### **Undergraduate Programme** in Mathematics



### Faculty of Mathematics and Natural Sciences

CONTER

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### About Us

We are a thriving endeavour for learning mathematics in Indonesia, through research and education. With 59 faculty members, our programs train a student body of 705, in Undergraduate Program in Mathematics, Undergraduate Program in Actuarial Science, Master Program in Mathematics, Master Program in Actuarial Science, Master Program in Mathematics for Teaching, and Doctoral Program in Mathematics. For research provision, the faculty members are divided into research divisions, they are Algebra RD, Analysis and Geometry RD, Combinatorial Mathematics RD, Industrial and Financial Mathematics RD, and Statistics RD.

Our house since October 2015 is the 4th and 5th floors of the Center for Advanced Sciences (CAS) Building on the north-eastern part of the Ganesha campus of the Institut Teknologi Bandung. Administrative offices and faculty members' offices are in the 4th floor, while faculty lounge, library, computer labs, doctoral students' offices, and study areas are on the 5th.

As part of the oldest science and engineering institution of higher learning in Indonesia, we play a significant role in conducting high quality education in mathematics and sciences to produce graduates with strong characters and global competitiveness, conducting high quality and cutting edge research in mathematics and sciences, and conducting public services and community empowerment through faculty expertise for national welfare.

We believe that the quality of education does not depend solely on the formal classes, but to the large extent, to the whole lively interactions amongst students, faculty members, or in general academic communities. Here in Mathematics ITB, we strive to provide such environment.

## Career Opportunity

Mathematics is applicable to nearly every industry today, from science and technology to business, retail, healthcare, and more. Professionals with advanced degrees in math are highly desirable for their mastery of certain skills, particularly for their critical thinking and problem-solving expertise. Math major diverges into two distinct career paths: while some may work in academia as math researchers, others work in diverse industry roles.

In Indonesia, industry varies greatly, and thus career opportunities are endless based on our interests. Many of our graduates have interest in information technology and work as computer programmers, may software developers, or data scientists. Others with business interests may take jobs working as auditors or financial analysts.

Many of our graduates have good career in research and higher education; either in ITB, other universities, and national research agencies, which means that most of them have pursued further degrees in Mathematics or other fields. The greatest thing about Mathematics major in ITB was its learning culture. I was always intrigued with the lecturers' ways of knowledge sharing: interactive, practical, and meaningful. The environment itself kept motivating me to grow and pushed me to come up with creative problem solving. Ability to learn something new and critical thinking skills were sharpened as well.

All those amazing experiences led me to pursue my study further in the UK before entering the real-life world. MA ITB is doing an impressive job of preparing students for a broad range of professions, from being an academician to successful businessman. Now I am working as a Data Analyst in one of the biggest E-commerce in Indonesia. My experience as a MA student back then equips me to have a foundation of interdisciplinary research here at my current office. From analysing lots of data, modelling skill, being a strategic partner of business and product team, until helping them to make important decisions.

I highly recommend Mathematics Major in ITB for other students because of its reputation, high quality of teaching, and great multicultural environment.

In Mathematics ITB, I learned a lot of different subjects, from theoretical to applied. I realized that mathematics is very diverse. From mathematics, I learned about how to think systematically and enhancing my curiosity, that I need for my job as a researcher.

> Robby, Mathematics 2014 PhD Candidate, Dept Mathematics, Technical University of Kaiserslautern



Patricia Nadya, Mathematics 2010 Data Analyst, **Tokopedia** 



# Our Curriculum

Our curriculum undergone a revision in 2019, in which ITB wished that it must consider strategic issues to be faced in eras of globalization. The four strategic issues that need to be mastered by ITB graduates, are *coding/computational thinking, big data analysis, artificial intelligence,* and *sustainability*.



Our curriculum is divided into four stages, in which each year of the programme has the following intended philosophy.

- 1. **Common First Year Stage** (Semester 1 and Semester2): This is a transition period from high school to university. During this stage, students must take, among others, Mathematics IA and Mathematics IIA which are basic mathematics courses.
- 2. Object-oriented Stage (Semester 3 and semester 4): in this stage, students have an opportunity to develop a solid and strong foundation in mathematics. This stage is also considered as a confident building stage. Computational and manipulative aspects of mathematics are emphasized in problem solving, in which students must manipulate various mathematical objects such as numbers, functions, sets, and relations. Students are gradually acquainted with mathematical, logical, and rigorous reasoning. Students must build awareness of the steps they have to take in using theorems. Compulsory courses offered at this stage are elementary linear algebra, discrete mathematics, mathematical computation and simulation, multivariable calculus, data analysis, and introduction to differential equations.
- 3. **Property-oriented Stage** (Semester 5 and semester 6): In this stage, the emphasis is the ability to work with or manipulate mathematical properties. Then, students use the results to obtain a deeper understanding and new perspectives of topics or problems. In this stage, students acquire deeper concepts of mathematics. Learning activities offered by courses in this stage are designed to help students to develop critical thinking skills and ability to develop rigorous mathematical argumentation in complex context.
- 4. **Maturation Stage** (Semester 7 and semester 8): In this stage, one of students' important activities in this stage is a Final Project, in which students could synthesize all the mathematical knowledge and skills they have acquired. Completing Final Projects should help students acquire skills to perform a task independently, to communicate in oral and written presentations clearly and efficiently.



### Compulsory Courses

Semester 1			Semester 2		
Code	Course Name	СР	Code	Course Name	СР
MA1101	Mathematics IA	4	MA1201	Mathematics IIA	4
FI1101	Elementary Physics IA	4	FI1201	Elementary Physics IIA	4
KI1101	General Chemistry IA	3	KI1201	General Chemistry IIA	3
KU1011	Indonesian Language: Scientific Writing	2	KU1001	Sports	2
KU1160	Introduction to Mathematics and Natural Sciences	2	KU1202	Introduction to Engineering and Design	3
KU1102	Introduction to Computation	3	KU1024	English	2

Semester 3			Semester 4		
Code	Course Name	СР	Code Course Name		СР
MA2111	Fundamental Mathematics	2	KU2071	Pancasila and Civic Education	2
KU206X	Religion and Ethics	2	MA2231	Multivariable Calculus	4
MA2121	Elementary Linear Algebra	4	MA2271	Introduction to Differential Equation	4
MA2151	Simulation and Mathematical Computation	4	MA2251	Discrete Mathematics	4
MA2181	Data Analysis	4			
		16			14

Semester 5			Semester 6		
Code	Course Name	СР	Code	Course Name	СР
MA3131	Introduction to Real Analysis	4	MA3231	Introduction to Complex Analysis	4
XXLING*	Environmental Subject	2	XXMANJ**	Management Subject	2
MA3171	Numerical Mathematics	4	MA3011	Career in Mathematics	2
MA3181	Probability Theory	4	MA3271	Mathematical Modeling	4
		14			12

Semester 7			Semester 8		
Code	Subject	СР	Code	Subject	СР
MA4093	Final Project I	3	MA4094	Final Project II	3
MA4091	Mathematics Seminar I	1	MA4092	Mathematics Seminar II	1
		4			4



### Learning Outcomes

Aligned with the vision and mission of ITB and FMIPA, in the current curriculum the **Programme Educational Objective (PEO)** of the Undergraduate Programme in Mathematics is to *yield* graduates who are able to develop their mathematical power and potential, to expand their mathematical interests, to manifest their leadership and innovativeness in mathematics or related fields, and to acquire good attitude and characteristics needed for advanced studies as well as career advancement. Derived from the PEOs, the Learning Outcomes (LOs) of UPM have been constructed by taking into considerations suggestions from stakeholders. Postgraduate study requirements are also reflected in the learning outcomes, as some graduates will advance to postgraduate studies.

he learning outcomes are as follows:

- LO1. The students are able to exhibit sufficient knowledge and insight in mathematics and relevant areas, with a relatively deep understanding in some particular sub-fields of mathematics, and apply them to solve problems,
- LO2. The students are able to demonstrate adequate basic math skills, such as observing, recognizing, collecting and utilizing data, to make calculation, estimation, and interpretation, with or without the aid of technologies (such as computers and software),
- LO3. The students are able to exhibit mathematical powers, that include reasoning, making connections, solving problems, and communicating,
- LO4. The students are able to show the ability to complete tasks and to develop relatively new ideas, both independently and in teams, including preparing and presenting reports, orally and in writing as well,
- LO5. The students have personality characteristics and habits of work necessary for succesful career, and understand professional and ethical responsibility,
- LO6. The students are aware of contemporary issues and able to respond appropriately,

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LO7. The students are well-prepared for self-development, in mathematics and relevant areas, or careers

### **Student Activities**

To establish the academic environment, students are encouraged to involve in the research of their supervisors. The results of the research are sometimes written in scientific articles or presented at conferences

Additionally, the Undergraduate Program in Mathematics unreservedly endorses the Mathematics Student Association (HIMATIKA).



Our students are also able to participate in interdisciplinary activities organized by Society of Industrial and Applied Mathematics (SIAM). As part of the only SIAM Student Chapter in Indonesia, our students are provided with invaluable opportunities to develop networks with non-ITB faculty members outside of the classroom, share ideas and research with people with similar interests, learn about career options, and develop leadership skills.



In more than five decades, HIMATIKA has organized scientific and professional activities that prepare students to learn organizational and collaborative skills. Some of those activities are:

Mathematical Challenge Festival, a competition held biennially and aims to introduce and popularize mathematics in middle school and college.

HIMATIKA Social Action, in which students, in collaboration with Teras Santri, develop educational projects in Islamic schools nearby Bandung area.

Fourier Media, an Instagram-based media with aims to popularize mathematics to wider audience.



### People

#### Algebra

#### Chair: Pudji Astuti Waluyo

#### Members:

- 1. Afif Humam
- 2. Ahmad Muchlis
- 3. Aleams Barra
- 4. Defita
- 5. Dellavitha Nasution
- 6. Elvira Kusniyanti
- 7. Fajar Yuliawan
- 8. Gantina Rachmaputri
- 9. Hanni Garminia Y.
- 10. Irawati
- 11. Intan Muchtadi
- 12. Ning Jauharotul Farida
- 13. Rani Sasmita Tarmidi

#### Analysis and Geometry

#### Chair: M. Wono Setyabudhi

#### Members:

- Arnasli Yahya
- 2. Denny Ivanal Hakim
- 3. Eric Haryanto
- 4. Hendra Gunawan
- 5. Ifronika
- 6. Iwan Pranoto
- 7. Jalina Widjaja
- 8. Janny Lindiarni
- 9. Johan M. Tuwankotta
- 10. Oki Neswan
- 11. Rizal Afgani
- 12. Yudi Soeharyadi

#### **Combinatorial Mathematics**

Chair: Djoko Suprijanto

#### Members:

- 1. Aditya Purwa Santika
- 2. Edy Tri Baskoro
- 3. Erma Suwastika
- 4. Finny Oktariani
- 5. Hilda Assiyatun
- 6. M. Salman A.N.
- 7. Pritta Etriana Putri
- 8. Rinovia Simanjuntak
- 9. Saladin Uttunggadewa
- 10. Suhadi Wido Saputro
- 11. Warsoma Djohan
- 12. Yusuf Hafidh

#### **Industrial and Financial Mathematics**

Chair: Sri Redjeki Pudjaprasetya F.

#### Members:

- 1. Ade Candra Bayu
- 2. Adhe Kania
- 3. Agus Yodi Gunawan
- 4. Dewi Handayani
- 5. Dila Puspita
- 6. Edy Soewono
- 7. Ikha Magdalena
- 8. Janson Naiborhu
- 9. Kuntjoro Adji Sidarto
- 10. L. Hari Wiryanto

- 11. Mochamad Apri
- 12. Muhammad Islahuddin
- 13. M. Ridwan Reza Nugraha
- 14. Muhammad Syamsuddin
- 15. Novriana Sumarti
- 16. Novry Erwina
- 17. Nuning Nuraini
- 18. Prama Setia Putra
- 19. Roberd Saragih
- 20. Rudy Kusdiantara

Statistics

Chair: Sapto Wahyu Indratno

#### Members:

- 1. Adilan W. Mahdiyasa
- 2. Dumaria R. Tampubolon
- 3. Khreshna A. Syuhada
- 4. Marianik
- 5. RR. Kurnia Novita Sari
- 6. Sandy Vantika
- 7. Udjianna Sekteria Pasaribu
- 8. Utriweni Mukhaiyar
- 9. Yuli Sri Afrianti