

FACULTY OF MATHEMATICS AND NATURAL SCIENCES



INSTITUT TEKNOLOGI BANDUNG

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A leading faculty, pioneering the advancement of mathematics and sciences, and contributing to the national prosperity

Institut Teknologi Bandung (ITB) is located in West Java, Indonesia. ITB is a state, co-educational research university located in Bandung. Established in 1920, ITB is the oldest technology oriented university in Indonesia. The University prides itself on its reputation as one of the country's centers of excellence in science, technology, and art. It has 12 faculties and a graduate school.

Faculty of Mathematics and Natural Sciences (FMIPA) – ITB is one of the faculties at ITB. FMIPA was established on 6 October 1947 as *Exacte Faculteit van Wetenschap, Faculteit van Wiskunde en Natuur Wetenschap*; In 1952, it changed to *FIPIA (Faculty of Natural Sciences)*; Since 1972 became: *Faculty of Mathematics and Natural Sciences (FMIPA)*.

Our mission are: conducting high quality education in mathematics and sciences to produce graduate with strong characters and global competetiveness; Conducting high quality and cutting edge research in mathematics and sciences; Conducting public services and community empowerment through faculty expertise for nation welfare.

Academic Programs

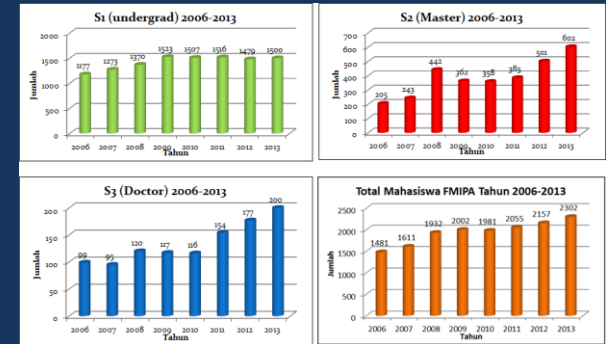
We run undergraduate, master and doctoral degree in Astronomy, Chemistry, Mathematics and Physics and also master degree in teaching in chemistry, mathematics and physics; actuarial and computational sciences as described as follows:

Regular duration of is 4 years, 2 years, and 2 years for undergraduate, master, and doctor degree respectively. In fast track program, excellent students may take master courses during undergraduate program. Extra ordinary students may enroll doctoral program after completing their undergraduate.

Undergrad	Master	Doctor
Astronomy	Astronomy	Astronomy
Physics	Physics	Physics
Chemistry	Chemistry	Chemistry
Mathematics	Mathematics	Mathematics
	Actuarial	
	Teaching in Physics	
	Teaching in Chemistry	
	Teaching in Mathematics	
	Computational Sciences	
4 years	2 years	3 years
4 years	1 year	3 years
4 th	4 years	

All of the study programs are accredited by national accreditation board, most of them with highest level. Undergraduate program in physics were assessed by AUN-QA in 2009, and chemistry was accredited by RSC (Royal Society of Chemistry) in 2012. Undergraduate program in Astronomy, Mathematics, and Physics are prepared for accreditation by ASIIN – Germany.

Number of students in 2014 are 1550, 600, 200 for undergraduate, master and doctoral degree, respectively.



Academic Collaboration Programs:

Double degree in master program:

- Japan: University of Kanazawa
- French: more than 15 Universities.
- Netherland: University of Twente.
- In preparation: University of New Castle (Australia), University of Lleida (Spain).

Double degree in doctoral degree:

- Japan: University of Kanazawa
- French: more than 15 Universities.

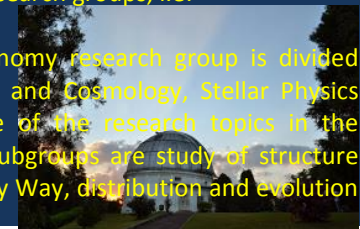
Student exchange:

- KAIST (since 2010)
- Campus Asia Program: Kanazawa
- Sandwich program: Universities in Europe, Turkey, Japan, USA, Korea, etc.

Research Collaborations: with many universities in Europe, USA, Japan, Australia, Asian countries.

FMIPA has 183 faculty members with 33 Professors who are actively work in 15 research groups, i.e:

ASTRONOMY: The Astronomy Research group is divided into 3 subgroups Galaxy and Cosmology, Stellar Physics and Solar System. Some of the research topics in the Galaxy and Cosmology subgroups are study of structure and dynamics of the Milky Way, distribution and evolution



of galaxies, active galaxies (quasar), search for dark matter, and theoretical and observational cosmology.

ANALYTICAL CHEMISTRY: Focus is on the development, validation and application of state-of-the-art, integrated and automated analytical methods and instrumentation, for trace analysis and speciation.

BIOCHEMISTRY: The current research is molecular biology thermophilic microorganism and biochemistry of DNA polymerase and thermostable lipases; studies of clinical isolates of *Mycobacterium tuberculosis* resistant to anti-tuberculosis drugs; biochemical and bioprocess of enzymes acting on carbohydrates, such as family of amylase, cellulase, and chitinase; biodiesel production from micro and macro algae, as well as simulations of molecular dynamics to study protein folding and its stability.

ORGANIC CHEMISTRY: Its missions are: to study and develop organic chemistry with many related aspects focused on acquiring biodiversity for broadening molecular diversity regarding chemical and biological potential to the human race, as well as on developing organic synthesis to develop techniques and its applications on material science and bioscience. O

INORGANIC AND PHYSICAL CHEMISTRY: The research interests: coordination compounds, metal oxides, catalysts, ceramic, biodegradable polymer, biopolymer, membrane, composite, corrosion and computational and theoretical chemistry.

ALGEBRA: The research program covers the fundamental research with emphasis on the development of the theory of module with categorical approach, and the applied research with emphasis on the application of algebraic structures in control system, cryptography, coding theory and other areas.

ANALYSIS AND GEOMETRY: Analysis & Geometry Research Division put emphasis towards the applied side of Mathematical Analysis, without leaving the fundamentals behind. Some recent research includes analysis in n -normed spaces, fractional integral operators, analysis in

seismic, energy in diffusive equations, impulsive delay equations, Hamiltonian systems.

COMBINATORIAL MATHEMATICS

Our research focus on (1) graph extremal problems: degree/diameter problems in di(graphs) and Ramsey theory and its generalizations/variations, (2) various aspects of graph labelings and colorings, (3) distance-related concepts in graphs, (4) combinatorial designs and association schemes, (5) random graphs, (6) coding & cryptography, and (7) combinatorial applications in real-world problems or other fields.

INDUSTRIAL AND FINANCIAL MATHEMATICS: We focus on mathematical modeling and simulation of problems that are arisen not only from mathematics itself, but also from industry. We develop an active and strong network between mathematicians and users of mathematics in solving real problems through mathematical modeling.

STATISTICS: Statistics Research Division put emphasis towards the applied side of Probability Theory and Mathematical-Statistics. Some recent research include topics in space-time analysis, copula, hidden-Markov models, financial time series, reliability process, statistical process control, statistical inverse problems, general insurance, bio-informatics, geo-statistics, warranty.

PHYSICS FOR ELECTRONIC MATERIAL: The scopes of research activities are growth and characterization of electronic materials, theoretical/numerical studies of electronic material properties, and its application for electronic and optoelectronic devices. Research areas that we are interested in are divided into four major groups that are of nano semiconductors and other nanomaterials, compound semiconductors, superconductors and oxides, and theory and simulations.

THEORETICAL HIGH ENERGY PHYSICS AND INSTRUMENTATION: Research activities in the Theoretical High Energy Physics and Instrumentation Division are grouped into two main streams of research: researches in theoretical aspects of fundamental physics and researches in physical instrumentation. The topics are Einstein general relativity and other models of gravity, quantum field and gauge theory, topological gauge theory,

supersymmetry, supergravity, superstring and brane world as well as analytical and numerical studies in integrable and dynamical systems. The second research stream weighs on the development of sensors and systems of instrumentation.

PHYSICS OF MAGNETIC AND PHOTONIC: This group consists of two subgroups with fairly different research topics. Magnetic subgroup deals with magnetic, thermopower, dilute magnetic semiconductor, and strongly correlated electron system. Whereas, photonics subgroup focuses on theoretical and numerical study of periodic system and photonic crystal-based devices as well as experimental study of organic-based optical laser, amplifier, and nonlinear optical materials as well.

NUCLEAR PHYSICS AND BIOPHYSICS: Nuclear Physics and Biophysics research division consists of two sub-division, namely Nuclear Physics sub-division and Biophysics sub-division. Nuclear Physics sub-division mainly studies several aspects of nuclear physics and its applications for research and development of the advanced nuclear power plants, especially Generation IV reactors. Biophysics sub-division studies the physical processes in bio-system (molecule, cell, and organ) using several quantitative methods and measurements. Main research topics of this sub-research division are: molecular biophysics, membrane biophysics, radiation biophysics, and medical physics.

PHYSICS OF EARTH AND COMPLEX SYSTEMS: Recently, the main research activities focused on the two main issues concerning the national energy survival and mitigation of the natural disaster. Those include electromagnetic technology for exploration, fluid dynamics and rock physics, as well as seismicity.

COMMON FACILITIES:

- SEM
- Micro CT-scan
- NMR
- RT PCR
- Research laboratories
- Etc.

