Graduate Programs in Physics

Faculty of Mathematics and Natural Sciences
INSTITUT TEKNOLOGI BANDUNG
History

Department of Physics, Faculty of Mathematics and Natural Sciences (Fakultas Matematika dan Ilmu Pengetahuan Alam – FMIPA), is located inside the campus complex of ITB (Institut Teknologi Bandung) at Jalan Ganesa 10, Bandung 40132. It is the oldest one amongst physics departments in Indonesia. Since our establishment in 1948 as a part of Fakulteit van Exacte Wetenschap at Nood Universiteit van Jakarta (Emergency University of Jakarta), we were once part of Faculteit van Wiskunde en Natuur Wetenschap, then after Indonesia's independence from the Netherlands in 1949, we became part of Fakultas Ilmu Pasti dan Ilmu Alam (FIPIA) and was part of Universitas Indonesia (UI). The name FIPIA has been changed to FMIPA since 1972.

All of the programs in Physics have been accredited A by BAN-PT. In 2008, our undergraduate program was selected as one of the two programs to be evaluated in Self Assessment Report Quality Assurance which was hosted by ASEAN University Network (AUN). Our undergraduate program is currently being assessed by Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik (ASIIN), an international accreditation institution based in Germany.

Lecturers Profile & Publication

Department of Physics has 71 members who obtained doctorates from top universities all around the world, mostly from Japan, Germany, Netherlands, Australia, UK, USA, Indonesia, etc.

Faculty members in Department of Physics are very active in research and publish articles indexed by scopus.com as shown in the picture.
Research Groups in Physics

The Department of Physics works on group basis in its research activities related to the cutting edge of advance sciences. There are five major groups in our department.

**Physics of Earth and Complex Systems** (http://pcs.phys.itb.ac.id)
The complexity of physical systems and their responses to disturbances are the main interests of this group. By imposing the central paradigm of complex system to the physical concepts, common tolls such as numerical methods, expert system and symbolic manipulation, nonlinearity and robust prediction, as well as fuzzy logic and artificial neural network are applied to solve related problems. Associated laboratories: Earth Physics, Rock Physics, etc.

**Nuclear Physics and Biophysics** (http://fi.itb.ac.id/fnb)
This group has two subdivisions and each has its own research interests. Nuclear physics focuses on design and analysis of nuclear reactor safety and nuclear fuel cycle, especially for Generation IV reactors. Biophysics, on the other hand, focuses in physical mechanisms on bio-systems (molecules, cells, organs), biophysics irradiations, and medical physics. Associated laboratories: nuclear and reactor, nuclear fuel and waste management, biophysics, and medical physics.

**Physics of Electronic Material** (http://pem.phys.itb.ac.id/?page_id=43)

**Theoretical High Energy Physics and Instrumentation** (http://thepl.phys.itb.ac.id/)
Theoretical high energy physics focuses on fundamental aspects of nature which cover 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. Instrumentation focuses on the development of sensors, computation physics and systems of instrumentation including imaging and signal processing, bioinstrumentation, and big data in physics as well as Internet of Things. Associated laboratories: Theoretical High Energy Physics Lab., Sensor Lab., Digital signal and image processing Lab., Advanced Computing Lab., System Instrumentation Lab.

**Magnetic and Photonic Physics** (http://fismats.fis.itb.ac.id/FMF)
This group focuses on the development of nonlinear optical and photonic materials, wave guide, light sources for information technology and telecommunication, as well as optical sensors. The topics cover development of superconductor, transition metal oxide, superconducting magnetic energy storage, spintronics, and thermoelectric power source. Associated laboratories: Synthesis and Fabrication of Photonic Materials, Magnetic and Superconductor Materials, Optical Characterization, and Design and Computation of Photonic Devices.
Master Program

Master of Physics Program was established in 1979 under Graduate School of ITB as one of the first master programs in ITB. In 2006, the management of Master of Physics Program is under the Faculty of Mathematics and Natural Science ITB. It is supported by excellent and competent faculty staff which distributed into the five Research Groups in the Physics Department. In 2018, there are 143 active students in the program. Up to now, master program in Physics has graduated 518 students who work across the nation in industries, as well as in research and education institutions.

Curriculum

Master of Physics Program is designed to be completed within 4 semesters or 2 years. The subjects consist of compulsory subjects, elective courses, and Thesis. The program requires a minimum of 36 credits (15 compulsory credits, a minimum of 12 elective credits, and 9 credits of Thesis).

<table>
<thead>
<tr>
<th>No</th>
<th>Compulsory Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electrodynamics*</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Statistical Mechanics*</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Quantum Mechanics*</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Analytical Mechanics*</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Physical System Computation*</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Physical Instrumentation System*</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Research Methodology</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Thesis</td>
<td>9</td>
</tr>
</tbody>
</table>

*Compulsory Credits 24

Elective Credits 12

Total 36

*Students are required to complete 4 subjects amongst 6 compulsory subjects. If the student passes more than 4 of them, the excess credits will be counted as electives.

Objectives

The graduate is expected to possess the following qualities:

- Ability of lifelong learning and active participation in overcoming challenges.
- Ability to progress in career and to gain knowledge.
- Ability to analyze natural phenomena using scientific methods and applied physics concepts to solved engineering problems.
- Ability to work independently or in groups (monodisciplinary and interdiscipliary teams).
- Ability to perform scientific communications (oral and written).
- Ability to master information technologies and computational methods in research.
Master of Physics Teaching

Master in Physics Teaching is a program to improve the quality of physics and natural sciences teachers in high school. This program was established in 2008. Now, there are 34 active students enrolled. The program has graduated 235 students who teach physics and natural sciences in educational institutions across the nation.

Prospective Student: Physics teacher, prospective physics teacher in senior high school or science teacher of junior high school.

Curriculum

Master in physics teaching is designed to be completed within 4 semesters or 2 years. The subjects consist of compulsory subjects, self-support courses, educational subjects, and natural science courses. The program requires a minimum of 36 credits (24 credits of compulsory courses and minimum 12 credits of elective courses) and a final project to complete. This requirement is in line with the general rules for graduation in ITB master’s programs.

<table>
<thead>
<tr>
<th>No</th>
<th>Compulsory Courses</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Mathematical Physics</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Physics II</td>
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<tr>
<td>4</td>
<td>Physics III</td>
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<tr>
<td>5</td>
<td>Professional Ethics and Teaching Methods</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Experiments in Physics</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Computational Physics</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Final Project I</td>
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<tr>
<td>9</td>
<td>Final Project II</td>
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<td></td>
<td>Compulsory Credits</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Elective Credits</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>36</td>
</tr>
</tbody>
</table>

Objectives

The graduates are expected to be teachers in Junior and Senior High School who master the basic concepts and principles of physics and natural sciences.

The graduate is expected to possess the following qualities:

- Ability of life-long learning and active participation in overcoming challenges.
- Ability to progress a career and gain knowledge formally and informally.
- Ability to master the basic concepts and principles of physics and natural sciences.
- Ability to work independently and creative in teaching.
- Ability to perform scientific communication (oral and written).
Doctoral Program in Physics was established in 1979. It has then been managed under the Faculty of Mathematics and Natural Sciences (FMIPA) since 2006. Doctoral program is supervised by the Graduate Program Committee (KPPs) of the faculty and Graduate School Committee (KSPs) of the institution. Graduates of the Doctoral Program in Physics have been employed across the country in fine institutions. In 2018, there are 89 active students in the program. Up to now, the doctoral program in Physics has graduated 108 alumni who work across the nation in research and education institutions.

Curriculum

For the academic course of study, the doctoral program requires a minimum of 42 credits (36 credits of compulsory courses and 6 credits of elective courses) to complete for students with a master’s degree in physics and 54 credits (48 credits of compulsory courses and 6 credits of elective courses) for students having master’s degree from other fields.

<table>
<thead>
<tr>
<th>No</th>
<th>Compulsory Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Research Methodology</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Qualification Exam</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Dissertation Proposal</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Research and Progress Report I</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Research and Progress Report II</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Research and Progress Report III</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Research and Progress Report IV</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Dissertation Defense</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Philosophy of Science</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Scientific Articles Publication</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Compulsory Credits</strong></td>
<td><strong>36</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Elective Credits</strong></td>
<td><strong>6</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

Objectives

The doctoral program aims to produce highly distinctive graduates who can give positive contributions to scientific communities and, by extension, to general public both in national and international level. Specifically, students are trained to have:

- The ability to discover new things in their fields of expertise.
- The ability to do research independently or in groups.
- The ability of lifelong learning and active participation to overcome challenges.
- Deep understanding in information technologies and computational methods for research.
- Initiative and leadership to solve problems in societies.
- Oral and written scientific communication skills.
# Faculty Members

## Theoretical High Energy Physics and Instrumentation
- Dr. Agus Suroso, S.Si., M.Si.
- Prof. Dr. rer. nat. Bobby Eka Gunara, S.Si., M.Si. (*)
- Dr. Fiki Taufik A. S., S.Si., M.Si.
- Prof. Drs. Freddy Permana Zen, M.Si., M.Sc., D.Sc. (*)
- Getbogi Hikmawan, S.Si., M.Si.
- Dr. Drs. Hendro, MS
- Irfan Dwi Aditya, S.Si., M.Si.
- Dr. Jusak Sali Kosasih
- Drs. Maman Budiman, M.Eng., Ph.D.
- Maria Evita, S.Si., M.Si.
- Prof. Dr.-Ing. Mitra Djamil (*)
- Dr.Eng. Muhammad Miftahul Munir, S.Si., M.Si.
- Dr. Nina Siti Aminah, S.Si., M.Si.
- Prof. Dr. Suprijadi, M.Eng. (*)
- Prof. Triyanta, MS, Ph.D. (*)
- Dr. Wahyu Hidayat, S.Si., M.Si.

## Physics of Earth and Complex Systems
- Acep Purqon, S.Si., M.Si., Ph.D.
- Dr.Eng. Alamtta Singarimbun, MS (*)
- Prof. Doddy Sutarno, M.Sc., Ph.D. (*)
- Dr.Eng. Enjang Jaenal Mustopa, S.Si., M.Si.
- Dr. Fourier Dzar Eljabbar Latief, S.Si., M.Si.
- Dr. Gunawan Handayani, M.Sc.E
- Harry Mahardika, S.Si., M.Si., Ph.D.
- Prof. Ir. Lilik Hendradjaja, M.Sc., Ph.D. (*)
- Dr. rer. nat. Linus Ampang Pasasa, MS
- Dr. Neny Kurniasih, MS
- Dr. Nurhasan, S.Si., M.Si.
- Dr.Eng. R. Bagus Endar Bachtiar N.
- Prof. Dr. rer. nat. Umar Fauzi (*)
- Wahyu Srigunotomo, S.Si., M.Si., Ph.D. (*)
- Dr. Muhammad Rizkie Arbie, S.Si., M.Si.

## Physics of Electronic Materials
- Dr. rer. nat. Akfiny Hasdi Almon, S.Si., M.Si.
- Dhewa Edhikresna, M.Si.
- Dr. Euis Sustini, MS
- Dr. Fatimah Arofiati Noor, S.Si., M.Si.
- Dr.Eng. Ferry Iskandar, M.Eng.
- Prof. Dr.Eng. Khairunnjali, M.Si. (*)
- Prof. Dr.Eng. Mikrajuddin Abdullah, M.Si. (*)
- Dr. Neni Surtiyeni, S.Si., M.Si.
- Dr. Pepen Ariffin
- Prof. Dr. Toto Winata (*)
- Dr.Eng. Yudi Darma, M.Si.

## Physics of Magnetism and Photonic
- Dr. Agoes Soehanie
- Dr. Agustinus Agung Nugroho Sulistyo Hutoomo (*)
- Drs. Alexander Agustinus P. Iskandar, Ph.D. (*)
- Dr. rer. nat. Berlinson Dominikus Napitu, S.Si., M.Si.
- Dr. Daniel Kurnia
- Dr. Herman, MS (*)
- Dr. Inge Magdalena Sutjahja, S.Si., M.Si. (*)
- Dr. Priastuti Wulandari, S.Si., M.Si.
- Rachmat Hidayat, S.Si., M.Eng. Ph.D.

* Eligible as Promotor for Doctoral Program
Seminar and Conference Activities:
Seminar Kontribusi Fisika (SKF)
Simposium Nasional Inovasi dan Pembelajaran Sains (SNIPS)
Asian Physics Symposium (APS),
International Conference on Energy and Sciences (ICES)
International Conference on Advances in Nuclear Science and Engineering (ICANSE),
International Conference on Instrumentation, Communication & Information Technology (ICICI),
Nanoscience and Nanotechnology Symposium (NNS),
International Symposium on Modern Optics and Its Application (ISMOA)
Seminar Nasional Material (SNM)

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