

Ir. Zulkifli Zaini, MBA
Director, PLN

M Fajrin Rasyid, ST
Director, Telkomsel

Ir. Adams Yogasara
Manager Executive Director Regional Sulawesi Maluku
Papua & Nusa Tenggara PT. PLN (Persero)

Dr. Ir. Richard Karel Willem Mengko
Lecturer, STEI ITB

Dr. Ir. Suhartono Tjondronegoro
Lecturer, STEI ITB

Research Groups

Biomedical Engineering

Chair: Prof. Andriyan Bayu Suksmono, M.T, Ph.D

Biomedical Engineering is a multidisciplinary field involving various engineering, scientific and technological methods to solve problems in biology and medicine for the improvement of the community healthcare. To study this interdisciplinary field, basic science and engineering are required. This includes basic and advanced electronics and computer, anatomy and physiology, biomedical physics, biomedical transducers and instrumentation, and biomedical system design.

The research areas focus on medical instrumentation, e-health and telemedicine, biomedical imaging and image processing, as well as biomechanics and medical rehabilitation

Selected Research Projects:

1. Test Bed for Integrated electronic medical record system in local hospital.
2. Multimedia medical record implementation in public health facilities.
3. Economical 3-channel Electrocardiogram (EKG) design.
4. Propagation model prediction using Ray-tracing method for High Altitude Platform Station (Haps) channel.
5. e-Health Pilot System development for handling tropical deases.
6. Open HER-based multimedia medical record for traditional/ modern treatment.

Computer Engineering

Chair: Prof. Ir. Emir Mauludi Husni, M.Sc, Ph.D

The computer engineering research areas focus on coding, cryptography and information protection, communication and wireless network, compilers and operating systems, computational science and engineering, computer networks, mobile computing & distributed systems, computer systems (architecture, parallel processing, and dependability), computer vision and robotics, integrated circuits, VLSI design, testing & CAD, signal Image & speech processing.

Selected Research Projects:

1. Core Computer Engineering, Infrastructure & Information Retrieval: 3D Spatial Database System, Set-Top Box for IPTV, Base station for WiMax, HLMA Chipset of DBTV.
2. Advanced e-Learning System & Entertainment: Virtual Class, Virtual Tutor, Virtual Character.
3. Health and Medical: Micro motor Enhancement for Dental Equipment, Brain-Computer Interface, Exoskeleton.
4. Kikaku Art Application as a case study for collaboration oriented interactive art & culture development.
5. Computer Supported Collaborative Work system development for animated movie development process.
6. Development of open source-based creative content technology.
7. eduLife.Com, a Collaborative virtual environment for distance learning education platform.

Control and Computer System

Chair: Prof. Dr. Ir. Bambang Riyanto Trilaksono

The control and computer system research area focus on control system methodology (modeling and identification, robust control, adaptive control, nonlinear control and chaos, stochastic control and estimation, multivariable systems, distributed parameter systems, process optimization and scheduling, anti-windup systems, model predictive control, sliding mode control), embedded control systems (embedded controller, integrating field level, controller and corporate information, wireless, sensor network and network control), robotics (vision-based robot control/visual-servoing, collaborative robot, aerial unmanned vehicle, bipedal robot, humanoid, flying Robot), hybrid and switching control (discrete event control and hybrid systems), control and intelligent systems (genetic algorithm, artificial intelligence and expert systems, fuzzy logic, and neural network)

Selected Research Projects:

1. Game content development as educational and society empowerment of CikapundungNet in Bandung City.
2. A computational intelligence approach for Digital Signal Processing and its application in Software-Defined Radio (SDR) & Active Noise Control (ANC).
3. Dissipative control and linear matrix approach for the design and construction of Networked Control Systems.
4. Hybrid control for three phase induced electrical generator.

Power Engineering

Chair: Prof.Dr.Ir. Suwarno, MT

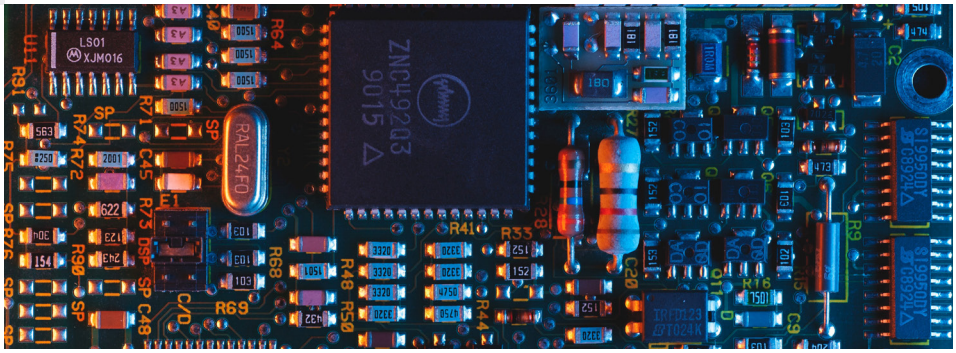
The electrical power engineering research area focuses on generation system (distributed generation and system, bioenergy, power electronics on distributed generation systems), power system (computation, security, power quality, transmission and distribution automation & monitoring system), power delivery (DSM, wide area protection, reactive power management, FACTS, power economic, electrical power business, electrical pricing, undersea cable technology), protection system (material and technology, electromagnetic compatibility, lightning protection technology), power apparatus (instrumentation and measurement, field analysis on power system apparatus, maintenance of high voltage apparatus).

Selected Research Projects:

1. EMPT on minimally reduced power systems.
2. Development of active power filters and boost inverters by using the predictive control to achieve good dynamic response.
3. Partial Discharges in High Voltage Insulations and Their Applications for Diagnosis of High Voltage Equipment.
4. Diagnostics Transformators & Multi Parameter High Voltage Isolator in Tropical Climate.
5. Design & Construction of Low Head PLTM Turbine Prototype.

Electronics

Chair: Prof. Trio Adiono, ST., MT., Ph.D



The electronics research areas focus on Digital IC, Analog IC, IC processing, RF IC, Devices Technology and Embedded System. The research areas cover the electronics system architecture design, System on Chip (SoC), Algorithm optimization for hardware implementation, VLSI Design, Hardware-Software Co-Design and Device Design and Implementation. These research are targeted for various applications such as WiMax, 3GPP LTE, Smart Card, Security Engine, Low Power MIPS/RISC Processor Design, Wireless Sensor Network, Nano wire and sensors. The research utilizes industrial standard Design Tools for Hardware Design and Simulation. Several implementations use standard chip such as FPGA, DSP and Microprocessor. The group also has small scale clean room for developing laboratory experiment devices.

Selected Research Projects:

1. Media Access Control layer development for Broadband Wireless Access.
2. MIMO STC 2x2 Design for Mobile WiMax IEEE 802.16e.
3. Security of PGP (Pretty Good Privacy) application implementation.
4. LTE Baseband Processor Design.
5. Digital TV System on Chip Design.
6. AD/DA Converter Design.
7. Power Amplifier/Low Noise Amplifier Design.

Informatics

Chair: Prof. Ir. Kridanto Surendro, M.Sc., Ph.D.

The informatics research areas focus on search engines, cryptography, multimedia security, integrated messaging engine, knowledge engine, intelligent graphical engine, intelligent agent, natural language processing, text mining, computer vision, distributed computing systems, computer networks, computer networks security, mobile processing, wireless management, next generation networks, information system, data compression, model and simulation, numerical methods.

Selected Research Projects:

1. Prototype System for Search and Markets Competitive Local Products.
2. GPU-based high performance computing.
3. Automatic Summarization for Survey Paper.
4. Intelligent System for Promoting SME Handicraft Development.
5. Spatial Inference Engine.
6. System Monitoring using Embedded Linux.
7. Handwritten Text Recognition based on Spatial Relation.
8. Collaborative System.
9. Governance System.
10. Automatic Scientific Paper Summarization using Rhetorical Doc Profile Representation.
11. Knowledge Management System.
12. Interactivity-based System Design.

Information Technology

Chair: Prof. Dr. Ing. Ir. Suhardi, M.T

The information technology research areas focus on information technology and its application, cloud computing, social networking, digital signal processing, human-machine interface, stochastic system, information theory, intelligent system, IT governance, networking technology, optical communication technology, next generation media and robotic instrumentation.

Selected Research Projects:

1. Cloud computing platform and its applications in health, education and business etc.
2. Quality of service on Cloud, Cloud computing business model.
3. Web-based Multimedia conference system for digital learning of primary education in rural area.
4. Low Cost Thin Client –based multimedia system for language laboratory.
5. e-Farming application development for sustainable food supply planning, monitoring, evaluation and decision support system.
6. Wireless technology and GIS-based Ubiquitous-Farming for improving agricultural products.
7. Rural Information & communication technology-based Smart Village Development.

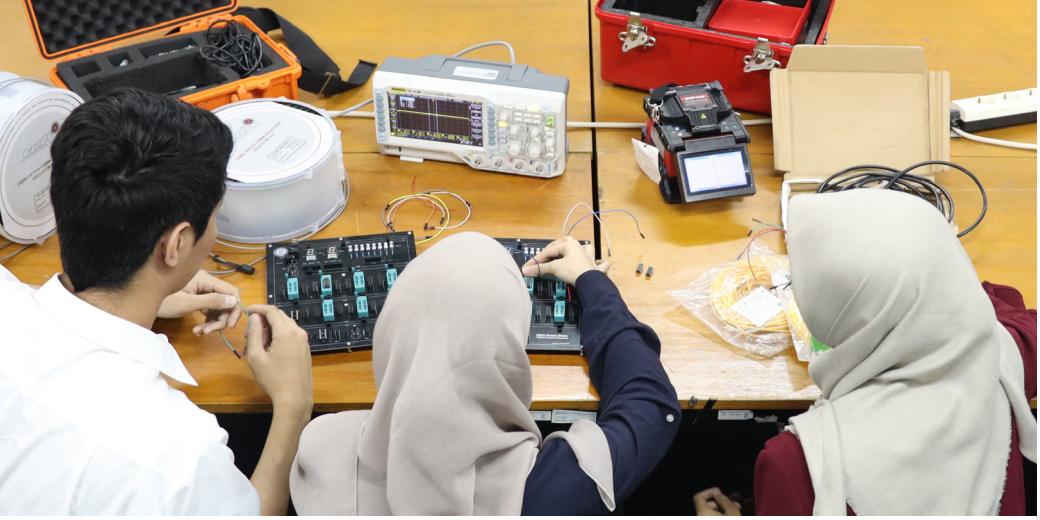
Knowledge and Software Engineering

Prof. Dr. Ir. Nana Rachmana Syambas, M.Eng

The Knowledge and Software Engineering research division focuses on developing new paradigms on software engineering, knowledge discovery and data mining, content management system, mobile application, artifacts & process based software metrics, software project management tools, XML based financial electronic reporting, source code documentation generator, web services, service oriented architecture.

Selected Research Projects:

1. Indonesian regional languages repository development using web semantic technology.
2. Digital Learning technology for rural villages.
3. Disaster Management Information System.
4. Mini Air Traffic Control System (ATCS) for middle class airport.
5. Content-based Direct Access methods on non-alphanumeric database.
6. Integrated Information and Rehabilitation System for Multiple Handicapped Person.
7. Data Mining, Knowledge Extraction on medical data.



Telecommunication Engineering

Chair: Prof. Ir. Hendrawan, M.Sc., Ph.D.

The Telecommunication Engineering Scientific and Research Group (TESRG) research areas focus on

1. Telematics: broadband networking, communication protocols, network security, network management, new wave telecom services.
2. Wireless Communications Technology: cellular 3G, 4G beyond, broadband satellite, HAPs communications systems, Radiowave propagation, Digital communications based on SDR.
3. Networking: IP, optical, and software defined networking (SDN).
4. Radar and Microwave Technology: Radar systems, Surface penetrating radar, antennas and microwave devices.
5. Policy and Regulation in Telecommunications: Telecommunication convergence, Spectrum management, Telecommunications Techno-Economic Analysis.

Selected Research Projects:

1. Highspeed Ground Penetrating Radar, The Development of Algorithm and High Speed processing for SFCW radar signal reconstruction
2. Design and Implementation of SOM Prototype with Dielectric Resonator as a part of Low Noise Block in Satellite TV Receiver
3. Design and Implementation of Fixed Broadband Wireless Access WIMAX Repeater FDD at 3.3 GHz, Context Aware Services
4. Tunable Microwave Radar Absorber, Mobile Portal, Interactive Video over Hybrid DVB Broadcast Network and Unicast 3G Network
5. IP Multimedia Subsystem (IMS), MIMO Long Term Evolution Antennas

Research Centers

ITB-KOREA Cyber Security Research and Development Center

Prof. Dr.-Ing.Ir. Suhardi, MT.

The Indonesian cyber security policy is to protect against the disruption of the operation of information systems for critical infrastructures and, thereby, help to protect the people, economy, and national security of Indonesia. We must act to reduce our vulnerabilities to these threats before they can be exploited to damage the cyber systems supporting our Nation's critical infrastructures and ensure that such disruptions of cyberspace are infrequent, of minimal duration, manageable, and caused the least damage possible.

ITB-Korea Cyber Security Research and Development Center (CSC) was built on grant from the South Korean government as a cooperative effort to support and enhance the capability of Indonesia's cyber security strategy. It is located in ITB-Jatinangor campus and was inaugurated on 27 February 2014 by the Korean Ambassador. CSC will host many activities to support the nation security.

Educating our students, strengthening Indonesian security profession, and increasing awareness of the Indonesian people will be the key to enhancing the human capability.

CSC will host a security master's program and doctoral program. CSC will also coordinate research and development of security technology programs that will ensure the security of information system. Other research activities will focus on information security governance and policy research.

Micro Electronics Center

Ir.Adi Indrayanto, M.Sc,Ph.D.

Vision

"Microelectronics (ME) Center – ITB becomes a center of excellence that drives microelectronics technology development for the basis of Indonesia electronics industry development."

Mission

"Through joining industry, research, and university collaboration, ME Center will develop advance microelectronics sciences, technology, systems, and applications to lower local industry entry barrier to develop a high technology based end product."

http://pme.itb.ac.id

Activities

The research in Micro Electronic (ME) center is focusing on Electronics/Embedded System, Digital and Analog IC Design, Product Design for Manufacturing and Semiconductor Devices Design and Processing such as sensor, transistor etc.

Currently the target application covers 4G Wireless Broadband (WiMax, 3GPP LTE), Digital TV, Wireless Sensor Network, Open Source, Energy Meter, Soft Switch, Internet of Things (IOT), Artificial Intelligent Embeded System, 5G Technology.

The wireless research includes the design of Digital Baseband System on Chip (SoC), Analog to Digital/Digital to Analog Converter, RF, Power Amplifier (PA) and Low Noise Amplifier (LNA), as well as Medium Access Control (MAC) layer design.

The system development utilizes several advanced Industrial CAD Tools and implementation technology such as Applied Specific Integrated Circuits (IC), Field Programmable Gate Array (FPGA), GPU, Multicore DSP, Microcontroller and etc.

The ME Center equips with Advance 3D Printer for fast prototyping, Surface Mount Technology (SMT) machines for small scale productions, Rapid multi-layer PCB Prototyping, Environmental Test Chamber for electronic products, Broadband Wireless Test Instrumentations, Smartphone RF Test Instrumentations, and other Electronics Test Instrumentations.

The ME Center also has responsibility to develop electronics techno-industrial cluster in Indonesia, and helping the Indonesian government in developing the electronics and telematics industrial policies.

Smart City and Community Innovation Center

Prof. Dr. Ir. Suhono Harso Supangkat

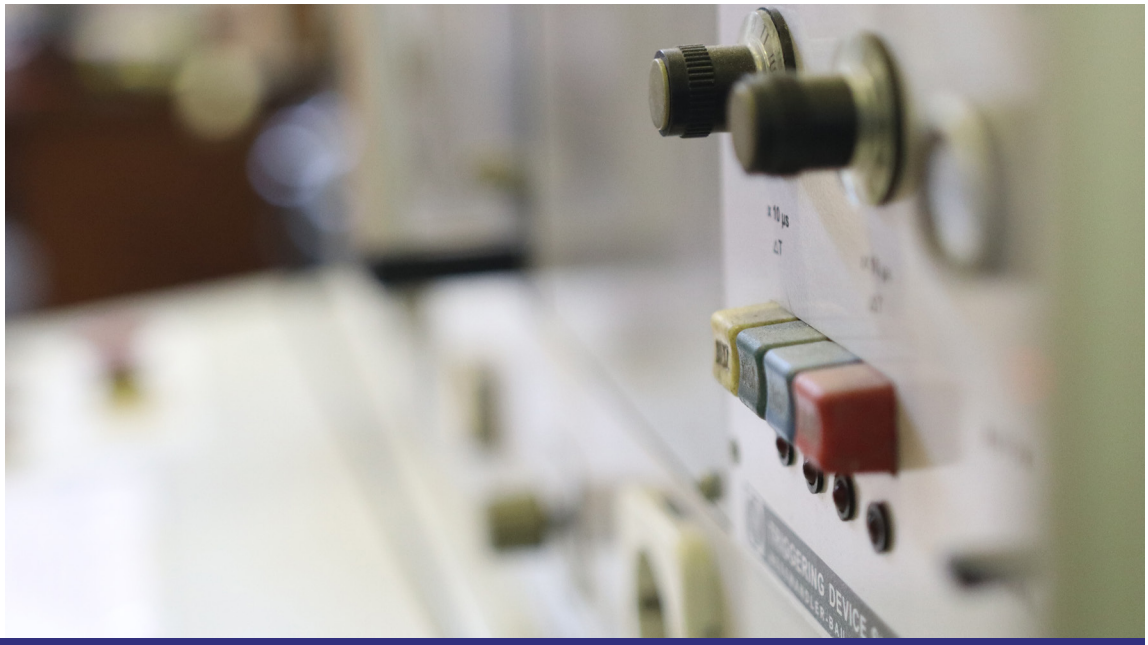
SCCIC is a smart city innovation community that has a vision to develop innovations to create smart cities. The relatively fast population growth in cities raises various typical urban problems, such as a decrease in the quality of public services, reduced availability of residential land, congestion on the highway, difficulties in getting parking space, swelling levels of energy consumption, garbage accumulation, increased crime rates, and problems other social. These problems will continue to grow with increasing population and all these problems cannot be solved quickly and precisely if they still use conventional solutions that are used today.

Therefore, to solve problems and realize the ideals of the city (safe and comfortable) for its residents, intelligent solutions are needed so that problem solving can be done faster than the growth of the problem itself. The smart solution here is through the application and collaboration of urban ecosystems that fall into the Smart City concept. In the concept of smart city solutions, government, industry, academia, and the community are involved to make the city better.

ITB Bukalapak Innovation Center

Dr.Ir. Gusti Ayu Putri Saptawati S. M.Comm.

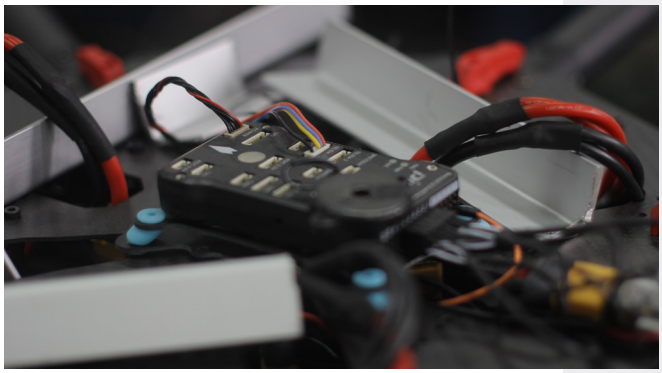
This center is intended for the activities of the Development and Use of ITB - Bukalapak Artificial Research Lab and ITB - Bukalapak Cloud Computing Research Lab. The activity referred to the utilization of research capacity, technology development and educational activities owned by STEI ITB and Artificial & Cloud Computing technology owned by Bukalapak. The main areas of research are: Recommendation Systems, Natural Language Processing, and Computer Vision.



LABORATORIES

Advanced Computing Laboratory

Advanced Computing Laboratorium provides various advanced facilities for all study program in School of Electrical Engineering and Informatics. It provides equipments for Internet of Things, Virtual Reality/Augmented Reality, Drone and High Performance Computing facilities, including GPU processing.



Basic of Electrical Engineering Laboratory

This facility is an educational laboratory particularly for compulsory courses in Electrical Engineering (EE) study program that complies with a quality standard of ABET international accreditation. It supports laboratory works for core EE courses such as Electrical Circuits (EC), Electronics and Digital System (DS), as well as for EE breadth courses such as Digital Signal Processing (DSP) and Microprocessor System (MS).

Each semester the laboratory can handle labortory works for up to 240 students for EC, 380 students for DS, 80 students for DSP and 120 students for MS. In addition, the laboratory also provides services of electronic laboratory work for Industrial Engieering study progam and Embedded System laboratory work as well facilitate students in their final projects.

Basic of Informatics / Computer Science Laboratory

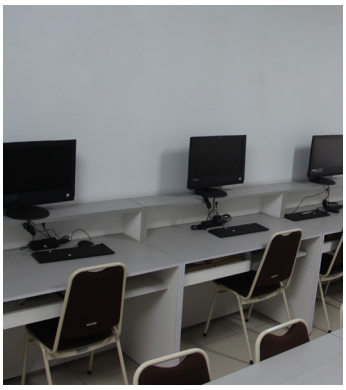
Basic of Informatics/Computer Science Laboratory provides computing services to all students at the School of Electrical Engineering and Informatics (SEEI). It particularly supports laboratory works for basics of programming, algorithm & data structure as well as object-oriented programming courses. This laboratory occupies five rooms, hosting a total of 181 units of networked computers with Internet access. Whenever any of the lab rooms is not used for scheduled laboratory work, SEEI students may use the lab to do their courseworks and access to the Internet.

Biomedical Engineering Laboratory

The Biomedical Engineering Laboratory has strategic position between the disciplines of biomedical instrumentation and biomedical informatics. Research in Biomedical Instrumentation including improved medical imaging construction, fetal sign detectors and systems, Ultrasound hardware and diagnostic software.

Some researchers focus on the application of various technologies for implementing E-health for rural area including mobile telemedicine. There are also research in imaging technology directed toward the application of image processing for diagnostic purpose. Some activities develop softwares for e-health application, including data base for host hospital in the application of medical consultancy.

Computational Science & Engineering Laboratory



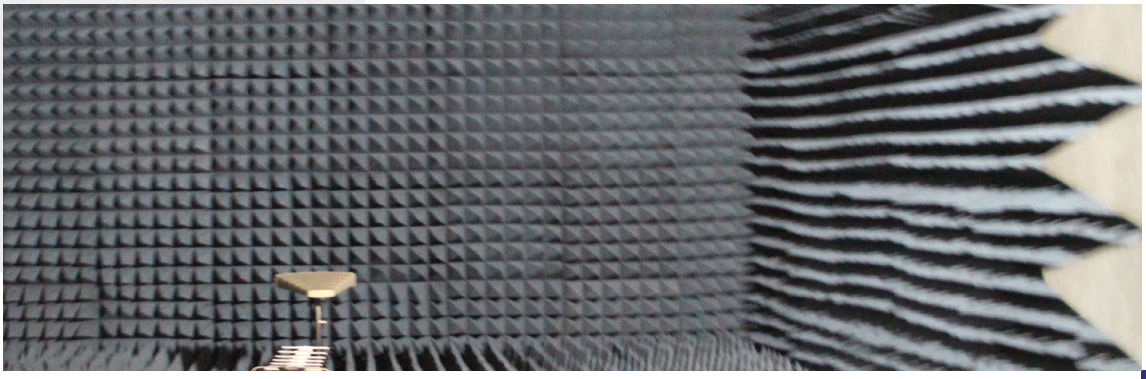
The Laboratory of Computational Science and Engineering is facilitating research related to information retrieval and filtering, search-engine, information extraction, recommender systems, document summarization, text processing, computational linguistics, cryptography, coding theory, compression method, computer simulation, computational theory, design and analysis of algorithms, computational complexity, numerical method, formal language and automata, compiler design.

Computer Engineering Laboratory

This lab support RnD activities in Human-Content Interaction, Internet-of-Things, High Performance Computer & Artificial Intelligence especially in graduate level. The lab also has a role to support academic activities in Capstone Final Project at Electrical Engineering Bachelor and Master Program especially Digital Media & Game Technology & Computer Engineering. It is equipped with state-of-the-art Human Content Interaction such as HMD, AR Hololense, IoT Development System, 3D Printer, and Laser Cutting System and also supported by high performance datacenter.

Computer Systems & Control Laboratory

This laboratory provides support for research on Optimal Control, Robust Control, Adaptive Control, Nonlinear Control and Chaos, Stochastic Control and Estimation, Multivariable Linear Systems, Distributed Parameter Systems, Modelling and Identification, Control and Intelligent Systems, Process Optimization and Scheduling, Discrete Event Control and Hybrid Systems, Computer Architecture, Parallel and Distributed Computation, Complex Adaptive Systems.



Database Laboratory

The laboratory of Database provides support for educational and research activities related to database computing. Its facility includes several platforms of database server machines connected in a network computer for research in the following topics: data warehouse and business intelligence, data mining, web database, temporal database representation and modeling, metadata application & management, distributed database, database processing, and patterns & pattern language of conceptual data models.

Distributed Systems Laboratory

The laboratory of Database provides support for educational and research activities related to database computing. Its facility includes several platforms of database server machines connected in a network computer for research in the following topics: data warehouse and business intelligence, data mining, web database, temporal database representation and modeling, metadata application & management, distributed database, database processing, and patterns & pattern language of conceptual data models.

Electrical Energy Conversion Research Laboratory

Electrical energy conversion research laboratory is a laboratory for research and experiments related to electrical machinery, power electronics, electric drives, power quality, power generation systems, and microgrids. In addition to electrical machines, power converters, and computers for experiments, the laboratory has a facility for mechanical works. The laboratory also has cooperation with many national and international companies and institutions for research on various fields in electrical engineering.

Electronics & Component Laboratory

The laboratory of electronic and component facilitates research on digital radion SoC, analog VLSI circuits and systems, heterogeneous multicore architecture, wireless sensor networks and embedded systems

Graphics & Artificial Intelligence Laboratory

This laboratory focuses on intelligent graphical engine, computer vision, intelligent agent & multiagent systems, natural language processing, text mining, speech processing, expert system, intelligent information system, machine learning, robotics (human computer interaction, vision, and planning).

High Voltage & High Current Laboratory

This lab provides facilities for conducting research on insulation material in tropical environment, lighting physical phenomenon and protection for power and electronic systems, grounding problems, electromagnetic compatibility, maintenance and technologies of electrical equipment, and risk analysis of equipment problems.

Honeywell Control Laboratory Profile

(Electrical Engineering Basic Laboratory 05)

Honeywell Control Laboratory was inaugurated on December 1st, 2016 by the President of Honeywell Indonesia, Allex Pollack, the President of Bandung Institute of Technology (ITB) Prof. Dr. Ir. Kadarsyah Suryadi, and the Dean of School of Electrical Engineering and Informatics (SEEI ITB) Dr. Ir. Jaka Sembiring. This laboratory is intended for students to learn industrial process control and other related fields that support Industry 4.0. Various facility available in this lab are a full set of Mini Refinery Plant (provided by Honeywell) and a Process Instrumentation Trainer that has belonged to Control System and Computer Laboratory since 2010. Both are currently equipped with an Experion Process Knowledge System - a Distributed Control System which employs a C300 controller as its main controller.

Ever since the beginning of its operation, this laboratory has become a residency laboratory for undergraduate students in senior year who are doing their Final Project (Capstone Design) and graduate students who are doing their Thesis research or other research activities related to Cyber-Physical System. Since 2017, there have been 4 graduate students who have published their papers to various international seminar/symposium, 11 undergraduate students who have completed their Capstone Design Final Project, and currently, there are 4 graduate students who are doing research for their thesis in Honeywell Control Laboratory. Common topics for research held in this laboratory are Cyber Security, Sensor and Instrumentation, Virtual Reality, and Advanced Control method for Industrial Process. Besides research activities, there are also laboratory experiment activities for undergraduate students, as a part of the compulsory subject EL3015 Control System. The laboratory experiment is intended to familiarize students with industrial process control. Until April 2019, 5 laboratories experimental period have conducted, with 60-150 students participated in each period. Furthermore, in 2017 and 2018 there has been additional residents in this laboratory, 7 exchange students from GIFU College Japan and KMUTT Thailand. Activities for exchange students included learning and doing research about sensors, instrumentations, and process control.

For future plans, besides all the research and laboratory experiment activities that already proceed, a program to allow general public access to Honeywell Control Laboratory facilities, so more academician and students will be benefited from this laboratory, has already been initiated this year. A training program for young professionals and students from other universities to learn more about Advanced Control Method is being arranged to cover both fundamental concepts and its practical implementation. The program is expected to bring a significant contribution to improving the national quality of human resources in the control system and industrial process field.

Information System Laboratory

Information System Lab (ISL) is an academic and research supporting unit to conduct research in information system area. ISL aims to provide enabling technologies for the emergence of an information society and a digital economy. Research in ISL focuses on data management and information analysis to optimize the systematic implementation of the linked digital world. Core topics include information system development, data analytics, information science, and conceptual modeling. Member of ISL teaches information system development; data, information, and IS management and integration; and business-technology integration.

Power System & Electrical Distribution Laboratory

This laboratory is facilitating research in the area of electrical power system computation, electrical power system delivery (electric distribution planning & management system, AI-based for simultaneous generation and transmission planning, application of FACTS), electrical power system operation and economics (application of game theory and evolutionary computation for power system operation, application of phasor measurement unit for voltage stability & out of phase detection), and SCADA & SMART GRID (adaptive protection for electric distribution, self-healing mechanism).

Programming Laboratory

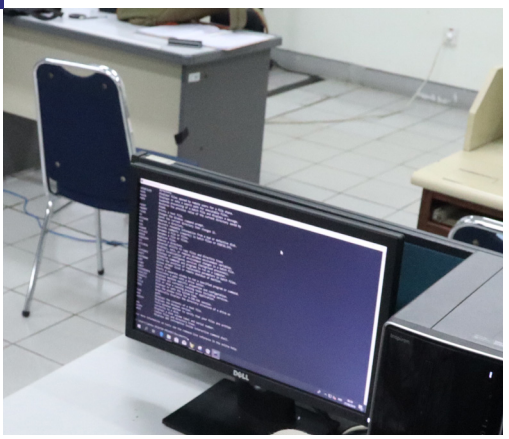
This laboratory mainly provides services to SEEI students to do their Final Project related to the field of programming. It occupies a 60-meter square room and is equipped with computers with various platforms/operating systems. In addition, this lab provides assistance to programming-related courses.

Radio Telecommunications and Microwave Laboratory

The laboratory provides research facilities in the areas related to radio telecommunications, electromagnetics, satellite and terrestrial communications, mobile communications, wireless communications, antennas and wave propagation, microwave devices, signal processing, radar and navigation, as well as telemedicine and e-Health.

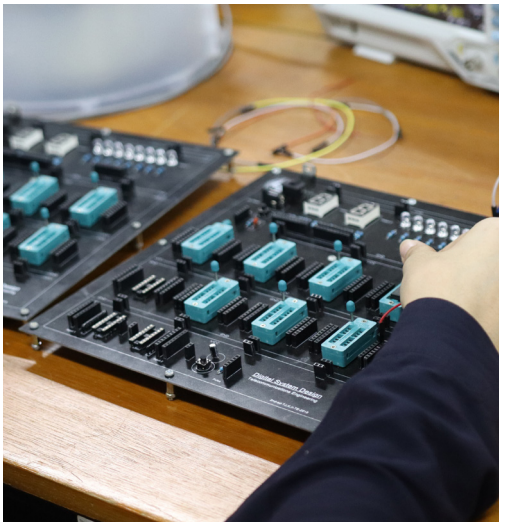
Signal & System Laboratory

This lab supports research on digital signal processing, speech processing, natural language processing and robotics, signal compression, stochastic system, system theory, system analysis and design, optical communication, and information technology



Software Engineering Laboratory

This laboratory supports research activities in the following topics: web enginering including web services, service-oriented architecture, development of mobile applications, enterprise application technologies, and software development techniques and methods. It also supports teaching activities for software engineering and related courses such as fundamental and Advanced Software Engineering, Software Project, and Object-oriented Software Analysis and Design.



Telematics Laboratory

Telematics Laboratory provides research and education facilities in the area of: networking and infrastructure, Internet of Things and smart devices/appliances, telecommunication system and services, performance modeling and analytics, application and bussiness studies, and network security. The laboratory is equipped with various facilities and networking labs, occupying around 1,200-meter square floor.

Curricula And Programs

Curricula of Undergraduate Programs

Undergraduate students must earn at least 144 credits within at most six years of study to be awarded with Bachelor of Science degree. All new SEEI students must take the same prescribed courses during the freshman (first) year (a total of 36 credits). The freshman year courses cover college level mathematics, basic sciences, sports, scientific writing, information technology, programming fundamental as well as introduction to circuit analysis. All freshman year courses must be completed with a minimum GPA of 2.0 and no grade of "E" within two years of study.

The remaining 108 credits can be completed within the next three years without "D" or "E" grade. The curriculum structures for all undergraduate programs at SEEI are as follows:

Subject Classification	Subject					
	EL	IF	EP	ET	II	EB
Freshman year courses	36					
ITB's compulsory courses	16					
Compulsory Courses	57					
Elective	21					
Non Major Elective	6					
Industrial Practice (internship/co-op)	2					
Final Project /Capstone Design	6					
Total Credit Hours	**144**					

Programs: EE=Electrical Engineering, IF=Informatics/Computer Science
EP=Electrical Power Engineering, ET=Telecommunication Engineering
II=Information System & Technology, EB=Biomedical Engineering

The ITB's compulsory courses consist of Religion and Ethics (2 credits) and Pancasila & Civic Education (2 credits) as well as environmental elective (2 credits) and management elective (2 credits). The detail curriculum structures (excluding the freshman year courses) for each study program are described in the corresponding program description chapter.

All undergraduate students are required to take industrial practice in private or government sector for about 10 weeks during the short semester of the third year. The purpose of the training is to provide students with practical technical knowledge and to expose them to working environment in the industry. The curriculum also requires all senior (final year) students to do a research or design project related to their fields of study. This provides students an opportunity to apply the knowledge and skill acquired to solve a significant real world problem. Students must write a formal report and defend it in front of final project examiners.

List of MBKM Placeholder Courses

Source: 2024 SIX ITB Curriculum

Informatics

No	Code	Subject	Credit
1	IF4082	Professional Development/Informatics Community A	2
2	IF4083	Professional Development/Informatics Community B	3
3	IF4084	Professional Development/Information Community C	4
4	IF4085	Special Topic Informatics A	2
5	IF4086	Special Topic Informatics B	3
6	IF4087	Special Topic Informatics C	4
7	IF4088	Interpersonal Ability Development	2

Electrical Engineering

No	Code	Subject	Credit
1	KU3001	Community Service Learning A	1
2	KU3002	Community Service Learning B	2
3	KU3003	Community Service Learning C	3
4	KU3004	Community Service Learning D	4
5	KU3005	Community Service Learning E	5
6	KU3006	Community Service Learning F	6
7	KU3007	Student Entrepreneurship A	1
8	KU3008	Student Entrepreneurship B	2
9	KU3009	Student Entrepreneurship C	3
10	KU3010	Student Entrepreneurship D	4
11	KU3011	Student Entrepreneurship E	5
12	KU3012	Humanitarian Project A	1
13	KU3013	Humanitarian Project B	2
14	KU3014	Humanitarian Project C	3
15	KU3015	Humanitarian Project D	4
16	KU3016	Humanitarian Project E	5
17	KU3017	Humanitarian Project F	6
18	KU3018	Teaching Assistantship in Educational Unit A	1
19	KU3019	Teaching Assistantship in Educational Unit B	2
20	KU3020	Teaching Assistantship in Educational Unit C	3
21	KU3021	Teaching Assistantship in Educational Unit D	4
22	KU3022	Teaching Assistantship in Educational Unit F	5
23	KU3023	Teaching Assistantship in Educational Unit G	6
24	KU3024	Independent Study/Project A	1
25	KU3025	Independent Study/Project B	2
26	KU3026	Independent Study/Project C	3
27	KU3027	Independent Study/Project D	4
28	KU3028	Independent Study/Project F	5
29	KU3029	Independent Study/Project G	6

Electrical Power Engineering

No	Code	Subject	Credit
1	EP4193	Professional Development/Electrical Engineering Community	3
2	EP4078	High Voltage Test	3
3	EP4092	Merdeka Learn Electrical Engineering A	2
4	EP4093	Merdeka to Learn Electrical Engineering B	3
5	EP4094	Merdeka to Learn Electrical Engineering C	4

Telecommunication Engineering

No	Code	Subject	Credit
1	ET4301	Telecommunication Engineering Professional/ Community Development A	1
2	ET4302	Telecommunication Engineering Professional/ Community Development B	2
3	ET4303	Telecommunication Engineering Professional/ Community Development C	3
4	ET4304	Telecommunication Engineering Professional/Community Development D	4
5	ET4305	Telecommunication Engineering Professional/Community Development E	5
6	ET4306	Telecommunication Engineering Professional/Community Development F	6
7	ET4307	Telecommunication Engineering Professional/Community Development G	7

Biomedical Engineering

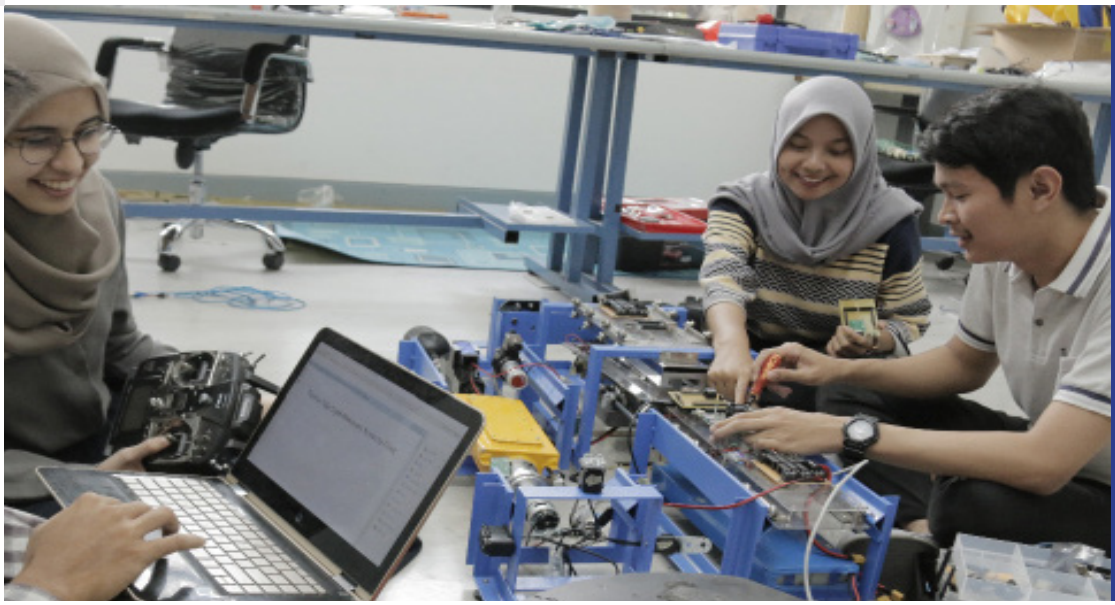
No	Code	Subject	Credit
1	EB4081	Special Topics in Biomedical Engineering A	2
2	EB4082	Special Topics in Biomedical Engineering B	3
3	EB4083	Special Topics in Biomedical Engineering C	4

Information System and Technology

No	Code	Subject	Credit
1	II4071	IST Professional and Community Development A	2
2	II4072	IST Professional and Community Development B	3
3	II4073	IST Professional and Community Development C	4
4	II4074	IST Soft Skills Development	2
5	II4075	IST Innovation and Independent Study	3
6	II4077	IST Entrepreneurial Development	4
7	II4078	IST Field Research	4
8	II4079	IST Spescial Topics A	2
9	II4080	IST Spescial Topics B	3
10	II4081	IST Spescial Topics C	4

To acquire knowledge, one must study; but to acquire wisdom, one must observe.

—Unknown



Electrical Engineering Undergraduate Program

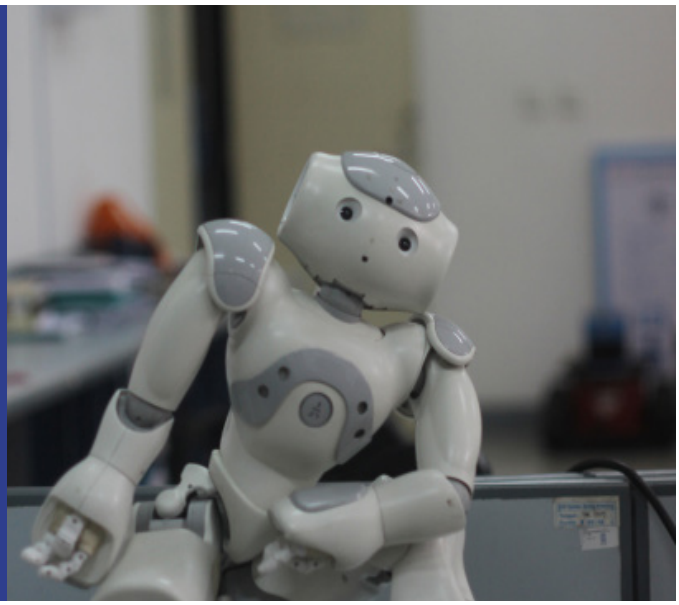
Indonesian Acreditation Board of Engineering Education

Electrical Engineering is among the most significant engineering field which drives the evolution of human civilization in the last centuries. It is expected will continue to be the one in the foreseeable future. A new frontier of human endeavor is opened every moment which are only possible by the technology delivered by electrical engineering.

Electrical engineer undoubtedly become the necessary agent of such transformation by delivering a best engineering practice in every possible aspect i.e. delivering an best practice in maintenance and operation; creating a new product and innovation; pursuing state-of-the-art research etc. The demand for electrical engineer is among the highest in engineering.

The Electrical Engineering Program at SEEI ITB is made up of faculty members who are well respected in their areas of research and education. They engage in research activities encompassing a wide range of areas such as automatic control, biomedical engineering, communications, computer-aided design, machine vision and image processing, computer systems & networking, digital signal processing, electronics, electrical energy, information networking, intelligent systems, parallel and distributed processing, microelectronic materials and devices, microwave engineering and VLSI integrated circuit design.

Program Educational Objectives



1. Our graduates will have successful careers in their professions in Electrical Engineering or related fields.
2. Our graduates will successfully pursue graduate study or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community, especially industry, government, or education sectors.

Student Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. An Ability to learn advance knowledge in engineering field.

Career Prospects

A degree in electrical engineering can qualify you to pursue a job in almost any industry you can think of. After all, nearly everyone uses electricity and electrical devices, so industries demand skilled professionals to build, repair, and improve these devices. Electrical engineers work several key industry sectors such as: Telecommunications, Energy and Electric Power, Computers, Semiconductors, Aerospace, Bio engineering, Manufacturing, Services, Education and Research, Transportation and Automotive.

The following job titles represent only a handful of the choices available:

1. Research engineers work in the lab, testing and inventing. This job requires a high level of creativity on the part of the engineer, as well as a great deal of patience. Whether inventing a new opto-electronic device or simply designing a better electric can opener, research engineers are responsible for the discovery-stage technology behind any new electronic product.
2. Once a new technology is invented, it must be applied. The design engineer uses computer simulations and models to turn innovations like wireless technology into the tiny parts that make up an actual cell phone. Design engineers must visualize how the insides of a future product could look, while inventing several possible scenarios for the applications of new technologies.
3. The project engineer oversees many specialist engineers throughout the construction of a working prototype of a new product or technology. The project engineer must have natural leadership ability, as well as a high proficiency in a variety of electrical engineering disciplines.
4. Test engineers design programs to check the functions of electronic devices and to troubleshoot those devices when things go wrong. They keep technology working properly, and understand which elements to test and in what order. Successful test engineers remain sharp, even after long hours on the job.
5. Power grids, phone lines, and wireless networks all require the skills of a system engineer for proper installation and maintenance. Keen attention to detail is important for graduates who enter this profession. Experienced system engineers rely on their ability to think holistically about the systems they create.
6. Application engineers work with whatever resources are available, adapting existing equipment and technologies to fulfill the needs of their employers. They need to be resourceful, while counting on their deep understanding of the capabilities and the potential modifications of existing equipment.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	MA1101	Mathematics I	4
2	FI1101	General Physics I	3
3	KI1101	General Chemistry I	3
4	WI1101	Pancasila	2
5	WI1102	Computational Thinking	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1112	Basic Chemistry Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	WI2001	Introduction to Engineering and Design	3
2	WI2002	Artificial Intelligence and Data Literacy	2
3	WI2005	Bahasa Indonesia	2
4	MA1201	Mathematics IIA (for Natural Sciences and Engineering)	4
5	BI1011	Biology A	2
6	IF1210	Algorithm and Programming 1	3
7	EL1200	Introduction to Circuit Analysis	2
		Total	**19**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	EL2001	Electric Circuit	4
2	EL2002	Digital System	4
3	EL2003	Discrete Structure	3
4	EL2004	Probability and Statistics	3
5	EL2101	Electric Circuit Laboratory	1
6	EL2102	Digital System Laboratory	1
7	MA2072	Engineering Mathematics IA	3
		Total	**19**

Fourth Semester

No	Code	Subject	Credit
1	EL2005	Electronics I	3
2	EL2006	Electrical Engineering Materials	3
3	EL2007	Signal and System	3
4	EL2008	Problem Solving by Programming	3
5	FI2281	Electromagnetic Physics	3
6	MA2074	Engineering Mathematics IIA	3
7	EL2205	Electronics I Laboratory	1
		Total	**19**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	EL3009	Electronics II	3
2	EL3010	Digital Signal Processing	3
3	EL3011	Computer System Architecture	3
4	EL3012	Microprocessor System	3
5	EL3112	Microprocessor System Laboratory	1
6	WI201X	Religion	2
7	WI2006	Civic Education	2
8	WI2003	Sports	1
		Total	**18**

Sixth Semester

No	Code	Subject	Credit
1	EL3013	Instrumentation System	3
2	EL3014	Professional and Engineering Ethics	2
3	EL3015	Control System	3
4	EL3016	Communication System	3
5	EL3017	Electrical Power System	3
6	WI2021	Industrial Engineering Management	2
7	WI2004	English	2
		Total	**18**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	EL4090	Proposal of Final Project	3
2	EL4092	Industrial Experiences	2
		Total	**5**

Eighth Semester

No	Code	Subject	Credit
1	EL4091	Final Project	3
		Total	**3**

Electrical Engineering Course Descriptions

EL1200. Introduction to Circuit Analysis

Basic concepts, basic laws, methods of analysis, circuit theorems, operational amplifier, capacitors and inductors, first-order circuits, second-order circuits, sinusoidal & phasors, and sinusoidal steady-state analysis.

Prerequisites: FI1101 Elementary Physics IA

EL2001. Electric Circuits

Sinusoidal steady-state analysis, AC power analysis, three-phase circuits, magnetically coupled-circuits, frequency response, Laplace transform and its application to circuit analysis, Fourrier series, Fourrier Transform, two-port networks.

Prerequisites: EL1200 Introduction to Circuit Analysis
Corequisites: EL2101 Electric Circuits Laboratory
Restriction: EB2102 Electric Circuit and Electronics

EL2002. Digital Systems

Fundamentals of digital logic design. Covers combinational, sequential, and complex logic circuits, programmable logic devices, hardware description languages, and computer-aided design (CAD) tools. Laboratory component introduces simulation and synthesis software and hands-on hardware design.

Prerequisites: EL1200 Introduction to Circuit Analysis
Corequisites: EL2102 Digital Systems Laboratory, EL2003 Discrete Structures

EL2003. Discrete Structures

To provide an understanding of discrete mathematics and its application in the field of electrical engineering and computer engineering

Prerequisites: MA1201 Mathematics IIA

EL2004. Probability & Statistics

The concept of probability, random variables and their distributions, combinatorial and geometric elements, conditional probability, Bayes theorem, distribution functions, bivirate random variables, functions of random variables, estimation, hypothesis testing. Applications may be from digital communications, signal processing, automatic control, computer engineering, computer science.

Prerequisites: MA1201 Mathematics IIA
Restriction: EP2091 Probability and Statistic

EL2005. Electronics

Physics, operation, and models of diodes, BJT, MOSFET, and thyristors. Analysis and design of single-stage amplifiers: DC bias, small-signal properties, and frequency responses. Output Stage and Power Amplifier. CMOS logics.

Prerequisites: EL2001 Electric Circuits
Corequisites: EL2205 Electronics Laboratory

EL2006. Electrical Engineering Material

Material Structure, Atomic Structure, Crystal Bonding, Semiconductor material: Silicon wafer, Energy Band Model, Particle Statistics, Density of States (DOS), Carrier Scattering, Carrier Diffusion Process, Continuity equation, P-N Junction Diode, Dielectric Material, Magnetic Material

Prerequisites: KI1101 General Chemistry I

EL2007. Signals & Systems

1) Time-domain analysis of continuous-time signals and systems 2) Frequency-domain analysis of continuous-time signals and systems 3) Laplace-domain analysis of continuous-time signals and systems 4) Case study: filter designs 5) Case study: introduction to linear feedback control system

Corequisites: MA2074 Engineering Mathematics IIA
Restrictions: EP2094 Signal & System

EL2004. Probability & Statistics

The concept of probability, random variables and their distributions, combinatorial and geometric elements, conditional probability, Bayes theorem, distribution functions, bivirate random variables, functions of random variables, estimation, hypothesis testing. Applications may be from digital communications, signal processing, automatic control, computer engineering, computer science.

Prerequisites: MA1201 Mathematics IIA
Restriction: EP2091 Probability and Statistic

EL2005. Electronics

Physics, operation, and models of diodes, BJT, MOSFET, and thyristors. Analysis and design of single-stage amplifiers: DC bias, small-signal properties, and frequency responses. Output Stage and Power Amplifier. CMOS logics.

Prerequisites: EL2001 Electric Circuits
Corequisites: EL2205 Electronics Laboratory

EL2006. Electrical Engineering Material

Material Structure, Atomic Structure, Crystal Bonding, Semiconductor material: Silicon wafer, Energy Band Model, Particle Statistics, Density of States (DOS), Carrier Scattering, Carrier Diffusion Process, Continuity equation, P-N Junction Diode, Dielectric Material, Magnetic Material

Prerequisites: KI1101 General Chemistry I

EL2007. Signals & Systems

1) Time-domain analysis of continuous-time signals and systems 2) Frequency-domain analysis of continuous-time signals and systems 3) Laplace-domain analysis of continuous-time signals and systems 4) Case study: filter designs 5) Case study: introduction to linear feedback control system

Corequisites: MA2074 Engineering Mathematics IIA
Restrictions: EP2094 Signal & System

EL2205. Electronics Laboratory

IV characteristization of the semiconductor devices. Diode circuits. Determination of DC bias. Single transistor amplifiers with BJT and MOSFET. Transistors as switches. Design and implementation of transistor amplifiers on PCB.

Prerequisites: EL2101 Electric Circuits Laboratory
Corequisites: EL2005 Electronics

EL3009. Electronics II

Analysis and design of electronic circuits. Integrated-circuits amplifiers: building blocks, differential and multi stage, feedback, opamp circuits. Filter and tuned amplifiers. Circuits for signal generation, voltage regulation,

Prerequisites: EL2005 Electronics

EL3010. Digital Signal Processing

History and Overview in Digital Signal Processing, Theories and Concepts, Discrete Time Signals and Systems, Analysis of LTI Systems Using z-Transfoms, Frequency Analysis of Signals and Systems, The Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Spectrum analysis, Implementation of Discrete-Time Systems, Design of Digital Filter

Prerequisites: EL2007 Signals & Systems

EL3011. Computer Systems Architecture

This course will learn about trade-off and processor design super scalar and parallelism, Programming and I/O Systems, RISC Core Design, RISC Memory Systems, RISC Benchmarking.

Prerequisites: EL2002 Digital System, EL3011 Computer Systems Architecture

EL3012. Microprocessor Systems

This course covers topics microprocessor systems and the hardware implementation based on 8-bit microprocontroller, analog & digital interfaces, peripherals & parallel/serial communication, and the design project of microprocessor systems

Prerequisites: EL2005 Electronics, EL2008 Problem Solving with Programming
Corequisites: EL3112 Microprocessor Systems Laboratory

EL3013. Instrumentation Systems

This course contains material about the role of instrumentation system in various fields of engineering; the characteristic of system components; the method of measurement, the method of calibration, data processing methods in the measurement. Classification of sensor and transducer: mechanical; thermal; optics; acoustic, LVDT signal conversion, amplification and modulation, analog signal conditioning and digital converter circuit, final controller, mechanical actuator; electric actuator; hydraulic actuator; analog controller circuits; filters, signal recordings, communications, and displays and readings

Prerequisites: EL2005 Electronics

EL3014. Professional and Engineering Ethics

Social Context of Engineering & Technology, Risks and Liabilities of Safety-critical Systems, Professional dan Ethical Conduct, Intellectual Property, Digital Revolution, Information Security

EL3015. Control Systems

The course covers control systems analysis and design for continuous time linier systems. The system's stability or performance are covered. System analysis and design are undertaken in time and frequency domain. Introduction to modern concept of state space and digital control system are also provided in the course.

Prerequisites: EL2007/EP2002 Signal and System

EL3016. Communication Systems

Analog Modulation, Random Signals and Noise, Digital Baseband Pulse Transmission, Digital Bandpass Transmission, Capacity Sharing Technique, Introduction to Channel Coding.

Prerequisites: EL2004 Probability and Statistics, EL2007 Signal and System

EL3017. Electrical Power Systems

This course is an introductory subject in the field of electric power systems and electrical to mechanical energy conversion. The course introduce power electronics and renewable energy.

Prerequisites: EL2001 Electric Circuits

EL3214. Microprocessor System Laboratory

Toolchain, Digital I/O, Analog I/O, Data Communication, Timer, Interupt, FreeRTOS, Internet of Things, Digital Motor Control.

Prerequisites: EL2205 Electronics Laboratory, EL2008 Laboratory of Problem Solving with Programming
Corequisites: EL3012 Microprocessor Systems

EL4001. Computer Systems Architecture II

This course will learn about trade-off and processor design super scalar and parallelism, Programming and I/O Systems, RISC Core Design, RISC Memory Systems, RISC Benchmarking.

Prerequisites: EL2002 Digital System, EL3011 Computer Systems Architecture

EL4002. RF Microelectronics

Introduction to RF and Wireless Technology, Basic Concepts in RF Design, Communication Concepts, Transceiver Architecture, Low Noise Amplifier, Mixers, Passive Devices, Oscillators, Phase Lock Loop, Integer-N Frequency Synthesizers, Fractional-N Synthesizers, Power Amplifier, Transceiver Design Example.

Prerequisites: FI2281 Electromagnetic Physics, EL2007 Signal and System, EL3009 Electronics II

EL4003. Embedded Systems Design

This courses taught about embedded systems, real time systems, real time OS and embedded system design

Prerequisites: EL2002 Digital System, EL3012 Microprocessor System

EL4004. Electrical Drive Systems

Elements of electric drive systems, introduction to solid states devices, introduction to solid state switching circuits, joint speed-torque charactesristics of electric motors and mechanical load, speed-torque characteristics of dc and ac electric motors, speed control of dc motors, speed control of induction motors, braking of dc motors, braking of induction motors, dynamic of electric drive systems

Prerequisites: EL2005 Electronics

EL4005. Parallel Computing & Architecture

This is an introductory course for undergraduate students on the broad subject of parallel computing covers the following: an overview of the field focusing on the convergence of many diverse architectural approaches around the communication architecture; parallel methods generally applicable for parallel computers, with software standards for portable parallel programming. Message Passing Interface (MPI), POSIX threads and OpenMP have been selected as programming models and the application mix of parallel computing is reflected in various examples throughout the course.

Prerequisites: EL2008 Problem Solving by Programming, EL3011 Computer System Architecture

EL4006. Computer Networks

OSI 7 and TCP/IP layer models, Circuit and Packet Switching, Medium Access Control, Error Control Techniques (ARQ), Routing and Dijkstra's Algorithm, flow/congestion control, IEEE 802.11 (WLAN), Bluetooth, Wireless Sensor Network (WSN).

Prerequisite: EL3016 Communication System

EL4007. Digital Image Processing

Introduction, 2D System and matrix review, Image enhancement, Image restoration, Image Segmentation, Image reconstruction from projection, Image compression, Feature extraction, Pattern Recognation.

Prerequisite: EL3010 Digital Signal Processing

EL4011. Analog-Mixed-Signal Electronic Design

Introduction to CMOS Design, CMOS Technology and Devices, MOSFET Operation and Models for Analog Design, Current Mirrors and Amplifiers, Voltage References, Operational Amplifiers, Nonlinear Analog Circuits, Data Converter Fundamentals, Data Converter Architectures, Data Converter Implementation.

Prerequisite: EL3009 Electronics II, EL3010 Digital Signal Processing

EL4012. Analysis & Design of Digital IC

The course includes an introduction to CMOS devices, manufacturing technology, CMOS inverters and gates as well as the understanding of CMOS design parameters and methodology. The course also teaches the student to design and optimize the standard cell of combinatorial and sequential digital circuits

Prerequisite: EL2002 Digital System

EL4013. VLSI Systems Design

This course has an objective to provide student with the capabily in designing Application Specific Integrated Circuits (ASICs). In this course, ASICs implementation is more focus on Semicustom Technology using CMOS Standard Cell. The course covers the introduction of various VLSI Technology Implementation and its design flow.

Prerequisite: EL4012 Analysis and Design of Digital IC

EL4021. Semiconductor Devices

Review on semiconductor material, PN junction, MOS capacitor, MOSFET, Bipolar Transistor, and application specific semiconductor devices

Prerequisite: EL2005 Electronics I, EL2006 Electrical Engineering Materials, FI2281 Electromagnetics Physics

EL4022. IC Technology

Overview of semiconductor materials, devices, and process; crystal growth; silicon oxidation; photolithography and etching; diffusion and ion implantation; thin film deposition; BJT and MOSFET fabrication process; process integration; process simulation; IC manufacturing.

Prerequisite: EL2006 Electrical Engineering Materials

EL4023. Optoelectronics

Light as waves, particles and photons, Fiber optics and dielectric waveguides, Light Emitting Diode, Stimulation Devices: Semiconductor Laser and electro-optic modulator, Photodetectors and image sensors, Solar Cell, Applications.

Prerequisite: EL2006 Electrical Engineering Materials, FI2281 Electromagnetics Physics

EL4031. Multivariable Control Systems

Introduction to Multivariable Control System, State Space Representation of System, Solving The Time-Invariant State Equation, Controllability, Observability, Pole Placement, Design of Multivariable Control System with State Feedback, Observer Design, Multivariable Control System Simulation, Implementation of Multivariable Control System with Observer and State Feedback.

Prerequisite: EL3015 Control System

EL4032. Fundamentals of Intelligent Systems & Controls

Introduction, Machine Learning : Supervised vs Unsupervised, Regression, Classification, Overfitting Phenomenon and Regularization, Artificial Neural Network, Multilayer Perceptron, Deep Neural Networks (Convolutional Neural Networks), Performance evaluation, Artificial Neural Networks for Identification System and Control.

Prerequisite: EL3012 Microprocessor System, EL3015 Control System

EL4033. Robotics

1) Introduction:, 2) Robot Locomotion, 3) kinematics and invers kinematics model, 4) Dynamic Model, 5) Robot Motion Planning : Manipulators and Mobile (wheel and leg), 6) Robot Sensors 7) Robot Control Systems: Design and Implementation

Prerequisite: EL3015 Control System

EL4034. Robotics Project

Introduction, Robot components, Actuator, Robotic Motion Displacement Planning, Manipulator, Kinematics, Sensor and Perception Systems on Robots, Robot Control System, Final Design Project

Prerequisite: EL3012 Microprocessor Systems
Corequisite: EL3015 Control System, EL3013 Instrumentation Systems

EL4041. Network Software Design

Introduction to computer networking and ISO layering architecture, Review of TCP/IP, Unix Programming Model, Sockets, Protocols, Sessions, and State, Transport Layer interface, Library Routines (Berkeley Sockets), Routing, TCP and UDP Sockets, Client Server Programming, Network Security, Network Programming Applications.

Prerequisites: EL2008 Problem Solving by Programming

EL4042. Encryption and Security Techniques

Encryption Techniques, Security in Computing.

EL4043. Quantum Computation and Technology

Quantum Information Processing, Quantum Communication, Quantum Computing.

Prerequisites: MA2072 Engineering Mathematics IA

EL4044. Internet of Things System Design

Real-world IoT systems, System Planning

EL4045. High Performance Computation

High Performance Computing Systems, Parallel and Distributed Systems

EL4060. Professional dan Community Development

Public Communication, Scientific Activity, Professionalism

Prerequisite: Has completed coursework up to Semester 4

EL4061. Elective Topics in Electrical Engineering

Research trend, Technology trend, Electronics manufacturing & industry, Engineering education, Impact of engineering

EL4062. Engineering Innovation and Entrepreneurship

Introduction, Market research, Idea Generation, Brainstorming, Testing Ideas, Get Feedback, Problem and Idea Formulation, Value proposition canvas, Proposal Writing, Review engineering design, Idea refinement: conceptual solutions, B100 Preparation

EL4063. Engineering Business Development

Introduction, Fundamentals of Entrepreneurship, Recognizing Opportunities, Brainstorming Entrepreneurial Cognition, Team Dynamic, Business Model, Practical Thinking and Design, Risk Management and Mitigation, Financial Management, Building an Organization, Business cycles.

Hardrequisite: EL4062 Engineering Innovation and Entrepreneurship

EL4064. Engineering Research

Introduction of the topic, Scientific method, Defining research Question, Literature Studies, Seminars, Re-defining research Question, Building a Hypothesis, Experiment Planning, Presentation, Experimental remediation plan, Writing scientific papers, Publishing scientific papers

EL4065.Independent Engineering Project

Introduction, Project description, targets, and specifications and Project topic presentation, Project implementation planning, Project implementation budget, Project testing success/planning indicators, Project testing and Project Report Preparation, Presentation of implementation planning and budget, Project implementation, Implementation presentation and Improvement plan, Implementation Testing, Final implementation presentation, Writing technical reports, Publication of scientific pa-

EL4071. Multidisciplinary Course A

Tailored to the multidisciplinary course activities

EL4072. Multidisciplinary Course B

Tailored to the multidisciplinary course activities

EL4073. Multidisciplinary Course C

Tailored to the multidisciplinary course activities

EL4074. Multidisciplinary Course D

Tailored to the multidisciplinary course activities

EL4075. Multidisciplinary Course E

Tailored to the multidisciplinary course activities

EL4076. Multidisciplinary Course F

Tailored to the multidisciplinary course activities

EL4077. Multidisciplinary Course G

Tailored to the multidisciplinary course activities

EL4090. Proposal of Final Project

Capstone Design Project, Engineering Design Process, Plagiarism, Safety Induction, Project Management, Communication, Teamwork, Problem Formulation, Solution Generation,System Design

Prerequisite: EL2XXX Second Year Courses, EL3XXX Third Year Courses, WI2001 Introduction to Engineering and Design, MA2072 Engineering Mathematics IA, MA2074

EL4091. Final Project

Komunikasi Publik, Penulisan Karya Ilmiah, Impelementasi Desain, Pengujian dan Verifikasi

Prerequisite: EL4090 Proposal of Final Project

EL4092. Industry Experiences

Industrial Experience Seminar

Prerequisite: Has completed coursework min. 108 credits

EL4093. Industry Internships

For the readiness of students to real-world needs, students can engage directly in engineering related industries in a semester duration. During this activity, students should also take EL4092 Industrial Experience. Each student must have an on-site internship supervisor.

Prerequisite: Has completed coursework min. 108 credits, conducted on a full-time basis

EL4094. Electrical Engineering Independent Study A

Tailored to the independent study activities

EL4095. Electrical Engineering Independent Study B

Tailored to the independent study activities

EL4099. Electrical Engineering Elective Laboratory

Tailored to the corresponding labwork course activities

Informatics/ Computer Science Undergraduate Program

ABET Computing Accreditation Commission

Informatics/Computer Science Program provides education in the area of theoretical foundations of information and computing as well as of practical techniques for their applications in computer systems. Students of Informatics/Computer Science program will also learn a wide range of computer science topics such as algorithm & data structure, theory of computation, programming languages, database & information retrieval, operating system, artificial intelligence, computer visions, computer network, software engineering, computer security & cryptography, machine learning, distributed system, computer graphics & visualization, and other exciting areas.

The program's curriculum is designed to prepare students to enter the rapidly expanding computer field and competitive job markets. Its curriculum development is based on the curricula and courses recommendation by the Institute of Electrical and Electronic Engineer Computer Society and the Association for Computing Machinery.

Program Educational Objectives

1. Our graduates will have successful careers in their profession in informatics or related fields.
2. Our graduates will successfully pursue graduate study or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community, especially in the development of new tools, technologies, and methodologies.

Student Outcomes

The expected program outcomes derived from the Program Educational Objectives are:

1. An ability to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. An ability to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. An ability to communicate effectively in a variety of professional contexts.
4. An ability to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. An ability to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. An ability to apply computer science theory and software development fundamentals to produce computing-based solutions.

Career Prospects

Jobs for Informatics/Computer Science graduates generally fall into three paths:

1. Designing and constructing software, referring to software development job such as web-based application development, mobile application, security issues, interface design, and so on. A career path in this area represents the majority jobs of Informatics/Computer Science graduates. Many large or small software companies, large or small computer services companies, and large organizations of any sector such as in government, industry banking, education, healthcare, etc. offer career in this path.
2. Devising new and better ways to use computers, which refers to improvement and innovation in the application of computer technology. This career path can involve advanced graduate work, followed by a position in a research university or industrial research and development laboratory. It can involve entrepreneurial activity such as establishing new high tech start-up company.
3. Developing effective ways to solve computing problems. This path refers to the development of theory and algorithms to ensure the best possible solutions for computationally intensive problems such as searching information from billions of web documents, processing simultaneous millions of query, providing new approaches to security problems, etc. This career path typically requires graduate work to the doctoral level, followed by a position in a research university or an industrial research and development laboratory.

Several examples of job titles include the following:

1. Software Engineer, to develop software for various needs.
2. System Analyst & System Integrator, to perform system analysis in an organization or company and to provide computer software-based integrated solutions.
3. IT Consultant, to plan and evaluate IT in an organization.
4. Database Engineer/Database Administrator, to plan and maintain database (including data warehouse) in an organization.
5. Web Engineer/Web Administrator, to plan, develop, and maintain a Website and its services.
6. Computer Network/Data Communication Engineer, to design a computer network architecture, including its maintenance and management in a company or organization.
7. Programmer, either as a system programmer or application developer, this position has a high demand in various sectors.
8. Software Tester, to evaluate and make sure that software runs properly according to the specified specifications.
9. Game Developer, an Informatics/Computer Science graduate is also prepared to develop multimedia game softwares.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	WI1102	Computational Thinking	2
2	MA1101	Mathematics I	4
3	FI1101	General Physics I	3
4	KI1101	General Chemistry I	3
5	WI1101	Pancasila	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1116	Computer Interaction Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	WI2002	Artificial Intelligence and Data Literacy	2
2	IF1220	Discrete Mathematics	3
3	IF1221	Computational Logic	2
4	IF1230	Computer Organization and Architecture	3
5	WI2001	Introduction to Engineering and Design	3
6	WI2005	Indonesian Language	2
7	IF1210	Algorithm and Programming 1	3
		Total	**18**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	IF2110	Algorithm and Programming 2	3
2	IF2120	Probability and Statistics	3
3	IF2123	Geometric and Linear Algebra	3
4	IF2130	Operating System	3
5	IF2150	Software Engineering	4
6	WI2003	Sports	1
7	IF2180	Sosio-informatics and Professionalism	2
		Total	**19**

Fourth Semester

No	Code	Subject	Credit
1	IF2010	Object-Oriented Programming	3
2	IF2211	Algorithm Strategy	3
3	IF2224	Formal Language Theory and Automata	4
4	IF2230	Computer Network	3
5	IF2240	Database	3
6	WI2022	Project Management	2
		Total	**18**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	IF3110	Web Application Development	3
2	IF3130	Parallel and Distributed Systems	3
3	IF3140	Database System	3
4	IF3141	Information System	3
5	IF3151	Human-Computer Interaction	3
6	IF3170	Artificial Intelligence	4
		Total	**19**

Sixth Semester

No	Code	Subject	Credit
1	IF3210	Mobile Application Development	2
2	IF3250	Software Project	4
3	IF3270	Machine Learning	3
4	WI2004	English	2
5	IF3211	Domain-Specific Computation	2
		Total	**13**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	WI201X	Religion	2
2	WI2006	Civic Education	2
3	IF4090	Industrial Internship	2
4	IF4091	Project Proposal	**2**
		Total	**8**

Eighth Semester

No	Code	Subject	Credit
1	IF4092	Final Project	4
		Total	**4**

Informatics/Computer Science Course Descriptions

IF1210 Algorithm and Programming 1

This course offers the Basic Analysis Fundamental, Data Structures and Algorithms, Algorithmic Thinking and Problem Solving, Programming, Algorithms, Basic Type Systems, Working with various types of data, Algorithms and Design, Fundamental Programming Concepts, Fundamental Data Structures.

IF1220 Discrete Mathematics

Sets, relations and functions, proof techniques, number theory, combinatoric, graphs, trees, and algorithm complexity.

IF1221 Computational Logic

This course will learn about Basic Logic, Proof Techniques, Basic Knowledge Representation and Reasoning

IF1230 Computer Organization and Architecture

This course will learn about Machine Level Representation of Data, Assembly Level Machine Organization, Memory System Organization and Architecture, Interfacing and Communication, Functional Organization, Performance Enchancements, Threats and Attacks, Computational Paradigms.

IF2110 Algorithm and Programming 2

Fundamental Data Structures and Algorithms, Basic Complexity, Algorithmic Thinking and Problem Solving, Programming, Algorithms, Data structures, Functional Programming, Working with various types of data, Algorithms and Design, Fundamental Programming Concepts, Fundamental Data Structures

IF2120 Probability and Statistics

This course offers Discrete Probability, and Statistics.

IF2123 Linear Algebra and Geometry

This course will learn about Linear algebra, and Geometry Algebra.

IF2130 Operating Systems

This course offers the concepts of Concurrency and Parallelism, Multiprocessing and Alternative Architectures, Threats and Attacks, Platform Security, Overview of Operating Systems, Operating System Principles, Concurrency, Scheduling and Dispatch, Memory Management, Security and Protection, Virtual Machines, Device Management, File Systems, Cross-Layer Communications, Resource Allocation and Scheduling, Virtualization and Isolation.

IF2150 Software Engineering

Construction technologies, Construction tools, Modeling foundations, Types of models Requirements fundamentals, Eliciting requirements, Requirements specification and documentation, Requirements validation, Design concepts, Design strategies, Architectural design, Detailed design, Design evaluation, V&V terminology and foundations, Testing ,Process concepts, Software configuration management, Type of Process – Waterfall, Iterative, Scrum, Agile, Professional Ethics.

IF2050 Introduction to Software Engineering

This course discusses Software Construction, Construction tools, Modeling foundations, Requirements fundamentals, Eliciting requirements, Requirements specification and documentation, Requirements validation, Design concepts, Design strategies, Architectural design, Detailed design, V&V terminology and foundations, Testing, Process concepts, Type of Process – Waterfall, Iterative, Scrum, Agile, and Professional Ethics.

IF2180 Socio-informatics and Professionalism

Social Context, Analytical Tools, Professional Ethics, Intellectual Property, Privacy and Civil Liberties, Professional Communication, Sustainability, History, Economies of Computing, Security Policies, Laws and Computer Crimes, Group dynamics and psychology, Teamwork.

IF2010 Object-Oriented Programming

Fundamental Data Structures and Algorithms, Algorithmic Thinking and Problem Solving, Programming, Algorithms, Data structures, Object-Oriented Programming, Defensive Programming, Working with various types of data, Fundamental Data Structures, Development Methods

IF2211 Algorithm Strategies

This course discusses database systems in general, including database system architecture, data modeling, design of relational database schema, querying and management of data.

Prerequisites: IF2130 Computer Organization and Architecture, IF2121 Computational Logic, IF2120 Discrete Mathematics

IF2224 Formal Language Theory and Automata

This course provides an understanding of Basic Automata, Compilers and interpreters.

Prerequisites: IF2110 Algorithm and Programming 2, IF2120 Discrete Mathematics

IF2230 Computer Network

This course teaches basic principles of Threats and Attacks, Network Security, Cryptography - Asymmetric, Symmetric Cryptography, HMAC, PKI, Web Security, Introduction, Networked Applications, Reliable Data Delivery, Routing And Forwarding, Local Area Networks, Resource Allocation, Mobility, State and State Machines

Prerequisites: IF2130 Operating System

IF2240 Basis Data

Information Management Concepts, Database Systems, Data Modeling, Relational Databases, Query Languages.

Prerequisites: IF1221 Computational Logic

IF2040 Database Modeling

This course discusses about Information Management Concepts, Database Systems, Data Modeling, Relational Databases, Query Languages.

WI4003 Management

This course provides explanation, comprehension, and knowledge about Software Project Management, Software Construction, Construction technologies, Construction tools, Project planning and tracking, Software quality concepts and culture, Process assurance, Product assurance, Professional Ethics, Communications skills (specific to SE)

Prerequisites: IF2150 Software Engineering

IF3110 Web Application Development

This course provides knowledge and understanding about Web Security, Parallel Performance, Cloud Computing, Data privacy, Data security, Web Platforms.

Prerequisites: IF2230 Computer Network, IF2010 Object-Oriented Programming

IF3130 Parallel and Distributed Systems

This course discusses the Concurrency and Parallelism, Fault Tolerance, Parallelism Fundamentals, Parallel Decomposition, Communication and Coordination, Parallel Algorithms, Analysis, and Programming, Parallel Architecture, Parallel Performance, Distributed Systems, Parallel computing frameworks, Parallelism, Reliability through Redundancy.

Prerequisites: IF2230 Computer Network

IF3140 Database System

This course discusses about Database Systems, Transaction Processing, Distributed Databases, Physical Database Design, Data Mining, Data acquisition, Information extraction, Working with various types of data, Data integration, Data transformation, Data security.

Prerequisites: IF2240 Database

IF3141 Information System

This course explains various platform of computing. Information Management Concepts, Data, Information, and Knowledge, Construction technologies, Construction tools, Analysis fundamentals, Requirements fundamentals, Eliciting requirements, Requirements specification and documentation, Human-computer interaction design, Detailed design, Reviews and static analysis, Problem analysis and reporting, Professional Ethics, Security Policies, Laws and Computer Crimes, Communications skills (specific to SE).

Prerequisites: IF2240 Database, IF2230 Computer Network, WI4003 Manajement.

IF3151 Human-Computer Interaction

This course explains about Data acquisition, Foundations, Designing Interaction, Programming Interactive Systems, User-Centered Design & Testing, New Interactive Technologies, Collaboration & Communication, Human Factors & Security, and Human-computer interaction design.

Prerequisites: IF2150 Software Engineering.

IF3170 Artificial Intelligence

This course gives an overview of the Data acquisition, Information extraction, Working with various types of data, Data integration, Data reduction and compression, Data transformation, Data cleaning, Fundamental Issues, Basic Search Strategies, Basic Knowledge Representation and Reasoning, Basic Machine Learning, Advanced Search, Advanced Representation and Reasoning, Reasoning Under Uncertainty, Advanced Machine Learning, Proximity measurement, Classification and regression, General, Supervised learning, Unsupervised learning

Prerequisites: IF1221 Computational Logic, IF2120 Probability and Statistics, IF2211 Algorithm Strategy, IF2224 Formal Language Theory and Automata.

IF3070 Foundations of Artificial Intelligence

Fundamental Issues, Basic Search Strategies, Basic Knowledge Representation and Reasoning, Basic Machine Learning, Advanced Search, Advanced Representation and Reasoning, Reasoning Under Uncertainty, Proximity measurement, Classification and regression, General, Supervised learning, Unsupervised learning

Prerequisites: WI1102 Computational Thinking, WI2002 Artificial Intelligence and Data Literacy

IF3210 Mobile Application Development

This course discusses broad introduction to Mobile Platform Security, Mobility, Introduction, Mobile Platforms, Construction technologies, Construction tools, Architectural design, Human-computer interaction design, Detailed design.

Prerequisites: IF3110 Web Application Development.

IF3211 Domain-Specific Computation

This course discusses the Introduction to Modeling and Simulation, Modeling and Simulation, Numerical Analysis, Basic Machine Learning, General.

IF3250 Software Project

This course discusses about Software Construction, Software Evolution, Construction technologies, Construction tools, Eliciting requirements, Requirements specification and documentation, Requirements validation, Design strategies, Architectural design, Reviews and static analysis, Testing, Problem analysis and reporting, Process implementation, Project planning and tracking, Software configuration management, Evolution processes and activities, Process assurance, Product assurance,Communications skills (specific to SE).

Prerequisites: IF3151 Human-Computer Interaction, WI4003 Management.

IF3270 Machine Learning

Basic Machine Learning, Advanced Machine Learning, Proximity measurement, Data preparation, Cluster analysis, Classification and regression, General, Supervised learning, Unsupervised learning, Mixed methods, Deep learning.

Prerequisites: IF2123 Geometric and Linear Algebra, IF3170 Artificial Intelligence.

IF4090 Industrial Internship

Professional Ethics, Intellectual Property, Professional Communication, Teamwork.

Prerequisites: IF2180 Sosio-informatics and Professionalism

IF4091 Project Proposal

Professional Ethics, Intellectual Property, Professional Communication, Communications skills (specific to SE).

IF4092 Final Project

Professional Ethics, Intellectual Property, Professional Communication, Communications skills (specific to SE)

Prerequisites: IF4091 Project Proposal

IF4040. Advanced Data Modelling (Credit 3)

This course provides insight and knowledge on advance data modeling, such as including time or space aspect to the data model, the use of rules to deduce new facts from the database, and data modeling using non-relational approach.

Prerequisites: IF2240 Database

IF4010 Graphical Processing Unit Programming

Concurrency and Parallelism, Multiprocessing and Alternative Architectures, Parallel computing frameworks, Computational Paradigms, Parallelism.

IF4020 Cryptography

Cryptography - Asymmetric, Symmetric Cryptography, HMAC, PKI.

IF4021 Modeling and Simulation

Introduction to Modeling and Simulation, Modeling and Simulation, Discrete Probability.

IF4031 Distributed Application Architecture

System Performance Evaluation, Cloud Computing, Problems of scale, Big data computing architectures, Distributed data storage, Architectural design.

IF4033 Cyber Security

Foundational Concepts in Security, Threats and Attacks, Network Security, Cryptography - Asymmetric, Symmetric, Cryptography, HMAC, PKI, Security Policy and Governance, Security Control – Access Control, Organization Control, Processs, Risk Management, Incident Response – Pre-, During-, and Post Incident.

IF4040 Advanced Data Modeling

This course explains various advances in Data Modeling, Data Modeling, NoSQL System, Semi-structured and Unstructured Database.

IF4041 Data Mining

This course explains various advances in Data acquisition, Information extraction, Working with various types of data, Data integration, Data reduction and compression, Data transformation, Data cleaning, Proximity measurement, Data preparation, Information extraction, Cluster analysis, Classification and regression, Pattern mining, Outlier detection, Time series data, Mining web data, Information retrieval.

IF4042 Information Retrieval System

This course provides students with Information retrieval.

IF4044 Big Data Technology

This course explains various advances in Problems of scale, Big data computing architectures, Distributed data storage, Techniques for Big Data applications, Software support for Big Data applications, Parallel Computing Frameworks, Complexity Theory, Natural Language Processing.

IF4050 Advances in Software Engineering

This course explains various advances in Principles of Secure Design, Software Evolution, Construction technologies, Software Engineering Advances, Software Engineering Research, Eliciting requirements, Design strategies, Architectural design, Reviews and static analysis, Testing, Evolution processes and activities, Process assurance, Product assurance.

IF4051 IoT System Development

Reliable Data Delivery, Routing And Forwarding, Industrial Platforms.

IF4052 Service Computing

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IF4060 Interaction Engineering

Fundamental Concepts, Visualization,Designing Interaction, User-Centered Design & Testing, New Interactive Technologies, Human Factors & Security, Design-Oriented HCI.

IF4061 Data Visualization

The course describes the basic theory, algorithm, and architecture of speech processing, including speech recognition and synthesis.

IF4062 Computer Graphics

The course describes the basic theory of Geometry Algebra, Fundamental Concepts, Basic Rendering, Geometric Modeling, Advanced Rendering, Computer Animation.

IF4070 Knowledge Representation and Reasoning

Advanced Representation and Reasonin.

IF4071 Speech Processing

This course discus about Perception and Computer Vision, and Speech Processing.

IF4073 Digital Image Processing

This course discus about Perception and Computer Vision, Image Processing.

IF4082 Profession and Community Development in Informatics A

Professional Ethics, Professional Communication.

IF4083 Profession and Community Development in Informatics B

Professional Ethics and Professional Communication.

IF4084 Profession and Community Development in Informatics C

Professional Ethics and Professional Communication.

IF4085 Special Topics in Informatics A

Professional Ethics and Professional Communication.

IF4086 Special Topics in Informatics B

Professional Ethics and Professional Communication.

IF4087 Special Topics in Informatics C

Professional Ethics and Professional Communication.

IF4088 Interpersonal Skills Development

Professional Ethics and Professional Communication.

Indonesian Acreditation Board of Engineering Education

Electrical Power Engineering Undergraduate Program

The Electrical Power Engineering Program provides education on the area of electrical energy generation, delivery, and its application.
Within the program, students will gain the knowledge of electrical power engineering principles along with the required supporting knowledge of mathematics, science, computing, and engineering fundamentals. The students will also develop their abilities to formulate, analyze, and solve complex problem as well as to design a product or system based on real problems, especially in the field of electrical power engineering. Therefore, they will have sufficient breadth-and-depth knowledge for successful subsequent graduate and post-graduate study, or other lifelong learning opportunities.

The program also facilitates active roles in developing electrical power engineering and other related industries. It also embraces the broad spectrum of issues arising in professional world, including teamwork, leadership, safety, ethics, service, economy, environmental awareness, and professional organization.

Program Educational Objectives

Program Educational Objectives of the EPE Program are as following:

1. Our graduates will have successful careers in their profession in the field of electrical power engineering or related fields.
2. Our graduates will successfully pursue graduate study or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community.

Student Outcomes

1. Ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Ability to apply engineering design to produce solutions that meet specific needs by considering public health, safety and welfare factors, as well as global, cultural, social, environmental and economic factors.
3. Ability to communicate effectively in a variety of situations.
4. Ability to recognize professional and ethical responsibilities in engineering situations and make judgments based on available information, which must consider the impact of engineering solutions in global, economic, environmental and social contexts.
5. Ability to work effectively in teams whose members share leadership values, create a collaborative and inclusive environment, set goals, plan tasks, and achieve goals.
6. Ability to develop and conduct appropriate experiments, analyze and interpret data, and make engineering judgments to draw conclusions.
7. Ability to acquire and apply new knowledge as needed by using appropriate learning strategies.

Career Prospects

The graduates of Electrical Power Engineering Study Program will have opportunities to develop their professional careers as power system planning engineers, power generation and power system operation and maintenance engineers, electricity utility managements, design engineers, marketing engineers, power engineering and related fields researchers or power engineering educators and trainers in various institutions and companies.

These institutions/companies include: Electricity utility (PT PLN (Persero) and overseas electricity utilities), power generation companies, power transmission companies, power distribution and retail companies, electricity market authority (government body), industries having electricity network such as: government own and private petroleum and mining industries, manufacture industries, electrical equipment industries, appliances industries, consultancy services, power contractors, research and development institutions, higher education institutions and training providers, other related industries and institutions.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	MA1101	Mathematics I	4
2	FI1101	General Physics I	3
3	KI1101	General Chemistry I	3
4	WI1101	Pancasila	2
5	WI1102	Computational Thinking	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1112	Basic Chemistry Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	WI2001	Introduction to Engineering and Design	3
2	WI2002	Artificial Intelligence and Data Literacy	2
3	WI2005	Indonesian Language	2
4	WI2003	Sports	1
5	MA1201	Mathematics IIA (for Natural Sciences and Engineering)	4
6	EL1200	Introduction to Circuit Analysis	2
7	EP1209	Basics of Programming	2
8	BI1011	Biology A	2
		Total	**18**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	WI2004	English	2
2	MA2072	Engineering Mathematics IA	3
3	EL2001	Electric Circuit	4
4	EL2101	Electric Circuit Laboratory	1
5	EP2001	Probability and Statistics	3
6	EL2150	Digital System dan Microprocessor	3
7	MS2060	Thermal Engineering	2
		Total	**18**

Fourth Semester

No	Code	Subject	Credit
1	WI201X	Religion	2
2	WI2006	Civic Education	2
3	MA2074	Engineering Mathematics IIA	3
4	EP2002	Signal & System	3
5	EP2003	Electromagnetics	3
6	EP2004	Measurement System	3
7	EP2005	Computation and Numerical Analysis	3
8	EP2201	Power Engineering Laboratory I	1
		Total	**20**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	EP3001	Electric Machines	3
2	EP3002	Power System Analysis	3
3	EP3003	Electrical Engineering Material	2
4	EP3101	Power Engineering Laboratory II	2
5	EL3015	Control System	3
6	TI3004	Engineering Economics	2
7	WI2022	Project Management	2
		Total	**17**

Sixth Semester

No	Code	Subject	Credit
1	EP3004	Power Electronics	3
2	EP3005	High Voltage Technology	3
3	EP3006	Power System Protection	3
4	EP3007	Electric Power Plant	3
5	EP3008	Smart Energy Systems	2
6	EP3009	Utilization of Electrical Energy	2
7	EP3201	Power Engineering Laboratory III	2
		Total	**18**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	EP4001	Industrial Internship	2
2	EP4002	Design Project Proposal and Seminars	2
		Total	**4**

Eighth Semester

No	Code	Subject	Credit
1	EP4003	Final Design Project	4
		Total	**4**

Electrical Power Engineering Course Descriptions

EP1209 Basics of Programming

Fundamentals of Programming, Computational Thinking, Decomposition, Application.

EP2001 Probability and Statistics

An introduction to Random Variables, probability distribution, Statistical Inference & Estimation Theory, Statistical Inference, Stochastic Processes, Introduction to Big Data.

Prerequisites: MA2072 Engineering Mathematics IA, MA1201 Mathematics IIA (for Natural Sciences and Engineering).

EP2002 Signal & System

Introduction to Signals and Systems, Linear Time-Invariant System, Laplace Transform, Z-Transform, Continuous-Time Fourier Analysis, Discrete-Time Fourier Analysis, Filtering Sampling, and Linear Feedback Systems.

Prerequisites: MA2072 Engineering Mathematics IA, EL2101 Electric Circuit Laboratory.

EP2003 Electromagnetics

Vector Analysis, Systems and Coordinate Transformations, Maxwell's Equations in Integral and Differential Form, Vector Differentiation, Plane Wave Propagation in Free Space, Material Characteristics: Conductors, Dielectric Materials, Magnetic Materials, Plane Wave Propagation in Materials, Static Electric Field, and Static Magnetic Field.

Prerequisites: MA2072 Engineering Mathematics IA

EP2004 Measurement System

Fundamentals of Measurement, Data Processing, Measurement Equipment, Measurement Systems.

Prerequisites: EL2101 Electric Circuit Laboratory

EP2005 Computation and Numerical Analysis

Introduction to Numerical Methods, General Numerical Methods, Numerical Methods for Linear Algebra, Numerical Methods for Differential Equations, Applications of Numerical Methods in Electrical Power Engineering.

Prerequisites: MA2072 Engineering Mathematics IA, MA1201 Mathematics IIA (for Natural Sciences and Engineering), EP1209 Basics of Programming.

EP2201 Power Engineering Laboratory I

Measurement and Data Processing, Fault Location in Cables, Grounding Systems, and Computational and Numerical Analysis.

Prerequisites: EL2101 Electric Circuit Laboratory.

EP3001 Electric Machines

Magnetic circuits, Electromechanical conversion, Transformers, DC machine, AC machine, and Applications.

Prerequisites: EL2101 Electric Circuit Laboratory, EP2003 Electromagnetics.

EP3002 Power System Analysis

Classical and modern electron theory, Atomic structure, Electron statistics and energy band theory; properties of conductor materials, Superconducting materials, Semiconductor materials, Dielectric materials, and Magnetic and optical materials.

Prerequisites: EL2101 Electric Circuit Laboratory
Co-requisite: EP3001 Electric Machines.

EP3003 Electrical Engineering Material

Introduction, transportation of high voltage energy, industrial application of high voltage engineering, Electric field, calculation methods of electric field, breakdown mechanism on gas, fluid, and solid, High voltage insulation, High voltage generation, measurement and testing.

Prerequisites: EP2003 Electromagnetics

EP3004 Power Electronics

Power Switches, AC-DC Converter, AC-AC Converter, DC-DC Converter, DC=AC Converter, Power Converter Applications.

Prerequisites: EL2001 Electric Circuits.

EP3005 High Voltage Technology

Introduction to High Voltage Engineering, Safety aspects, High electric field, multi-layer dielectric, and conformal mapping, Gas insulation and through-gassing, Liquid insulation and penetrating liquids, Solid insulation and penetrating solids, High-voltage electrical equipment, Generation, measurement, and testing of high voltage and current, Overvoltage and insulation coordination, Maintenance of high-voltage equipment, Application of high voltage in industry and High voltage laboratory design.

Prerequisites: EL2001 Electric Circuits, EP2003 Electromagnetics

EP3006 Power System Protection

Power System Protection Characteristics, Tropical Lightning Phenomena and Parameters ,Traveling Wave, Overvoltage Protection System, Short circuit current calculation, Protection relay system, Application of short circuit protection, Application of power system protection for stability.

Prerequisites: EP2003 Electromagnetics, EP3002 Power System Analysis.

EP3007 Electric Power Plant

Introduction to power generation, Fundamentals of thermodynamics, Power plant cycle Fossil fuels, Combustion process, Steam generators, Steam turbine, Condensation and feedwater systems, Nuclear power plants, Gas turbines, Hydroelectric power plants, Electrical systems and plant control systems, Environmental aspects and plant design planning, Introduction to renewable energy and non-conventional generation.

Prerequisites: EP3001 Electric Machines, MS2060 Thermal Engineering.

EP3008 Smart Energy systems

Primary energy and its limits, Smart Grid Architecture, Integration of electricity, transportation, waste, gas, and cooling/heating energy, Digitalization in the electricity sector.

Prerequisites: EP3002 Power System Analysis

EP3009 Utilization of Electrical Energy

Introduction and Basic of Heating, Thermal Insulation, Electric Heating, Electric Furnace, Lighting, Electric Drive, Electric Precipitation, Other industrial electric applications, District Cooling, Heating and Power, Energy Efficiency, Environmental Consideration.

Prerequisites: EP3001 Electric Machines, MS2060 Thermal Engineering.

EP3101 Power Engineering Laboratory II

Power System Analysis Laboratory Works, Electrical Machinery Laboratory Works.

Prerequisite: EP3001 Electric Machines, EP3002 Power System Analysis

EP3201 Power Engineering Laboratory III

Introduction, Products and System design principal on Electric Power System, Design Cycle, Quality management, documentation and technical specification on equipment and power system, Standards and practical of electric installation, HAKI and patent, Economic aspect on design, Safety and environmental aspect on design, Cases study, Group project.

Co-requisite: EP3004 Power Electronics, EP3005 High Voltage Technology, EP3006 Power System Protection.

EP4001 Industrial Internship

Introduction (Professionalism, Professional Ethics, Safety), Industrial Experience Activities (Professionalism, Professional Ethics, Safety), Report & Presentation (Professionalism, Professional Ethics, Safety).

EP4002 Design Project Proposal and Seminars

Introduction to engineering design concepts, Problem identification, Determine design constraints and criteria in accordance with applicable standards and regulations Proposing solution alternatives, Writing Design Proposals.

EP4003 Final Design Project

Independent works, Presentation of Final Design Project.

Prerequisites: EP4002 Design Project Proposal and Seminars

EP4011 Electric Vehicle Systems

Electric Vehicle Technology, Charging Technology, The Impact of Electric Vehicles on the Grid.

EP4012 Energy Storage Systems

Electrical Energy Storage Technology, Application in electric vehicles, Application in electric power systems.

EP4021 High Voltage Apparatus and Testing

High Voltage Apparatus and Protection, High Voltage Appratus Design and Testing, and Operation and Maintenance.

EP4022 High Voltage Apparatus Insulation Engineering

Types of Insulation for High Voltage Apparatus and Design of Insulation for High Voltage Apparatus.

EP4023 High Voltage Apparatus Maintenance

Evaluation of reliability and lifespan of high voltage apparatus, Strategies for operation and maintenance of high voltage apparatus, Application of reliability-centered asset management to high voltage apparatus, Technology for maintenance of high voltage apparatus and echniques for diagnosing high voltage apparatus.

EP4031 Overvoltage Protection and Grounding System

Over Voltage Threat and Disturbances, Lightning Over Voltage Protection System, Switching and Nuclear Over Voltage Protection System and Grounding System.

EP4032 Relay Technology

Relay Protection System, Unbalance Disturbance, SCADA and Instrumentation, Adaptive Protection and Grounding System.

EP4033 Electrical Power Distribution Systems

Introduction to Distribution Systems, Load Modeling, Distribution System Components, Distribution System Modeling, Power Quality, Distribution System Reliability. Distribution Management System.

EP4034 SCADA & Energy Management

SCADA architecture & components, Energy management system for optimizing operations, control, and monitoring of electrical systems, Components and operations of substation automation system & interoperability, Demand-side management.

EP4041 Energy Policy and Regulation

National and international energy framework, National energy policy and regulatory trends, Regional and international energy policy and regulatory trends, Policies related to energy transition in the electrical energy sector.

EP4042 Renewable Energy Generation

Renewable energy status and market development, Fundamentals of renewable energy, Photovoltaics (Off-grid, grid-tied), Bioenergy- solid biomass, biogas, biofuels. Small hydropower.

EP4080 Selected Topics in Power Engineering

Latest developments in electrical power technology and Thematic topics.

EP4081 Electrical Power System Design

Introduction to Distribution Systems, Load Modeling, Distribution System Components, Distribution System Modeling, Power Quality, Distribution System Reliability, Distribution System Management.

EP4082 Systems Engineering

Systems and critical thinking, Optimization, Queuing Theory, Decision making and risk management, Reliability concept, and Market mechanisms.

EP4083 Electrical System Project Management

Definition of Project and Electrical System Project Planning.

EP4084 Applications of Electrical Motors

Load characteristic, Electric Machine Modeling, Electric Machine Control, and Applications.

EP4085 Engineering Ethics

Ethics and Professionalism, Commitment to Safety, Advances in Engineering and Technology.

EP4086 Safety in Electrical Power Engineering

Hazards & safety in the electrical power engineering field, Human factors in electrical power engineering safety, Safety rules and legal aspects, Safety, health, security and environmental procedures, Safety management & Safety-related organizational structure.

EP4091 Industrial Internship

Ethics, Professionalism, Engineering, HSE.

EP4092 Independent Study in Electrical Power A

Tailored to the independent study activities

EP4093 Independent Study in Electrical Power B

Tailored to the independent study activities

EP4094 Independent Study in Electrical Power C

Tailored to the independent study activities

Telecommunication Engineering Undergraduate Program

Indonesian Acreditation Board of Engineering Education

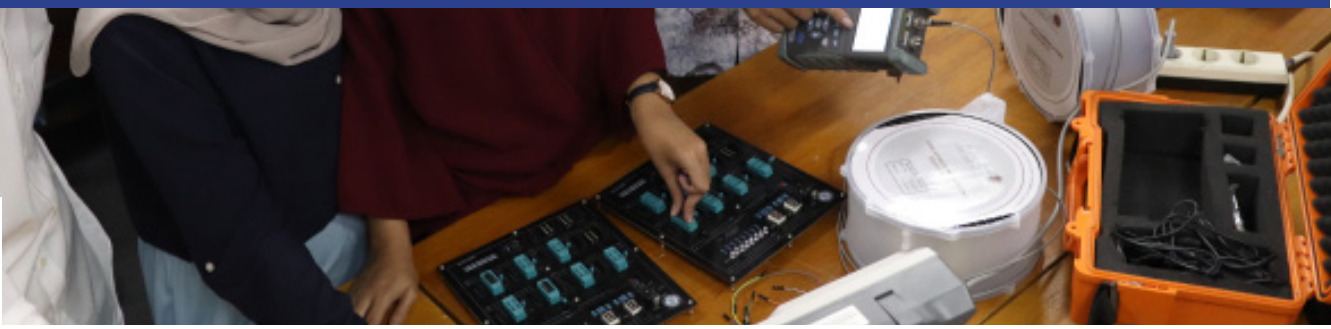
The Telecommunications Engineering Program is interdisciplinary program which blends the areas of Electrical Engineering, Computer Science, Management, Economics &Policy, in addition to Science & Mathematics as the foundation of engineering. Students in this program are given an opportunity to learn and extend their abilities in analyzing and solving problems of telecommunications engineering. They are also prepared to be capable in designing new implementations of technology in order to serve today's needs of society.

The program provides students with an integrated educational experience directed towards the comprehension in applying knowledge and techniques, as well as improving their ability in identifying and finding effective and efficient solutions for practical problems in telecommunications engineering. This program ensures that the student's ability and experience in design and analysis can be achieved by providing them with a sequential and integrated course works and laboratories described throughout the curriculum.

Program Educational Objectives

Graduates of Telecommunication Engineering Program will have the following objective of achievements:

1. Our graduates will have successful careers in their profession in telecommunication engineering or related fields.
2. Our graduates will successfully pursue graduate studies or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community.



Student Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Career Prospects

Graduates of Telecommunications Engineering Program will have broad career prospects because their competency is required by various national and multinational sectors. They include telecommunication operators and vendors; satellite communications industries; radio, television, broadcasting, multimedia industries; radar and navigation industries; banking industries and financial institutions; oil and mining industries; research and education institutions; government bodies; academic profession and research institutions; entrepreneur and consulting/ contractor companies; creative industries; airline and aircraft industries, armed forces and maritime; electrical power industries; internet service providers; etc.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	MA1101	Mathematics I	4
2	FI1101	General Physics I	3
3	KI1101	General Chemistry I	3
4	WI1101	Pancasila	2
5	WI1102	Computational Thinking	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1112	Basic Chemistry Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	WI2001	Introduction to Engineering and Design	3
2	WI2005	Indonesian Language	2
3	ET1201	Discrete Mathematics	2
4	ET1202	Electric circuit	3
5	ET1203	Programming	3
6	MA1201	Mathematics IIA (for Natural Sciences and Engineering)	4
7	WI2003	Sports	1
		Total	**18**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	ET2101	Probability and Statistic	3
2	ET2102	Communication Electronics	3
3	ET2103	Continuous Time Signal Processing	3
4	ET2104	Computer Networks	3
5	ET2108	Telecommunication Laboratory Works I	1
6	MA2072	Engineering Mathematics IA	3
7	BI1011	Biology A	2
		Total	**18**

Fourth Semester

No	Code	Subject	Credit
1	ET2201	Communication System	3
2	ET2202	Electromagnetics	3
3	ET2203	Digital System Design	3
4	ET2204	Machine Learning for Telecommunications	3
5	ET2208	Telecommunication Laboratory Works II	1
6	ET2209	Telecommunication Laboratory Works III	1
7	MA2074	Engineering Mathematics IIA	3
		Total	**17**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	ET3101	Modern Digital Communication Systems	3
2	ET3102	Transmission Lines and Antennas	3
3	ET3103	Signal Processing in Discrete Time	3
4	ET3104	Performance Engineering for Telecommunications	3
5	ET3108	Praktikum Telekomunikasi IV	1
6	ET3109	Telecommunications Practicum V	1
7	WI201X	Religion	2
8	WI2006	Civic Education	2
		Total	**18**

Sixth Semester

No	Code	Subject	Credit
1	ET3201	Optical Networks	3
2	ET3202	Wireless Access Network	3
3	ET3203	Network Automation and Software Defined Networking	2
4	ET3204	Connected Services and Cloud Computing	3
5	WI2022	Project Management	2
6	ET3206	Professional ethics	2
7	ET3208	Telecommunications Practicum VI	1
		Total	**16**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	ET4101	Practical work	2
2	ET4102	Final Assignment 1 & Seminar	2
3	WI2002	Artificial Intelligence and Data Literacy	2
4	WI2004	English	2
		Total	**8**

Eighth Semester

No	Code	Subject	Credit
1	ET4092	Final Works II	4 (4)
		Total	**4**

Telecommunication Engineering Course Descriptions

ET1201 Discrete Mathematics

This course will learn about Logic, and Probability Theory.

ET1202 Discrete Mathematics

This course will learn about Frequency response, and Electric circuit.

ET1203 Programming

This Lecture make the students study the Verbal communication, Engineering Design Algorithms and programming, and Data structure.

Prerequisites: WI1102 Computational Thinking

ET2101 Probability and Statistic

This course will learn about Probability Theory and Statistics.

ET2102 Probability and Statistic

Engineering Design, Electrical circuits and Electronic components.

Prerequisites: ET1202 Electric circuit

ET2103 Continuous Time Signal Processing

Engineering Design, Signals and systems, Analog filters, Feedback system.

ET2104 Computer Networks

Basic network concepts, Routing and switching concept.

ET2108 Telecommunication Laboratory Works I

Verbal communication, Written communication, Signals and systems, Analog Filters Feedback systems, Basic network concepts, Routing and switching concept.

Prerequisites: ET1202 Electric circuit

ET2201 Communication System

Principles of analog communication systems and Signals and systems.

Prerequisites: ET2101 Probability and Statistic

ET2202 Electromagnetics

Verbal communication and Electromagnetic fields.

Pre-requisite: MA2072 Engineering Mathematics IA.

ET2203 Digital System Design

Written communication, Engineering Design, Electric circuit, Electronic components, Microprocessor system.

Pre-requisites: ET2102 Communication Electronics.

ET2204 Machine Learning for Telecommunications

Verbal communication, Engineering Design, Simulation and modeling, Classification, regression, dimensionality reduction & clustering.

Pre-requisites: ET2102 Signal Processing in Discrete Time

ET2208 Telecommunication Laboratory Works II

Verbal communication, Written communication, Electric circuit, Electronic components, Simulation and modeling.

Prerequisites: ET2102 Communication Electronics, ET2201 Communication System.

ET2209 Telecommunication Laboratory Works III

This course presents basic concepts of continuous-time signals and systems, where the latter is emphasized on Linear Time Invariant (LTI) systems. The signals and systems are represented in time and frequency domains, where those domains are related through the Fourier series, Fourier transform, and Laplace transform. The basic concepts of signals and systems are applied to solve engineering problems in communications, to design analog filters, and to understand briefly the concept of analog linear feedback systems.

Co-requisite: ET2203 Digital System Design, ET2204 Machine Learning for Telecommunications

ET3101 Modern Digital Communication Systems

Principles of digital communication systems, Channel coding concept, Signals and systems.

Prerequisites: ET2201 Communication System

ET3102 Transmission Line and Antenna

Verbal communication, Engineering Design, Electromagnetic field, Transmission channel, Wireless devices, and Electrical circuits.

Prerequisites: ET2202 Electromagnetics

ET3103 Signal Processing in Discrete Time

Signals and systems, Digital filters, Sistem pengolahan sinyal.

Pre-requisites: MA1201 Mathematics IIA (for Natural Sciences and Engineering)

ET3104 Performance Engineering for Telecommunications

Engineering Design, Queuing theory, and Simulation and modeling.

Pre-requisite: ET2101 Probability and Statistic, ET2104 Computer Networks.

ET3108 Praktikum Telekomunikasi IV

Verbal communication, Electromagnetic field, Transmission channel, and Wireless device.

Corequisite: ET3102 Transmission Lines and Antennas

ET3109 Telecommunications Practicum V

Verbal communication, Principles of digital communication systems, Channel coding concept, Signals and systems, Digital filters and Signal processing system.

Corequisite: ET3101 Modern Digital Communication Systems, ET2103 Continuous Time Signal Processing.

ET3201 Optical Network

Verbal communication, Engineering Design, Principles of digital communication systems, Core and access networks.

Pre-requisites: ET3101 Modern Digital Communication Systems

ET3202 Wireless Access Network

Engineering Design, Wave propagation, rinciples of analog communication systems, Principles of digital communication systems, Wireless concept, Signal processing system

Pre-requisites: ET3101 Modern Digital Communication Systems

ET3203 Network Automation and Software-Defined Networking

Verbal communication, Engineering Design, Operating system, Advanced communication network.

Pre-requisites: ET2104 Computer Networks

ET3204 Connected Services and Cloud Computing

Verbal communication, Engineering Design, Operating system, Cloud computing and distributed services, and Service connected.

Prerequisite: ET2104 Computer Networks

ET3206 Professional ethics

Ethics

Pre-requisite: WI2006 Civic Education, WI201X Religion

ET3208 Telecommunications Practicum VI

Verbal communication, Written communication, Wave propagation, Wireless concept.

Prerequisite: ET3201 Optical Networks, ET3203 Network Automation and Software Defined Networking

ET4101 Practical work

Ethics, Verbal communication, Written communication, Entrepreneurship, Professional Development.

ET4102 Final Assignment 1 & Seminar

Verbal communication, Written communication, and Engineering Design.

ET4111 Antenna System

Transmission channel, Wireless Devices, Wave Propagation, Verbal communication, Techno Economics.

Pre-requisite: ET3102 Transmission Lines and Antennas

ET4112 Wireless Devices

Wireless Devices, Electronic Components, Electric Circuits, Techno Economics.

Pre-requisites: ET3102 Transmission Lines and Antennas, ET2102 Communication Electronics.

ET4113 Radio Frequency Electronics

Electronic Components, Transmission Channel, Electric Circuits.

Pre-requisites: ET2102 Communication Electronics.

ET4114 Radar System

Signal Processing, Wireless Devices, Wave Propagation.

Prerequisites: ET2103 Continuous Time Signal Processing.

ET4115 Electromagnetic Computation

Electromagnetic Field and Techno Economics.

Pre-requisites: ET3102 Transmission Lines and Antennas.

ET4116 Electromagnetic Compatibility

Electromagnetic Field, Wave Propagation, Environmental Knowledge.

Pre-requisites: ET3102 Transmission Lines and Antennas, WI1103 Introduction to Principles of Sustainability.

ET4131 Telecommunications Economics and Regulation

Telecommunications Regulations and Techno Economics.

ET4132 Capita Selecta Telecommunications

Engineering Design and Verbal communication.

ET4133 Blockchain Infrastructure

Engineering Design and Verbal communication.

Pre-requisites: ET3204 Connected Services and Cloud Computing.

ET4134 Named Data Networking

Advanced Communications Network and Engineering Design.

Corequisite: ET2104 Computer Networks

ET4135 Telecommunication Network Security

Advanced Communications Network and Engineering Design.

Corequisite: ET2104 Computer Networks

ET4202 Final Works II

Verbal communication, Written communication and Engineering Design.

Corequisite: ET2104 Computer Networks

ET4221 Satellite Communication Systems

Principles of Analog Communication Systems, Digital Communication System, Signals and Systems, Wireless Concept, Written communication.

Pre-requisite: ET3101 Modern Digital Communication Systems, ET3202 Wireless Access Network.

ET4222 Broadcasting Systems

Principles of Analog Communication Systems, Digital Communication System, Signals and Systems.

Pre-requisite: ET3101 Modern Digital Communication Systems.

ET4223 Komunikasi MIMO Masif

Digital Communication System, Signals and Systems.

Pre-requisite: ET3102 Transmission Lines and Antennas, ET3202 Wireless Access Network, ET2103 Continuous Time Signal Processing.

ET4224 Quantum Communication and Quantum Internet

Information theory, Digital communication principles, Advanced communication network.

Pre-requisite: ET3101 Modern Digital Communication Systems, ET2104 Computer Networks.

ET4225 Software Radio

Principles of Analog Communication Systems, Digital Communication System, Discrete Time Signal Processing

Pre-requisite: ET3101 Modern Digital Communication Systems, ET3103 Signal Processing in Discrete Time, ET3202 Wireless Access Network.

ET4241 Cyber Physical System

Electronic Components, IOT, Microprocessor Systems, and Verbal communication.

Pre-requisite: ET2203 Digital System Design.

ET4242 Video Compression and Communications

Information theory, Discrete Time Signal Processing Systems, Basic network concepts Engineering Design.

Pre-requisite: ET2104 Computer Networks, ET3101 Modern Digital Communication Systems.

ET4243 Advance Machine Learning for Telecommunications

Simulation and Modeling, Reinforcement Learning, Deep Learning, Verbal Communication, and Engineering Design.

Pre-requisites: ET2204 Machine Learning for Telecommunications, ET3104 Performance Engineering for Telecommunications

ET4244 Telecommunication Optimization

Algebraic Functions, Systems of Linear Equations, Engineering Design, Wireless Concept.

Pre-requisites: ET3104 Performance Engineering for Telecommunications, ET3203 Network Automation and Software Defined Networking, ET3201 Optical Networks.

ET4301 Telecommunication Engineering Professional/Community Development A

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4302 Telecommunication Engineering Professional/Community Development B

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4303 Telecommunication Engineering Professional/Community Development C

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4304 Telecommunication Engineering Professional/Community Development D

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4305 Telecommunication Engineering Professional/Community Development E

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4306 Telecommunication Engineering Professional/Community Development F

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

ET4307 Telecommunication Engineering Professional/Community Development G

Ethics, Oral communication, Written communication, Entrepreneurship, Professional development.

Information System and Technology Undergraduate Program

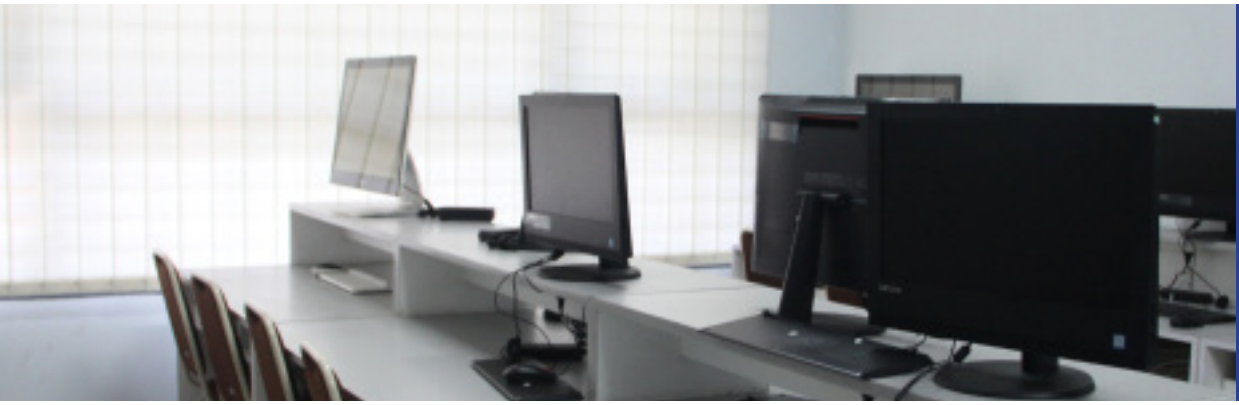
Information System and Technology program was developed to anticipate the fast growing of the phenomena, problems, needs, and impact of information system to the organization and society, according to development of information technology. This program provides comprehensive knowledge, skill, and way of thinking to be creative, building the abilities to follow advancement of knowledge, technology and the dynamic of social environment.

ABET Engineering Accreditation Commission

As one of the academic field in engineering, information system and technology program includes two major academic areas related to:

1. Planning, developing, and evaluating of system in the purpose of information management dedicated to preferred organization or in a global context for a community or society;
2. Planning, developing, and evaluating the management of the technology used to support the system in organization or society.

Nowadays, Information system and technology become a significant and decisive factor in the dynamics of business, organization and community development. Information system and technology has become an important part of daily lives including knowledge, sciences, engineering and design, services development and delivery, operational activities and management. Effective and efficient uses of information system and technology become urgent to achieve business competitive advantage and to take part in acceleration and growing the community, society or even nation. Use of system and technology should be embedded in every live dimensions, business (electronic-commerce), education and learning (e-education and e-learning), medicine and health (e-health), culture, transportation, industry, tourism, collaboration activities, even entertainment.



Program Educational Objectives

1. Our graduates will have successful careers in their professions in information systems, information technology, or related fields.
2. Our graduates will successfully pursue graduate study or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community.

Student Learning Outcomes

The expected program outcomes derived from the Program Educational Objectives are:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Support the delivery, use, and management of information systems within an information systems environment.
7. Identify and analyze user needs and to take them into account in the selection, creation, integration, evaluation, and administration of computing-based systems.

Career Prospects

A wide range of career possibilities are available for graduates of information system and technology program. The following job titles represent only a handful of the choices:

1. As a planner, to plan, develop and manage the governance of information system and technology in order to keep align with organization strategy including government or enterprise in general.
2. As a manager, to plan, develop and manage information system and technology to support the operation management of any organization.
3. As an engineer in software industry, to develop software for information system in corporate-wide level.
4. As researcher in research entities or education institutions.
5. As a creative person with the vision of the future prospects defining information as an asset of the corporate.
6. As a facilitator and emancipator to guide people in the community to build a growing and satisfying community.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	MA1101	Mathematics I	4
2	FI1101	General Physics I	3
3	KI1101	General Chemistry I	3
4	WI1101	Pancasila	2
5	WI1102	Computational Thinking	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1116	Computer Interaction Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	II1200	Introduction to Information Systems and Technology	3
2	IF1210	Algorithm and Programming 1	3
3	WI2001	Introduction to Engineering and Design	3
4	WI2005	Indonesian Language	2
5	WI201X	Religion	2
6	WI2006	Civic Education	2
7	WI2002	Artificial Intelligence and Data Literacy	2
8	WI2003	Sports	1
		Total	**18**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	II2100	Interpersonal and Public Communication	2
2	II2110	Discrete Mathematics	3
3	II2120	Computer Networks	3
4	II2130	Computer System and Architecture	3
5	IF2040	Database Modeling	3
6	IF2010	Object-Oriented Programming	3
7	WI2004	English	2
		Total	**19**

Fourth Semester

No	Code	Subject	Credit
1	II2210	Platform Technology	3
2	II2211	Probability and Statistics	3
3	II2221	Enterprise Requirement Analysis	3
4	II2240	Multimedia System	3
5	II2250	Database Management	2
6	II2260	Internet of Things	3
7	IF2050	Foundations of Software Engineering	3
		Total	**20**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	II3120	Information Systems and Technology Services	3
2	II3130	Enterprise Architecture	3
3	II3131	Human Computer Interaction	3
4	II3140	Web and Mobile Application Development	3
5	II3160	Integrated Systems Technology	3
6	II3170	Information Technology Laws and Ethics	2
7	IF3070	Foundations of Artificial Intelligence	3
		Total	**20**

Sixth Semester

No	Code	Subject	Credit
1	II3220	Information Technology Governance	3
2	II3230	Information Security	3
3	II3240	Information Systems and Technology Engineering	4
4	IF3211	Domain-Specific Computation	2
		Total	**14**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	II4091	Final Project Proposal	2
2	II4090	Industrial Practice	2
		Total	**4**

Eighth Semester

No	Code	Subject	Credit
1	II4092	Final Project 2	4
		Total	**4**

Information System and Technology Course Descriptions

II1200. Introduction to Information Systems and Technology

Basic concepts of information systems and technology

II2100. Interpersonal and Public Communication

Foundations of Interpersonal Communication; Culture and Interpersonal Communication; Perception and the Self in Interpersonal Communication; Listening in Interpersonal Communication; Verbal Messages; Nonverbal Messages; Emotional Messages; Conversational Messages; Interpersonal Relationships; Interpersonal Conflict and Conflict Management; Interpersonal Power and Influence;

II2110. Discrete Mathematics

Understanding of Discrete Mathematic, Proportional Logic, Sets, Predicate Calculus, Relations, Discrete Structure, Numbers, Program/Algorithm

Prerequisites: MA1201 Mathematics IIA

II2120. Computer Network

understanding of computer networks that covers physical layer, datalink layer, network layer, transport layer, and application. Network QoS, security and multimedia services.

Prerequisites: II2130 Computer Architecture and Systems

II2130. Computer System and Architecture

Student will gain a comprehensive knowledge about computer systems, its hardware components, software, data and procedures, communications, also the societies

II2210. Platform Technology

Definition, types and platform strategies, Platform design and implementation, Platform management and development

II2211. Probability & Statistics

The concept of probability, random variables and their distributions, combinatorial and geometric elements, conditional probability, Bayes theorem, distribution functions, bivirate random variables, functions of random variables, estimation, hypothesis testing, application of probability & statistic for computing & electrical engineering

Prerequisites: MA1201 Mathematics IIA

II2221. Enterprise Requirement Analysis

Analysis of Business Requirements, Configuration and Change Management, Different Approaches to Implementing Information Systems, High-level System Design Issues, Identification of Opportunities for IT-enabled Organizational Change, Realization of IT-based Opportunities with Systems Development Projecvts (BoK ACM)

Prerequisites: II2240 System Requirement Analisys

II2240. Multimedia System

To describe the methods to capture, process, store, analyzeand deliver multimedia information, and to evaluate its quality both subjectively and objectively.

Prerequisites: II2110 IST Mathematic

II2250. Database Management

This course provides knowledge and basic skills in database management, including data storage and file structure, database performance tuning, indexing and hashing, query processing and optimization, database programming, transcation management, database security and integrity, and database system architecture.

Prerequisite: IF2140 Database Modeling

II2260. Internet of Things

This course aims to provides a comprehensive introduction to IoT, related technologies, and common issues in the adoption of IoT on a large scale. In this course, students will survey recent technological advances and novel solutions for challenges in the IoT environment. Moreover, the students will study and discuss the utilization of IoT and its underlying technologies in critical application areas, such as smart grids, healthcare, insurance, and the automotive industry.

II3120. Information System & Technology Services

Concepts of IT service, business services, and service systems; service computing; service computing technologies; service engineering; service systems; and service systems engineering

Prerequisites: TI3005 Organization and Management of Industrial Companies

II4013. Data Analytics

Concepts of Data Analytics, Data Types, Measures of Central Tendency, and Measures of Dispersion, Data Collection and Cleaning, Descriptive Analytics, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics, Text Analytics, Data Visualizations

II3130. Enterprise Architecture

Enterprise Architecture Frameworks, Component Architectures, Interorganizational Architectures, Processes for Developing Enterprise Architecture, Architecture Change Management, Implementing Enterprise Architecture, Management Controls, Information Systems Strategy, Strategic Alignment, Impact of Information Systems on Organizational Structure and Processes, Information Systems Planning, Role of IT in Defining and Shaping Competition, Financing and Evaluating the Performance of IT Investments and Operations (BoK ACM)

Prerequisites: II3121 Enterprise Requirement Analysis

II3131. Human Computer Interaction

What is Interaction Design, Understanding & Conceptualizing Interaction, Cognitive Aspect, Social Interaction, Emotional Interaction, Interfaces, Data Gathering, Data AnalysisInterpretation, Representation, Process of Interaction Design, Establishing Requirement, Design Prototyping and Construction, Evaluation Framework, Introduction to Speech Processing, Data Capture Technologies, Information Generating Technologies

II3140. Web and Mobile Application Development

Planning and design mobile applications up to planning a startup company

Prerequisites: IF3152 Software Engineering IST

II3160. Integrated System Technology

This course introduces computing technology to build an integrated information systems, including hardware and software, data representation using XML and related format, communication protocols to exchange data, and related technologies to enable system integration.

II3170. Information Technology Legal & Ethics

Introduction To Cyberethics; Ethical Concepts and Ethical Theories; Critical Thinking Skills and Logical Arguments; Professional Ethics; Privacy and Cyberspace; Security in Cyberspace; Cybercrime and Cyberrelated Crimes; Intellectual Property; Regulating Commerce; Social Issues;Converging Technologies, Regulations in Indonesia.

II3220. Information Technology Governance

Strategic alignment and IT value delivery, IT governance and IT management, IT governance framework, Governance principles

II3230. Information Security

This course is intended to help students gain fundamental and comprehensive understanding of information security. We will focus on an overview of major information security issues, technologies, and approaches. Students who successfully complete this course will have a concept and knowledge of security properties, concerns, policies, models, cryptography, PKI, firewalls, security evaluation, and real life security cases. Students will also have handson experience in selected information security technologies through lab sessions.

Prerequisites: II2230 Computer Network, II3131 Human Computer Interaction

II3240. Information Systems and Technology Engineering

The principles, framework and process engineering of IST. The course also provides cases and tasks to students to conduct case studies of IST engineering during the lectures take place, so that students have the IST engineering skills.

Prerequisites: IF3152 Software Engineering IST

II4010. Data Management

Data Management Roadmap, Data Integration Strategy, Design Data as a Service, Business Aligned Data Management Strategy, Data Governance

II4011. Digital Transformation

Digitalizations and digital transformations, The main pillars of digitalizations, Digital transformations and its impact on organizations, Digital strategy and strategic ability, Digital business models, Digitally enabled services and digital service innovations, Digital transformation readiness

II4012. Artificial Intelligence for Business

This course discusses the foundation and the applications of artificial intelligence in business context

II4021. Cryptography

Techniques to encode and encrypt data in order to secure data or information

II4022. Digital Privacy Engineering

Privacy Regulations and Laws, Compliance with Privacy Regulations and Laws, Privacy and Compliance Gap Analysis, Privacy Maturity Model

II4023. Digital Forensic

Forensic investigation process, legal issue related to digital forensic, forensic evidence and searching process of forensic evidence, forensic laborayory, understading of computer based system (including mobile system) for forensic, case study for forensic process, writing forensic report.

II4024. Cyberlaw

Digital Transformation and Cyber Society, Criminology and Cybercrime, GDPR (General Data Protection Regulation), The law on electronic information and transactions, Personal Data Protection Act, Cyber Law Enforcement System in Indonesia

II4050. Multimedia System Engineering

The comprehension of multimedia fundamental, system engineering methodology, use of current tools and multimedia standards to create applications related to generation, storing, processing, distributing, and visualizing multimedia.

II4051. Product Management

This course discusses topics on product development, product lifecycle, product requirements developments, product development process

II4052. Analysis & Design of System Performance

understanding of system performance aspects in IT lifecycle

II4053. Information Technology Audit

This course is intended to give knowledge and help students gain understanding about fundamental of audit process and governance toward organisation management of information technology, in theories and in practices.

II4071. IST Professional and Community Development A

Activities for developing or implementing information systems and technology.

II4072. IST Professional and Community Development B

Activities for developing or implementing information systems and technology.

II4073. IST Professional and Community Development C

Activities for developing or implementing information systems and technology.

II4074. IST Soft Skills Development

Soft skill development in the field of STI

II4075. IST Innovation and Independent Study

Independent activities related to innovation and independent or structured learning activities in the STI field

II4077. IST Entrepreneurship Development

Development of entrepreneurial strategies, models and products, Development of managerial or leadership abilities, Managing innovation and finance

II4078. IST Research

Research methodology

II4079. IST Special Topics A

Capita selecta or current topics in the field of IST

II4080. IST Special Topics B

Capita selecta or current topics in the field of IST

II4081. IST Special Topics C

Capita selecta or current topics in the field of IST

II4090. Industrial Practices

Introduction and preparation for industrial practice, Composing practical work reports, Presentation of practical work reports

II4091. Final Project Proposal

Introduction to the final project, Methods of collecting information to identify problems and various alternative solutions, Analytical methods to determine solutions, Writing proposals and proposal presentation materials, Proposal presentation

II4092. Final Project

In this course, students perform analysis of the problem and solution of the final project, design and implementation of the solution, as well as presentation of the solution orally and in writing.
Prerequisites: II4091 Final Project 1 & Seminars

Indonesian Acreditation Board of Engineering Education

Biomedical Engineering Undergraduate Program

Biomedical Engineering is a multi/trans-disciplinary engineering approach aiming to bridge the traditional disciplines of engineering, biology, and medicine. Engineering approach has played an increasing role in the advances of life science and healthcare. Future breakthroughs on these fields are expected to be more and more technology-driven. Biomedical engineering expertise undoubtedly becomes the critical component of such advances, since best engineering practice in this particular setting demands comprehensive understanding of the biological and medical aspects. It essentially applies well-known principles in engineering and physical sciences to study and solve problems in biology and medicine. SEEI ITB foresees the increasing relevancy of educating future engineers with strong affinity to biology and medicine; hence a specialized program in Biomedical Engineering within SEEI is established.

The Biomedical Engineering Program at SEEI ITB is made up of faculty members who are well respected in their areas of research and education. They engage in research activities encompassing a wide range of areas such as electronics and instrumentation, signal processing, computer networks, intelligent system and robotics, machine vision, and biomedical system modeling. The multi/trans-disciplinary nature of the program is demonstrated through the active participation of different faculty and schools at ITB; among others the School of Life Science and Technology, School of Pharmacy, Faculty of Mathematics and Natural Sciences, and the Faculty of Industrial Technology.

Program Educational Objectives

1. Our graduates will have successful careers in their professions in biomedical engineering or related fields.
2. Our graduates will successfully pursue graduate study or engage in professional development.
3. Our graduates will demonstrate leadership and play active roles in the improvement of their community.

Student Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. Applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics;
9. Solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems;
10. Analyzing, modeling, designing, and realizing bio/biomedical engineering devices, systems, components, or processes; and
11. Making measurements on and interpreting data from living systems.

Career Prospects

Parallel with the advances in biology and medicine, the demands for biomedical engineering expertise will become increasingly popular in the future. The following job titles represent only a handful of the choices available:

1. Research engineers work in the lab, testing and inventing. This job requires a high level of creativity on the part of the engineer, as well as a great deal of patience in dealing with the complex characteristics of biological and medical systems. Keen attention to detail is important for graduates who enter this profession. Research engineers are responsible for the discovery-stage behind any new biomedical
2. Clinical engineers implement the skills of a system engineer for proper installation and maintenance of healthcare instruments in both pre-clinical and clinical settings. Experienced clinical engineers rely on their ability to think holistically about the technical aspects of the system as well as the foreseeable biomedical and biohazard consequences. Clinical engineers are responsible for routine examination and troubleshooting of medical instruments involved in healthcare facilities.
3. Biomedical technology analysts work in medical technology certifying agencies to assess whether a certain technological advancement is worthwhile to be adopted in clinical practice. Biomedical innovations should only be allowed to become parts of clinical routines when a thorough assessment has established its significant benefits over the corresponding costs and medical risks. This way, unnecessary burden and harm to the patients could be alleviated.

Freshman Year (First Year)

First Semester

No	Code	Subject	Credit
1	MA1101	Mathematics I	4
2	FI1101	General Physics I	3
3	KI1101	General Chemistry I	3
4	WI1101	Pancasila	2
5	WI1102	Computational Thinking	2
6	WI1103	Introduction to Principles of Sustainability	2
7	WI1111	Basic Physics Laboratory	1
8	WI1112	Basic Chemistry Laboratory	1
		Total	**18**

Second Semester

No	Code	Subject	Credit
1	MA1201	Mathematics IIA (for Natural Sciences and Engineering)	4
2	KI1201	General Chemistry IIA	3
3	EL1200	Introduction to Circuit Analysis	2
4	IF1210	Algorithm and Programming 1	3
5	WI2001	Introduction to Engineering and Design	3
6	WI2003	Sports	1
7	WI2005	Indonesian Language	2
		Total	**18**

Sophomore Year (Second Year)

Third Semester

No	Code	Subject	Credit
1	MA2072	Engineering Mathematics IA	3
2	KI2162	General Biochemistry	3
3	KI2163	General Biochemistry Laboratory	1
4	EL2101	Electric Circuit Laboratory	1
5	EB2101	Fundamentals of Biomedical Engineering	2
6	EB2102	Electric Circuit and Electronics	3
7	EB2103	Digital and Microprocessor Systems	3
8	WI2002	Artificial Intelligence and Data Literacy	2
		Total	**19**

Fourth Semester

No	Code	Subject	Credit
1	EB2201	Anatomy and Physiology	3
2	EB2202	Biomedical Electronics	3
3	EB2203	Signals and Systems	3
4	EB2204	Probability and Biostatistics	3
5	EB2205	Biomedical Data Analysis and Computing	3
6	EB2209	Biomedical Engineering Laboratory 1	2
7	WI2004	English	2
		Total	**18**

Junior Year (Third Year)

Fifth Semester

No	Code	Subject	Credit
1	EB3101	Biomedical Physics	3
2	EB3102	Biomedical Instrumentation	3
3	EB3103	Biomedical Signal Processing	3
4	EB3104	Molecules, Cells and Organisms	3
5	EB3109	Biomedical Engineering Laboratory 2	2
6	WI2006	Civic Education	2
7	WI201X	Religion	2
		Total	**18**

Sixth Semester

No	Code	Subject	Credit
1	EB3201	Biomechanics	3
2	EB3202	Biomedical Control Systems	2
3	EB3203	Biomedical Image Processing	3
4	EB3204	Machine Learning in Biomedical Engineering	2
5	EB3220	Biomedical System Design	2
6	WI2021	Industrial Engineering Management	2
		Total	**1**

Senior Year (Fourth Year)

Seventh Semester

No	Code	Subject	Credit
1	EB4120	Biomedical System Prototyping	3
2	EB4040	Research Methods and Bioethics	3

Eighth Semester

No	Code	Subject	Credit
1	EB4291	Final Project II (Capstone Design)	4
		Total	**4**

Biomedical Engineering Course Descriptions

EB2101. Fundamentals of Biomedical Engineering

Introduction. Fundamentals of Biomedical Engineering. Fundamentals of Biomedical System/Instrumentation. Fundamentals of bioelectric. Various biomedical transducer and sensors. Operational amplifier & biomedical amplifier. Patient safety. Introduction toanatomy andphysiology.

EB2102. Electric Circuit and Electronics

Sinusoidal steady-state analysis, AC power analysis, transfer function, frequency response and resonance, magnetic coupling circuit, un-ideal op-amp circuitry, diodes and diode circuits, MOSFET as amplifiers and switch, BJT as amplifier, fundamentals of amplifier frequency response

EB2103. Anatomy and Physiology I

Introduction, Basic Physiology Mechanism, Integration & Control System; Nervous System, Loco-motoric system: skeletal system, muscular system, Exchange & distribution; Cardiovascular System, Respiratory System, Urinary System, wrap up & enhancement

EB2200. Biomedical Engineering Laboratory 1

Biomedical Engineering Laboratory I comprises of 2 laboratory courses (each worth 1 credit); i.e. biomedical electronics laboratory (in-line with EB2206 Biomedical Electronics) and anatomy & physiology laboratory (in-line with EB2207 Anatomy & Physiology II).

Corequisite: EB2206 Biomedical Electronics, EB2207 Anatomy and Physiology II

EB2205. Signals, Systems, and Controls

1)Introduction 2)Mathematical Description of Signals (Continuous) 3)Mathematical Description of Signals (Discrete) 4)Description of System 5) Time Domain Analysis 6) Fourier Series 7)Circuit Analysis with Fourier Series 8) Fourier Transform 9) Laplace Transform 10)Analysis with Laplace Transform 11) Frequency Response Analysis 12) Sampling and Signal Processing 13)The Z Transform 14)State Space representation or Examples of application

EB2206. Biomedical Electronics

Sources and Properties of Biomedical Signals; Properties and Models of Semiconductor Devices Used in Analog Electronic Systems; The Differential Amplifier; General Properties of Electronic, Single-Loop Feedback Systems; Feedback, Frequency Response, and Amplifier Stability; Operational Amplifiers and Comparators; Introduction to Analog Active Filters; Instrumentation and Medical Isolation Amplifiers; Noise and the Design of Low-Noise Signal;; Digital Interfaces; Modulation and Demodulation of Biomedical Signals; Power Amplifiers and Their Applications in Biomedicine; Wireless Patient Monitoring;

Prerequisites: EB2102 Electric Circuit and Electronics
Corequisite: EB2200 Biomedical Engineering Laboratory 1

EB2207. Anatomy and Physiology II

Anatomy & physiologiy II focuses on Integrative Physiology which concerns two major themes: the integrative function of major organ systems, and the effect of changes in the internal or external environments to their functions.

Prerequisites: EB2103 Anatomy and Physiology I
Corequisite: EB2200 Biomedical Engineering Laboratory 1

EB3100. Biomedical Engineering Laboratory 2

Biomedical engineering laboratory 2 introduces standard practices of biomedical measurement and instrumentation systems together with the specific characteristics of biomedical measurement.

Corequisites: EB3105 Biomedical Measurement and Instrumentation

EB3101. Biomedical Physics

Fundamentals of Biomedical physics; Terminology, Modelling, and Measurement; Forces on and in the Body; Physics of the Skeleton; Heat and Cold in Medicine; Energy, Work, and Power of the Body; Pressure; The Physics of the Lungs and Breathing; Physics of the Cardiovascular System; Electricity in the Body; Cardiovascular Instrumentation; Application of Electricity and Magnetism in Medicine; Sound in Medicine; Physics of the Ear and Hearing; Light in Medicine; Physics of Eyes and Vision; Physics of Diagnostic X-Rays; Physics of Nuclear Medicine; Physics of Radiation Therapy; Radiation Protection in Medicine

Prerequisites: EB2207 Anatomy and Physiology II

EB3102. Biomedical Signal Processing

History and Overview in Digital Signal Processing, Theories and Concepts, Discrete Time Signals and Systems, Analysis of LTI Systems Using z-Transfoms, Frequency Analysis of Signals and Systems, The Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Spectrum analysis, Implementation of Discrete-Time Systems, Design of Digital Filter for biomedical applications

Prerequisites: EB2205 Signals, Systems, and Controls

EB3105. Biomedical Measurement and Instrumentation

This course contains material about the role of instrumentation system in the biomedical engineering; the characteristic of system components; the method of measurement, the method of calibration, data processing methods in the measurement. Classification of sensor and transducer: mechanical; thermal; optics; acoustic, LVDT signal conversion, amplification and modulation, analog signal conditioning and digital converter circuit, final controller, mechanical actuator; electric actuator; hydraulic actuator; analog controller circuits; filters, signal recordings, communications, and displays and readings

Prerequisites: EB2206 Biomedical Electronics

EB3108. Probability and Biostatistics

Probability, random variables and distributions of random variables, combinatorial dan geomterical elements, conditional probability, Bayes theorem, distribution functions, bivariate random variables, functions of random variable, estimations & hypothesis testings

EB3200. Biomedical Engineering Laboratory 3

Biomedical engineering laboratory 3 introduces design, analysis, and troubleshooting of biomedical measurement system

Prerequisites: EB3100 Biomedical Engineering Laboratory

EB3203. Bioelectromagnetics

Vector analysis; Maxwell's equations; Modeling of bioelectric sources and conductors; Theoretical methods in bioelectromagnetism; Electric and magnetic measurement of human body; Effects of external electromagnetic fields; Electric and magnetic stimulation; Electromagnetic imaging.

Prerequisites: EB3101 Biomedical Physics

EB3204. Biomechanics

This course teaches numerical analysis in molecular systems, cellular and physiological. Students will learn the general techniques to analyse stable and dynamic systems. These techniques will be applied to the MATLAB programming.

Prerequisites: EB3101 Biomedical Physics

EB3206. Biomedical Image Processing

Introduction, 2D System and matrix review, Image enhancement, Image restoration, Image Segmentation, Image reconstruction from projection, Image compression, Feature extraction, Pattern Recognation

Prerequisites: EB3102 Biomedical Signal Processing

EB4004. Biomedical Instrumentation System

Prerequisites: EB3200 Biomedical Engineering Laboratory 3

EB4005. Stochastic Biomedical Signal Processing

Properties of stochastic signals, classical spectral estimation techniques, adaptive filters, parametric modeling, examples in biomedical signals with Matlab simulations

Prerequisites: EB3102 Biomedical Signal Processing

EB4006. Biomedical Imaging System

A comprehensive introduction to the major aspects of standard medical imaging systems used today. Topics include xray imaging, computed tomography, image reconstruction and analysis, nuclear medicine, MRI, ultrasound and imaging applications in therapy. The fundamental physics and engineering underlying each imaging modality are reviewed and an performance analysis approach to each system is examined. The class involves site visit to several different imaging systems available at a Medical Center. Evaluation is based upon tests, labs, as well as journal club review of research papers and commercial equipment.

Prerequisites: EB3203 Bioelectromagnetics

EB4007. Medical Information System

Introduction, Back to the future, Structured Data, Biomedical Databases, Semi structured and weakly structured data, Multimedia Data Mining and Knowledge Discovery, Knowledge and Decision, Biomedical Decision Making, Intelligent Information Visualization and Visual Analytics, Biomedical Information Systems and Medical Knowledge Management, Biomedical Data, Methodology for Information Systems.

EB4008. Biomedical Transport Phenomenon

The quantitative description of momentum transport (viscous flow) and mass transport (convection and diffusion) in living systems. Application of engineering methods to model and quantify aspects of biomedical engineering.

Prerequisites: EB3101 Biomedical Physics

EB4009. Advanced Biomechanics

First course in undergraduate biomechanics that provides background in muskuloskeletal anatomy and principles of biomechanics. The course applies and builds on the concepts of Statics and, Dynamics for human activities, and Mechanics of Materials and tissues.

Prerequisites: EB3204 Biomechanics

EB4010. Biomedical System Modeling and Simulation

A wide variety of biomedical processes behave as dynamic systems where the system states vary in time, often in response to external stimuli or interventions. The aims of this course are to introduce techniques and computer tools for modelling, predicting, analysing and understanding dynamic behaviour in biomedical systems

EB4011. Pattern Recognition

This course is an advanced pattern recognition course comprising data classification methods, parameter estimation, and state estimation methods

Prerequisites: EB3108 Probability and Biostatistics

EB4101. Biomedical System Design

Optimation of biomedical system design and implementation according to user specifications. Advanced engineering design methodology.

Prerequisites: EB3200 Biomedical Engineering Laboratory 3

EB4103. Selected Topics in Biomedical Engineering

Introduction to clinical engineering, technology concept, risk factors & safety issues in Biomedical Engineering, Ethics in Biomedical Engineering, current Biomedical Engineering issues in Indonesia: organization, regulation, social.

EB4190. Final Project I and Seminar

The student is planned to do preliminary study / design of her / his final-year project. Under his / her supervisor, the student has to submit the final-year proposal, abstract and finally full paper which should be presented in student's seminar. The student has to work in the laboratory to do his / her research during the semester time.

EB4291. Final Project II (Capstone Design)

In this individual assignment, the student should continue her/his previous work in EB4190 course under the same supervisor. The work resulted in this project could be in the form of any implementation (software/hardware), even in the form of recommendation of solution to the electrical engineering problems. At the end of this project, the student should write the final report, and then defended in front of 3 examiners (lecturers).