Program Structure and Specification
Master of Science Program in Biochemistry
(International Program)
Curriculum Last Revised in 2012
for
Students Entering in Academic Year 2017

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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 – Teaching Institution
3.2 Faculty of Graduate Studies, Mahidol University – Awarding Institution

4. Philosophy and Expected Learning Outcomes of the Program

4.1 **Philosophy of the Program:**

To produce graduate students (M.Sc.) knowledgeable in biochemistry and molecular biology with high quality research output, having good research ethics and morality, and able pass on correct and trustable knowledge in biochemistry and molecular biology to the society.

4.2 **Expected Learning Outcomes of the Program:**

Expected Learning Outcomes or our master's degree program are adapted from 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 research and scientific professions.
4.2.2 demonstrate effective English communication skills in both verbal and writing.
4.2.3 independently operate international-standard laboratory experiments in biochemistry.
4.2.4 translate frontier knowledge in biochemistry to other audiences.

5. Admission Requirements

5.1 Applicants must be studying in the final year at the bachelor level, or hold a degree in B.Sc. (any area) or a bachelor's degree in clinical and health sciences with GPA of at least 2.50 or

5.2 Applicants whose credentials differ from above requirement could apply to the program if the permission is granted by the Administrative Program Committee in concurrence with the Faculty of Graduate Studies.

5.3 Applicants studying in the final year of the bachelor's degree program within Mahidol University with a cumulative GPA of 3.0 or more can be exempted for the entrance examination by direct admission track offered by the Faculty of Graduate Studies.

5.4 Applicants whose credentials differ from that listed in 5.3 are required to take entrance examinations arranged by the Faculty of Graduate Studies. The entrance examinations are Subject-Specific Tests, which are in English language covering general knowledge in biochemistry, biology and chemistry.

5.5 All applicants must pass English proficiency requirement according to the regulation of Faculty of Graduate Studies.

5.6 International applicants must apply through the online system available at the Faculty of Graduate Studies (http://www.grad.mahidol.ac.th) and are exempted for entrance examination.

6. Selection Method

Applicants are selected based on academic/research credentials and/or written examination 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**

Semester

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**

All master's degree students must

10.2.3 register for at least 24 credits of coursework and 12 credits of thesis. Total credits acquired must at least 36 credits. A cumulative GPA must be 3.00 or more.

10.2.4 pass the English Proficiency Examination offered by the Faculty of Graduate Studies, Mahidol University or equivalent.

10.2.5 present thesis and pass the oral thesis defense examination according to the rules and regulations of the Faculty of Graduate Studies, Mahidol University.

10.2.6 obtain at least one publication or a manuscript that has been accepted for publication as a journal article or a conference proceeding at the national or international level.

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 program is set according to the Ministry of Education Announcement titled "Standard Criteria for Graduate Studies 2005", with specified plan A(2) curriculum.

12.2.1	Required Courses	15	credits
12.2.2	Elective Courses at least	9	credits
12.2.3	Dissertation	12	credits
	Total no less than	**36**	**credits**

12.3 Course Requirements

12.3.1 Required Courses

			Credits (lecture-lab-self study)
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	611	Current Protocols in Biomolecular Research	1 (1-0-2)
SCID	502	Cell Science	2 (2-0-4)
SCID	506	Concepts of Molecular Bioscience	2 (2-0-4)
SCID	508	Biomolecular and Spectroscopy Techniques	1 (0-2-1)
SCID	509	Separation Techniques	1 (0-2-1)
SCID	511	Gene Technology	1 (0-2-1)
SCID	518	Generic Skills in Science Research	1 (1-0-2)

12.3.2 Elective Courses

			Credits (lecture-lab-self study)
GRID	617	Hypercourse of Bioinformatics	2 (1-2-3)
GRID	618	Cybertools for research	1 (2-0-4)
SCBC	601	Physical Biochemistry	2 (2-0-4)
SCBC	603	Advanced Biochemistry (Laboratory)	2 (0-4-2)
SCBC	607	Current Topics in Biochemistry	3 (3-0-6)
SCBC	612	Functional Genetics and Genomics	2 (2-0-4)
SCBT	502	Recombinant DNA Technology	3 (3-0-6)
SCBT	602	Gene Regulation	3 (3-0-6)
SCID	500	Cell and Molecular Biology	3 (3-0-6)
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)
SCID	513	Animal Cell Culture Techniques	1 (0-2-1)
SCID	514	Animal Experimentation in Biomedical Research	1 (0-2-1)
SCMI	513	Infection Diseases and Immunity	4 (4-0-8)
SCMI	602	Advanced Immunology	3 (3-0-6)
SCPM	502	Principle of Drug Action	2 (2-0-4)
SCTX	601	Molecular Toxicology	3 (3-0-6)

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)
SCBC	698	Thesis	12 (0-48-0)

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:

- Aquatic Molecular Biology
- Bionanotechnology
- Cancer and Stem Cell Biology
- Gene Regulation and Metabolic Science
- Plant Molecular Biology
- Structural Biology and Enzyme Catalysis
- Systems Biology

12.4 **Course Code Explanation**

Two first letters represent the abbreviated name of Faculty

SC	=	Faculty of Science
GR	=	Faculty of Graduate Studies

The third and fourth letters represent the abbreviated name of responsible units

ID	=	Inter-departmental Courses
BC	=	Department of Biochemistry
BT	=	Department of Biotechnology
MI	=	Department of Microbiology
PM	=	Department of Pharmacy
TX	=	Toxicology Graduate Program

The first numbers (5XX and 6XX) represent postgraduate program level.

12.5 **Study Plan**

Year	Semester 1			Semester 2		
1	SCID 500	Cell and Molecular Biology*	3(3-0-6)	SCBC 611	Current Protocols in Biomolecular Research	1(1-0-2)
	SCID 506	Concepts of Molecular Bioscience	2(2-0-4)			
	SCID 502	Cell Science	2(2-0-4)	SCID 509	Separation Techniques	1(0-2-1)
	SCBC 609	Structure and Mechanism of Enzymes	2(2-0-4)		Elective Courses	6 credits
	SCBC 610	Modern Metabolism	2(2-0-4)			
	SCID 508	Biomolecular and Spectroscopy Techniques	1(0-2-1)			
	SCID 518	Generic Skills in Science Research	1(1-0-2)			
	SCID 511	Gene Technology	1(0-2-1)			
		*Note: *Elective course*				
		Total	14 credits		**Total**	8 credits
2	SCBC 604	Biochemistry Seminar I	1(2-2-5)	SCBC 606	Biochemistry Seminar II	1(1-0-2)
	SCBC 698	Thesis	12(0-48-0)	SCBC 698	Thesis (continue)	12(0-48-0)
		Thesis Proposal Presentation				
		Total	1 credits		**Total**	1 credits

13. Thesis Research Proposal Presentation

In the second year of study, students must submit a document to 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 Thesis Advisory Committee, students must submit a document to Faculty of Graduate Studies for appointment of Thesis Defense Committee consisting of at least 4 members: a committee chair, an external examiner and the Thesis Advisory Committee (at least 2 members). After passing the oral thesis defense, students can submit final thesis to 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 Structure and Function, Center for Excellence in Vectors and Vector-Borne Diseases, Center for Shrimp Molecular Biology and Biotechnology, Center for Bioinformatics and Applied Genomics Research Unit, Consortium in Calcium and Bone Research. 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.