Course Detail

Master of Science in Medical Biochemistry and Molecular Biology

Course Title:	Master of Science in Medical Biochemistry and Molecular Biology
Master Degree:	Ms.C. (Medical Biochemistry and Molecular Biology)
Academic Institution:	Department of Biochemistry, Faculty of Medicine, Khon Kaen University
Duration:	2 years (4 semesters) (July 2022 – July 2024)

Background and Rational:

The Medical Biochemistry and Molecular Biology (MBMB) Program is active under the Department of Biochemistry, Faculty of Medicine, Khon Kaen University that focuses on molecular mechanisms of non-communicable and infectious diseases. The coursework covers basic knowledge and current advanced topics in medical biochemistry and molecular biology. Students can choose their thesis topic based on their interest, such as, cholangiocarcinoma (bile duct cancer), chronic kidney disease, metabolic syndrome, and melioidosis which are the important health problems in northeastern Thailand.

Objectives:

This program aims to produce independent and high-quality researchers in medical biochemistry and molecular biology with well-equipped skills in research methodology and professionality that meet the international standard in 21st century.

Course Synopsis and Methodology:

1.Study plan

International students are required to choose plan A2 (research and coursework plan).

Course Requirement

1.1 Coursework **(**compulsory**)**	12 credits
1.2 Coursework **(**elective**)**	6 credits
1.3 Thesis	18 credits
Total	36 credit

2. Course Content/Study Topic

PLAN A2

YEAR 1 SEMESTER 1		**credits**
MD 567 712	Cells and Molecular Biology	3
MD 567 713	Laboratory Techniques in Medical Sciences	2
MD 637 701	Biochemistry for Graduate Students	2
MD 637 711	Modern Nutrition	2
	Total credits enrolled	9
	Total cumulative credits	9

YEAR 1 SEMESTER 2		**credits**
MD 637 702	Medical Biochemistry and Molecular Biology	2
MD 637 703	Basic Laboratory Skills in Medical Biochemistry & Molecular Biology	2
MD 637 718	Advanced Techniques in Medical Biochemistry & Molecular Biology	2
MD 637 894	Selected Topics in Medical Biochemistry & Molecular Biology	1
MD 637 712	System Biology	1
MD 567 714	Medical Science Research Methodology	3
	Total credits enrolled	11
	Total cumulative credits	20

YEAR 2 SEMESTER 1		**credits**
MD 637 899	Thesis	8
MD 637 891	Seminar in Medical Biochemistry and Molecular Biology I	1
	Total credits enrolled	9
	Total cumulative credits	29

YEAR 2 SEMESTER 2		**Credits**
MD 637 899	Thesis	8
MD 637 892	Seminar in Medical Biochemistry and Molecular Biology II	1
	Total credits enrolled	9
	Total cumulative credits	38

DESCRIPTION OF COURSES

MD 567 712 Cells and Molecular Biology 3(3-0-6)

Biomolecules and molecular organization within cell, cellular energy and metabolisms, genome structure and gene regulation, molecular structures of the cell and their functions, cell cycle, growth and differentiation, cellular interactions and communication, the immune system, molecular and cellular basis of diseases, cancer biology, maintenance of life and control mechanisms

MD 567 713 Laboratory Techniques in Medical Sciences 2(0-6-3)

Principles and laboratory techniques in medical sciences, basic techniques in biochemistry, microbiology, immunology, molecular biology, parasitology, pathology, anatomy, physiology, neurosciences and pharmacology including laboratory animal handling

MD 567 714 Medical Science Research Methodology 3(2-3-6)

Principles, research design and methodology in medical science, practical and appropriate biostatistical analysis in medical sciences, including various presentations of research outcome, moral of researcher, human ethics and animal ethics

MD 627 732 Bioinformatics 2(1-3-4)

The internet and the new biology, human genome project and bioinformatics, bioinformatics in post genomic era, nucleic acid and protein databases, searching and retrieval of data from various public databases, analysis of DNA and amino acid sequence data, comparative genomics, gene prediction, analysis of the structure and function of genes and proteins, microarray data analysis, phylogenetic analysis, pharmacogenomics, and system biology

MD 637 701 Biochemistry for Graduate Students 2(2-0-4)

Basic concepts in chemical compositions of cell, structures and metabolisms of biomolecules, enzyme actions, vitamins, coenzymes, hormones, integration and control of energy metabolism, molecular genetic information, group discussion on assigned topics

MD 637 702 Medical Biochemistry and Molecular Biology 2(2-0-4)

Current concepts in advanced biochemistry, the regulations of gene expressions, post- transcriptional and post- translational processes, protein targeting, signal transduction, oxidative stress, roles of molecular cell biology in medicine, pathogenesis of the diseases, applications for the developments of disease diagnoses and treatments and paper appraisal

MD 637703 Basic Laboratory Skills in Medical Biochemistry & Molecular Biology 2(0-6-3)

Basic laboratory skills in medical biochemistry and molecular biology, solution preparation, cell culture, protein extraction and purification, chromatography, protein concentration determination, protein analysis, enzyme kinetics, western blotting, immunohistochemistry, nucleotide extraction and quantification, polymerase chain reaction and reverse transcriptase polymerase chain reaction

MD 637 711 Modern Nutrition 2(2-0-4)

Aspects of nutrition, integration of carbohydrate, lipid, and protein metabolisms, role of molecular micronutrients, body composition and energy expenditure, nutritional assessment, food as a drug, food related to life cycle, sport nutrition, nutrigenomics, microbiome, metabolome, nutritional related diseases, dietary supplement, phytochemicals, functional foods, experimental design in post-genomic nutrition research, and critical interpretation of research

MD 637 712 Systems Biology 1(1-0-2)

Basic concepts of computational and systems biology, principles of cellular- and organism-systems biology, genetic and biological networks, integrative DNA, RNA, and Protein data analysis, using of internet software and bioinformatics tools in systems biology, application of computational and systems biology for the research in basic biological and biomedical sciences. study, analyze, and criticize research data in computational and systems biology, group discussions on the assigned topics

MD 637 718 Advanced Techniques in Medical Biochemistry & Molecular Biology 2(0-6-3)

Advanced laboratory skills in medical biochemistry and molecular biology, advanced techniques for analyzing biomolecules, experimental design of animal models, high-throughput gene expression analysis, functional analysis of genes by knockout and knockdown methods, gene overexpression, gene editing, DNA technology, DNA cloning, DNA sequencing genome scan, determination of types of biomolecules by NMR spectroscopy

MD 637 891 Seminar in Medical Biochemistry and Molecular Biology I 1(1-0-2)

Presentation and participation in discussion of research articles in medical biochemistry and molecular biology related to student's thesis, to be able to present and clarify the knowledge for audiences who are distinguished in languages and cultures, generation of the research question(s) related to the selected articles

MD 637 892 Seminar in Medical Biochemistry and Molecular Biology II 1(1-0-2)

Presentation and participation in discussion on progress report of MSc thesis in medical biochemistry and molecular biology, to be able to present and clarify the knowledge for audiences who are distinguished in languages and cultures

MD 637 894 Selected topics in Medical Biochemistry and Molecular Biology 1(1-0-2)

A literature review of current research topics in medical biochemistry and molecular biology, analysis and synthesis for searching new knowledge, and presentation relevant to the selected topic

MD 637 899 Thesis 18 Credits

Conducting scientific research, writing the research results in the form of thesis with the ability to conduct research in order to explore the new knowledge and find solutions to the problems in medicine and public health related to the northeastern Thailand such as cholangiocarcinoma, chronic kidney diseases, nutrition, metabolic disorders, inborn error disesases and infectious diseases, moral of researcher and human ethics, the thesis or a part of the thesis is published or accepted for publication or be presented as a proceeding of a scientific meeting in a peer review journal for at least 1 research article

Applicants Qualifications:

1) The applicant must fit with the program listed below:

Type A 2 program, the applicant must hold a bachelor's degree or be a senior student in a Bachelor of Science program or other science-related disciplines with a grade point average of not less than 2.50.

2) The applicant must be in good physical and mental health and have no serious illness which may interrupt his/her studies. A notarized medial certificate is required;

3) The applicant must be of good behavior; and

4) The applicant must have one of the following English competencies:

a. Passing the English examination held by the Graduate Studies at 50% or more; or

b. Having a TOEFL score (within two years) of not less than 475 or more; or

c. Having a IELTS (within two years) of not less than 5.0 or more

5) If the applicant fails to meet any of the above qualifications, admission to the program requires approval from the Program Executive Committee and the Graduate School, Khon Kaen University.

6) Find the information of TIPP and Medical Report at: https://tica-thaigov.mfa.go.th/en/page/75500-tipp-application-form?menu=605b13dbb6f1b76ed31778b3

Document Required:

1. Copy of academic transcript in English
2. Copy of degree certificate in English
3. Recent photo (less than 3 months)
4. Two letters of recommendation (2 academic referees or 1 academic referee with 1 employment referee)
5. Copy of national passport

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* * * The application procedure will complete when TICA has received the hard copy of the application form and other related documents through the Royal Thai Embassy/Permanent Mission of Thailand to the United Nations/Royal Thai Consulate – General accredited to eligible countries/territories.