

MBMB

“The graduate program in Molecular and Integrative Biosciences (MBMB) builds upon the solid foundation of the previous graduate program in Molecular Genetics and Genetic Engineering (MGGE), which was first launched in 1995. The newly design program aims to empower students with cutting-edge knowledge and skills in the rapidly evolving fields of molecular biology and integrative biosciences. With a strong focus on interdisciplinary research and practical applications, the program provides a dynamic environment where students can thrive, grow, and prepare for the challenges of a global scientific landscape. Our mission is to nurture the next generation of scientists and innovators, equipping them with the expertise, critical thinking, and creativity needed to drive scientific discovery and contribute to advancements in health, biotechnology, and sustainable development.”

Program Specification
Master of Science Program in Molecular and Integrative Biosciences
(International Program / Revised Program in 2025)
(Multidisciplinary Program)

Name of Institution Mahidol University
Campus/Faculty/Department Institute of Molecular Biosciences

Program Title

Master of Science Program in Molecular and Integrative Biosciences (International Program)
(Multidisciplinary Program)

Degree Offered and Field of Study

Full Name: Master of Science (Molecular and Integrative Biosciences)
Abbreviation: M.Sc. (Molecular and Integrative Biosciences)

Philosophy

The program intends to produce graduates with practical knowledge, technical expertise, and innovative thinking by focusing on outcome-based education and constructivist principles for their self-development of knowledge, skills, and concepts in Molecular and Integrative Biosciences.

Program-Level Learning Outcomes: PLOs

When complete the learning of the program, students will be able to:

- (1) Conceptualize, integrate, and apply fundamental knowledge of theory and practice in Molecular and Integrative Biosciences.
- (2) Exercise cognitive and practical skills essential for conducting research in the field of Molecular and Integrative Biosciences.
- (3) Adhere to ethical standards and integrity in both personal and professional practices.
- (4) Possess academic and research communication, leadership and adaptability.

Career Opportunities of the Graduates

- Researcher / Research Assistant
- Academic Personnel/Lecturer
- Entrepreneur / Innovator
- Sales Representative
- Product Specialist / Technical Support Staff
- Science Communicator

Curriculum Structure, Course of the Program and Credits

1. Educational Management System

1.1 System

Two Semester Credit system. 1 Academic Year consists of 2 Regular Semesters, each with not less than 15 weeks of study.

2. Curriculum

2.1 Curriculum Structure

Plan 1.2 (Course work and thesis):

• Required courses	11 credits
• Elective courses not less than	9 credits
• Thesis	16 credits
Total not less than	36 credits

2.2 Courses of the Program

2.2.1 Courses of the Program

a) Required Courses

Plan 1.2 (Course work and thesis) **11 credits**

Course Code	Course Title	Credits (lect-lab-self)
MBMB 500	Graduate School Essentials for M.Sc. Students in Molecular and Integrative Biosciences	2 (2-0-4)
MBMB 501	Molecular Biology	2 (1-2-3)
MBMB 502	Cell Biology	3 (2-2-5)
MBMB 503	Integrative Biosciences	1 (0-2-1)
MBMB 504	M.Sc. Research Design in Molecular and Integrative Biosciences	1 (0-2-1)
MBMB 505	M.Sc. Seminar in Molecular and Integrative Biosciences	1 (1-0-2)
MBMB 506	M.Sc. Research Forum	1 (1-0-2)

b) Elective Courses

Several elective courses may be recommended to students as specialized pathways, tailored to the relevance of their thesis projects, including but not limited to the following:

Plan 1.2 (Course work and thesis)



Specific skills recommendation



Generic skills recommendation

Course Code	Course Title	Credits (lect-lab-self)	Pathway 1: Advanced Therapy Medicinal Products (ATMPs)	Pathway 2: Antibiotic Resistance	Pathway 3: Biosensor Technology	Pathway 4: Drug Discovery and Precision Medicine	Pathway 5: Integrative Neuroscienc e Research	Pathway 6: Sustainable AgriTech	Pathway 7: Thalassemia Research	Pathway 8: Vaccines and Antiviral Drugs
MBMB 521	Current Topics in Molecular and Integrative Biosciences	1 (1-0-2)								
MBMB 522	Apprentice Teaching (M.Sc.)	1 (0-2-1)								
MBMB 523	Career Development for Molecular Biosciences Students (M.Sc.)	1 (0-2-1)								

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MBMB 624	Adeno-Associated Viral Vectors	1 (0-2-1)								
MBMB 625	Antibacterial and Bacteriophage	2 (1-2-3)								
MBMB 626	Bacteriology	2 (2-0-4)								
MBMB 627	Bio-Based Products for Sustainability	1 (0-2-1)								
MBMB 628	Biosensor Technology: Fundamentals and Applications	2 (2-0-4)								
MBMB 629	Cancer Biology and Precision Medicine	2 (2-0-4)								

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MBMB 630	Cellular and Molecular Imaging	1 (1-0-2)								
MBMB 631	CRISPR/Cas9 Genome Editing	1 (0-2-1)								
MBMB 632	DNA Barcoding	1 (0-2-1)								
MBMB 633	DNA Sequencing for Bacterial Pathogen Study	1 (0-2-1)								
MBMB 634	Drug Discovery and Development	1 (0-2-1)								
MBMB 635	Environmental DNA (eDNA): Technique for Biodiversity Conservation	1 (0-2-1)								

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MBMB 636	Experimental Animals for Biosciences Research	1 (0-2-1)								
MBMB 637	Fluorescent Protein Technology and Yeast Genome Engineering	1 (0-2-1)								
MBMB 638	Fundamental Neuroscience	1 (1-0-2)								
MBMB 639	Induced Pluripotent Stem Cell (iPSC) Generation and Characterization	1 (0-2-1)								
MBMB 640	Introduction to Machine Learning for Molecular Biosciences Research	1 (1-0-2)								
MBMB 641	Lentiviral Vectors	1 (0-2-1)								

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MBMB 642	mRNA Vaccine Development	1 (0-2-1)								
MBMB 643	Omics in Gene Regulation Studies	1 (1-0-2)								
MBMB 644	PCR-Based Gene Mutagenization for Protein Engineering	1 (0-2-1)								
MBMB 645	Prime Editing Technique	1 (0-2-1)								
MBMB 646	Proteomics Technologies and Applications	1 (1-0-2)								
MBMB 647	Research to Business	1 (0-2-1)								

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MBMB 648	Starch Modification for Functional Food Innovation	1 (0-2-1)								
MBMB 649	Structural Bioinformatics and Drug Design	1 (0-2-1)								
MBMB 650	Technological Innovative Learning	2 (2-0-4)								
MBMB 651	Thalassemia: From Bench to Bedside	2 (1-2-3)								
MBMB 652	Vaccine Design	1 (1-0-2)								
MBMB 653	Vaccine Technology and Development	1 (1-0-2)								

Course Code	Course Title	Credits (lect-lab-self)	Pathway 1: Advanced Therapy Medicinal Products (ATMPs)	Pathway 2: Antibiotic Resistance	Pathway 3: Biosensor Technology	Pathway 4: Drug Discovery and Precision Medicine	Pathway 5: Integrative Neuroscienc e Research	Pathway 6: Sustainable AgriTech	Pathway 7: Thalassemia Research	Pathway 8: Vaccines and Antiviral Drugs
MBMB 654	Virological Techniques	2 (0-4-2)								
MBMB 655	Virus and Cell Interaction	2 (2-0-4)								
MBMB 656	Working with Pathogens in Secure Laboratory (BSL2/BSL3)	1 (0-2-1)								

In addition to elective courses mentioned above, students may register other graduate courses offered by other Mahidol University's international (graduate) programs or the ones offered by international (graduate) programs of other universities according to the students' interest with the approval of the curriculum committee or their advisor.

c) Thesis

Plan 1.2 (Course work and thesis) 16 credits

Course Code	Course Title	Credits (lect-lab-self)
MBMB 698	Thesis	16 (0-48-0)

2.3 Study Plan

Plan 1.2 (Course work and thesis)

Year	Semester 1			Semester 2		
1	MBMB 500	Graduate School Essentials for M.Sc. Students in Molecular and Integrative Biosciences	2 (2-0-4)	MBMB 504	M.Sc. Research Design in Molecular and Integrative Biosciences	1 (0-2-1)
	MBMB 501	Molecular Biology	2 (1-2-3)	<ul style="list-style-type: none"> Collect elective courses (at least 6 credits) following recommended specialized pathway (consult with tentative thesis advisor), <u>or</u> Choose any elective courses (at least 6 credits) as you like (no pathway) 		
	MBMB 502	Cell Biology	3 (2-2-5)			
	MBMB 503	Integrative Biosciences	1 (0-2-1)			
	Total			8 Credits	Total	
2	MBMB 698	Thesis	8 (0 - 24 - 0)	MBMB 698	Thesis	8 (0 - 24 - 0)
	MBMB 505	M.Sc. Seminar in Molecular and Integrative Biosciences	1 (1-0-2)	MBMB 506	M.Sc. Research Forum	1 (1-0-2)
	Elective course		1 credit	Elective course(s)		2 credits
	Total			10 credits	Total	
Grand Total = 36 credits (as a minimum)						

Admission and Graduation Requirements

Admission Requirements

- 1.1 Holding a Bachelor's degree or equivalent in biological sciences or other related fields.
- 1.2 Other requirements shall follow those that specified by the Faculty of Graduate Studies.
- 1.3 Qualifications different from 2) may be considered by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies.

Graduation Requirements

- (1) Students must complete their courses as stated in the curriculum with a minimum CUM-GPA of 3.00.
- (2) Propose thesis to the committee appointed by the Faculty of Graduate Studies and to the public and pass oral thesis examination as the final stage.
- (3) The complete or part of the thesis has to be published as a research article, accepted as an innovation, acknowledged as a creative product, or accepted as an academic article that can be searched.
- (4) Other requirements shall follow those that specified by the Faculty of Graduate Studies.

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