Program Structure and Specification
Master of Science Program in Biochemistry
(International Program)
Curriculum Last Revised in 2023
for
Students Entering in Academic Year 2025

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1. Program Title Master of Science Program in Biochemistry (International Program)

2. Name of Degree
Full name : Master of Science (Biochemistry)
Abbreviation : M.Sc. (Biochemistry)

3. Responsible Units
3.1 Department of Biochemistry, Faculty of Science, Mahidol University
3.2 Faculty of Graduate Studies, Mahidol University

4. Philosophy and Expected Learning Outcomes of the Program

4.1 **Philosophy of the Program:**

The program is designed to produce M.Sc. graduates with knowledge and research skills in biochemistry and molecular biology, good research ethics, and ability to apply their knowledge for the betterment of society.

4.2 **Program Learning Outcomes:**

Program Learning Outcomes are formulated according to the recommended "Standard for Doctoral Degrees in the Molecular Biosciences" published by International Union of Biochemistry and Molecular Biology in 2011 as following:

Upon completion of the doctoral program, graduates must be able to:

4.2.1 Demonstrate proper ethical conduct for the scientific professions, including conduct for research
4.2.2 Translate knowledge in biochemistry to the scientific community as well as to the public
4.2.3 Operate international-standard laboratory experiments in biochemistry
4.2.4 Analyze scientific questions and research findings using theoretical framework and principles in biochemistry to come up with rational explanation or discussion
4.2.5 Critically evaluate scientific merit of up-to-date biochemistry knowledge and literature, and design and perform experiments to create new knowledge in biochemistry in the form of research publication and/or innovation
4.2.6 Effectively work independently or as part of a team
4.2.7 Demonstrate effective uses of numerical and data analytical skills, communication skills and information technology

This program revision has been approved by Mahidol University Council on September 21, 2022 and by Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation on November 1, 2023.

5. Admission Requirements

Plan A1: Research only

1. Applicants must hold a Bachelor's degree in any area of science, pharmaceutical science, medicine, dentistry, veterinary medicine or other health sciences, from institutions accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation.
2. Applicants must have a cumulative GPA of at least 3.00 on a 4-point scale.
3. Applicants must meet the minimum English proficiency requirement of the Faculty of Graduate Studies, Mahidol University.
4. Applicants must have a minimum of two years full-time research work experience or of one publication in an international peer-reviewed journal, or have passed the SCBM 372, SCBM 374, SCBC 322 and SCBC 421 courses at the Faculty of Science, Mahidol University, with an average grade of B.
5. Applicants whose qualifications differ from items 2) – 4) may apply with approval from the Program Committee and the Dean of Faculty of Graduate Studies.

Plan A2: Coursework and research

1. Applicants must hold a Bachelor's degree in any area of science, pharmaceutical science, medicine, dentistry, veterinary medicine or other health sciences, from institutions accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation.
2. Applicants must have a cumulative GPA of at least 2.50 on a 4-point scale.
3. Applicants must meet the minimum English proficiency requirement of the Faculty of Graduate Studies, Mahidol University.
4. Applicants whose qualifications differ from items 2) and 3) may apply with approval from the Program Committee and the Dean of Faculty of Graduate Studies.

6. Selection Method

Applicants are selected based on academic/research credentials and interview according to rules and regulation of the Faculty of Graduate Studies, Mahidol University. International applicants may be subjected to phone/online interview and must provide proof of financial support during the study period to be considered for admission. Final judgment will be made under the consideration of the Administrative Program Committee in concurrence with the Dean of Faculty of Graduate Studies, Mahidol University.

7. Academic System

7.1 **Semester system**

Two semester credit system

7.2 **Credit Assignment**

The number of credits assigned to each subject is determined as follows:

7.2.1 Lecture or discussion consuming 15 hours per semester is equal to 1 credit hour.

7.2.2 Laboratory or practice consuming 30 hours per semester is equal to 1 credit hour.

7.2.3 Thesis consuming 45 hours per semester is equal to 1 credit hour.

8. Language

English is used in teaching and learning as well as in the assessment processes.

9. Registration

9.1 Students must register as full time students.

9.2 Students must register for no less than 9 credits and no more than 15 credits per regular semester, or according to program study plan.

10. Evaluation and Graduation Requirements

10.1 **Evaluation**

Student evaluation is in accordance with the rules and regulations of Mahidol University. (See details at http://www.grad.mahidol.ac.th)

10.2 **Graduation Requirements**

Plan A1: Research only

1. Total time of study should not exceed the study plan
2. Student must complete 36 thesis credits, but may register for other non-credit courses with approval from academic advisor and/or the Program Committee.
3. Student must meet the graduation English proficiency requirement of the Faculty of Graduate Studies, Mahidol University.
4. Student must complete the Essential Skills Development Activities for Graduate Students organized by the Faculty of Graduate Studies, Mahidol University.
5. Student must pass the thesis defense examination according to Regulations of the Faculty of Graduate Studies, Mahidol University. The thesis examination must be open to a general audience. The final version of the thesis must then be submitted to the Faculty of Graduate Studies, Mahidol University.
6. The student's thesis, in whole or in part, must be published or accepted for publication in an international peer-reviewed journal according to the Announcement of Ministry of Education on Standard Criteria of Graduate Studies and the Announcement of the Faculty of Graduate Studies, Mahidol University on Regulations of Thesis Publishing for Graduation. The candidate must be the first author.

Plan A2: Coursework and research

1. Total time of study should not exceed the study plan
2. Student must complete at least 36 credits, comprising 18 course credits and 18 thesis credits, with a cumulative GPA not less than 3.00.
3. Student must meet the graduation English proficiency requirement of the Faculty of Graduate Studies, Mahidol University.
4. Student must complete the Essential Skills Development Activities for Graduate Students organized by the Faculty of Graduate Studies, Mahidol University.
5. Student must pass the thesis defense examination according to Regulations of the Faculty of Graduate Studies, Mahidol University. The thesis examination must be open to a general audience. The final version of the thesis must then be submitted to the Faculty of Graduate Studies, Mahidol University
6. The student's thesis, in whole or in part, must be published or accepted for publication in a peer-reviewed journal, or must be presented at an academic conference in a peer-reviewed proceeding, according to the Announcement of Ministry of Education on Standard Criteria of Graduate Studies and the Announcement of the Faculty of Graduate Studies, Mahidol University on Regulations of Thesis Publishing for Graduation

11. Library

Our Stang Mongkolsuk Library possesses more than 10,000 books. Many journals can be accessed online. Besides, a lot of text books and journals (in both electronic and printed formats) are available at other libraries within Mahidol University.

12. Program Structure

12.1 The number of credits required for the program

Number of credits required for the program is at least 36 credits.

12.2 Curriculum Structure

The curriculum structure is set in compliance with the Announcement of Ministry of Education on the subject of the Graduate Program Standard Criteria B.E. 2558, Master of Science Degree, Plan A1 and Plan A2 as follows:

	Plan A1	**Plan A2**
1) Required courses	none	10 credits
2) Elective courses not less than	none	8 credits
3) Thesis	36 credits	18 credits
Total not less than	**36 credits**	**36 credits**

12.3 Course Requirements

12.3.1 Required Courses

			Credits (lecture-lab-self study)
SCID	506	Concepts of Molecular Bioscience	2 (2-0-4)
SCID	518	Generic Skills in Science Research	1 (1-0-2)
SCBC	604	Biochemistry Seminar I	1 (1-0-2)
SCBC	606	Biochemistry Seminar II	1 (1-0-2)
SCBC	609	Structure and Mechanism of Enzymes	2 (2-0-4)
SCBC	610	Modern Metabolism	2 (2-0-4)
SCBC	612	Functional Genetics and Genomics	2 (2-0-4)
SCBC	619	Integrated Skills in Biochemical Research	3 (3-0-6)

Note: { Students select to enroll one of these three courses most related to the student's research.

12.3.2 Elective Courses

			Credits (lecture-lab-self study)
SCID	500	Cell and Molecular Biology	3 (3-0-6)
SCID	502	Cell Science	2 (2-0-4)
SCID	503	Systemic Bioscience	3 (3-0-6)
SCID	507	Microscopic Technique	1 (0-2-1)
SCID	510	Immunological Methods	1 (0-2-1)
SCID	512	Receptor Binding and Enzyme Kinetic Assays	1 (0-2-1)

Note: Besides the above elective courses, students can enroll in other courses offered by graduate programs of Mahidol University with approval from the program director, major advisor, or program administrative committee.

12.3.3 Thesis

			Credits (lecture-lab-self study)
Plan A1: Research only			
SCBC	798	Thesis	36 (0-108-0)
Plan A2: Coursework and research			
SCBC	698	Thesis	18 (0-54-0)

12.3.4 Research Projects of the Program

Staff at the Department of Biochemistry has received many research grants from local agencies (e.g. National Science and Technology Development Agency

(NSTDA), Thailand Research Fund (TRF), TRF-Golden Jubilee, National Research Council of Thailand (NRCT)) and overseas granting agencies (e.g. World Health Organisation (WHO), Welcome Trust and Third World Academy of Science (TWAS)). Major research interests in the Department are:

- Protein and enzyme structure and function
- Gene regulation and metabolism
- Molecular cancer
- Regenerative medicine
- Biotechnology and nanotechnology

12.4 **Course Code Explanation**

The first two letters are abbreviation of the faculty offering the course.

SC = Faculty of Science

The last two letters are abbreviation of the department or the major offering the course.

ID = Inter-departmental Courses

BC = Department of Biochemistry

The three digits after the abbreviation, 5XX, 6XX and 7XX, indicate graduate level courses.

12.5 **Study Plan**

Plan A1: Research only

Year	Semester 1			Semester 2		
1	SCBC 798	Thesis	9(0-27-0)	SCBC 798	Thesis (continued) Proposal Examination	9(0-27-0)
	Total		**9 credits**	**Total**		**9 credits**
2	SCBC 798	Thesis (continued)	9(0-27-0)	SCBC 798	Thesis (continued)	9(0-27-0)
	Total		**9 credits**	**Total**		**9 credits**

Students may register for other courses as audit with the recommendation and approval of the Program Committee and/or the advisor.

Plan A2: Coursework and research

Year	Semester 1			Semester 2		
1	SCBC 609	Structure and Mechanism of Enzymes	2(2-0-4) *	SCBC 619	Integrated Skills in Biochemical Research	3(3-0-6)
	SCBC 610	Modern Metabolism	2(2-0-4) *			
	SCBC 612	Functional Genetics and Genomics	2(2-0-4) *			
	SCID 506	Concepts of Molecular Bioscience	2(2-0-4)			
	SCID 518	Generic Skills in Science Research	1(1-0-2)			
	Elective courses		3–5 credits	Elective courses		3–5 credits
	Total		**8–10 credits**	**Total**		**6–8 credits**
2	SCBC 604	Biochemistry Seminar I	1(1-0-2)	SCBC 606	Biochemistry Seminar II	1(1-0-2)
	SCBC 698	Thesis Proposal Examination	9(0-27-0)	SCBC 698	Thesis (continued)	9(0-27-0)
	Total		**10 credits**	**Total**		**10 credits**

* Students select to enroll 1 of these 3 courses most related to the student's research.

13. Thesis Research Proposal Presentation

In the second year of study, students must submit a document to the Faculty of Graduate Studies for appointment of Thesis Proposal Committee consisting of at least 2 faculty members, one of which is student's major advisor while another one (or more) can be any academic staff either within or outside Mahidol University. After approval of thesis research proposal, this same committee will serve as Thesis Advisory Committee monitoring and providing guidance to student regarding his/her master's research.

14. Thesis Defense

Upon completion of master's research and thesis writing along with approval from the Thesis Advisory Committee, students must submit a document to the Faculty of Graduate Studies for appointment of the Thesis Defense Committee consisting of at least 3 members: a committee chair, an external examiner and the Thesis Advisory Committee (at least 2 members). After passing the oral thesis defense, students must submit the final thesis to the Faculty of Graduate Studies.

15. Collaboration with Other Departments

Many of our faculty members are members of multidiscipline research centers such as Center for Excellence in Protein and Enzyme Technology, Center of Excellence for Vectors and Vector-Borne Diseases, Center of Excellence for Shrimp Molecular Biology and Biotechnology, Center of Calcium and Bone Research, Center for Neuroscience, Integrative Computational Bioscience Center. We also have collaborations with scientists at other research institutes and universities in Thailand and overseas.

16. Students Job Opportunities

A large number of our student alumni work as teachers in school, researchers or research assistance in research institutes, technical specialists for scientific products, sales representative of scientific products, or as scientists in food, pharmaceutical, cosmetic and chemical industries.