Master of Science Program in Neuroscience
(International Program)
Revised Program in 2022

Name of Institution Mahidol University

Campus/Faculty/Department Institute of Molecular Biosciences

Section 1 General Information

1. Curriculum Name

Thai หลักสูตรวิทยาศาสตรมหาบัณฑิต สาขาวิชาประสาทวิทยาศาสตร์ (หลักสูตรนานาชาติ)

English Master of Science Program in Neuroscience (International Program)

2. Name of Degree and Major

Full Title Thai: วิทยาศาสตรมหาบัณฑิต (ประสาทวิทยาศาสตร์)

Abbreviation Thai: วท.ม. (ประสาทวิทยาศาสตร์)

Full Title English: Master of Science (Neuroscience)

Abbreviation English: M.Sc. (Neuroscience)

3. Major Subjects (if any) None

4. Required Credits: not less than 36 credits

5. Curriculum Characteristics

5.1 Curriculum type/model: Master's Degree

5.2 Language: English

5.3 Recruitment: Thai or international students

5.4 Collaboration with Other Universities: This program is Mahidol University's program.

5.5 Graduate Degrees Offered to the Graduates: One degree

6. Curriculum Status and Curriculum Approval

6.1 Program revised program 2022

6.2 Starting in semester 1, the academic year 2022 onwards

6.3 Curriculum screening committee approved the program in its meeting 17/2021 on July 19, 2021 and meeting 3/2022 on January 24, 2022

6.4 The Mahidol University Council approved the program in its meeting 584 on September 21, 2022

6.5 The curriculum/program is approved by ..... on ..... .

7. Readiness to Implement/Promote the Curriculum

The curriculum from the program is readily implemented in the academic year 2022 and promoted its quality and standard according to criteria set by the Thai Qualification Framework for Higher Education in the academic year 2024 (2 years after implementation).

8. Career Opportunities of the Graduates

8.1 A research assistant

8.2 A product specialist or product manager in Neuroscience and related Biomedical Sciences

8.3 Specialist in allied health sciences

9. Name, ID Number, Title and Degree of the Faculty in Charge of the Program

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
1.	xxxxxxxxxxxxx Professor Dr. Banthit Chetsawang	Ph.D. (Neurosciences) Mahidol University: 1998 M.Sc. (Neurosciences) Mahidol University: 1989 B.Sc. (Medical Technology) Chiang Mai University: 1987	Research Center for Neuroscience, Institute of Molecular Biosciences

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
2.	xxxxxxxxxxxxx Associate Professor Dr. Nuanchan Chutabhakdikul	Ph.D. (Neurosciences) Mahidol University: 1998 M.Sc. (Neurosciences) Mahidol University: 1991 B.Sc. (Physical Therapy) Mahidol University 1987	Research Center for Neuroscience, Institute of Molecular Biosciences
3.	xxxxxxxxxxxxx Associate Professor Dr. Vorasith Siripornpanich	Ph.D. (Neurosciences) Mahidol University: 2018 Diploma Thai Board of Pediatric Neurology, Mahidol University: 2008 Diploma Thai Board of Pediatrics, Mahidol University: 2006 M.D. (First-Class Honours), Mahidol University: 2000	Research Center for Neuroscience, Institute of Molecular Biosciences
4.	xxxxxxxxxxxxx Assistant Professor Dr. Sujira Mukda	Ph.D. (Neurosciences) Mahidol University: 2006 M.Sc. (Neurosciences) Mahidol University: 2001 B.Sc. (Occupational Therapy) Chiang Mai University: 1997	Research Center for Neuroscience, Institute of Molecular Biosciences
5.	xxxxxxxxxxxxx Assistant Professor Dr. Sukonthar Ngampramuan	Ph.D. (Neurosciences) Mahidol University: 2008 M.Sc. (Neurosciences) Mahidol University: 2002 B.Sc. (Physical Therapy) Srinakharinwirot University: 1997	Research Center for Neuroscience, Institute of Molecular Biosciences

10. Venue for Instruction

Institute of Molecular Biosciences, Mahidol University.

11. External Factors to Be Considered in Curriculum Planning

11.1 Economic Situation/Development

Development and promotion of human capital are major issues in recent years in order to increase Thailand's competitiveness among global communities. To achieve this, enhancing the quality of life of the Thai population from infancy to adulthood and old age is the utmost priority. Key strategies include encouraging brain development in the young generation, raising concerns in mental health promotion, and development of better healthcare innovations in the aging society. These issues are projected to be of growing importance in the near future. The Master Degree Program in Neuroscience (International program) curriculum is therefore revised to produce new generations of graduates that possess comprehensive and updated knowledge in neuroscience, and are capable of conducting research related to neuroscience that could contribute to the development and promotion of the human capital and the quality of life of the Thai people.

11.2 Social and Cultural Situation/Development

In recent years Thai society is facing many urgent problems that need to be solved. These include several mental health concerns such as psychological stress, drug addiction, aggression, depression, and suicide. Also, neurological and psychiatric problems in the older population are increasing rapidly due to an aging society. Thus, it is necessary that our society needs more experts in brain-related sciences that have knowledge about the development, protection, and rehabilitation of the human brain. The Master Degree Program in Neuroscience (International program) curriculum is therefore revised to create new graduates that can perform research to provide evidence-based knowledge that can solve current and future social issues relating to neurological and mental health.

12. The Effects Mentioned in No.11.1 and 11.2 on Curriculum Development and Relevance to the Missions of the University/Institution

12.1 Curriculum Development

According to the economic and social changes mentioned in item 11.1 and 11.2, the Institute of Molecular Biosciences, Mahidol University revised the M.Sc. curriculum (international graduate program) in neuroscience to comply with the regulation from the Faculty of Graduate Studies and to update the program's coursework with the increasing knowledge in this field. The main objective of curriculum revision is to create master's degree graduates with good capability in knowledge-based research together with robust ethical responsibility, effective information technology application, and a global mindset.

12.2 Relevance to the Missions of the University/Institution

This revised curriculum strongly supports the mission of Mahidol University to excel in health, sciences, arts, and innovation with integrity for the betterment of Thai society and the benefit of mankind. Also, this curriculum is relevant to the mission of the Institute of Molecular Biosciences to create excellence in basic and applied research, and to nurture graduates with the potential to generate research on par with international standards.

13. Collaboration with Other Curricula of the University (if any)

13.1 Course(s) offered by other faculties/departments/ programs: 1 course as follows:

SCID 500 Cell & Molecular Biology Credit 3(3-0-6)

13.2 Course(s) offered to other programs: None

13.3 Coordination: The program director coordinates with the course coordinator

Section 2 Information of the Curriculum

1. Philosophy, Justification, and Objectives of the Curriculum

1.1 Philosophy and Justification of the Curriculum

The philosophy of the Master Degree Program in Neuroscience is to generate qualified neuroscientists and experts in the field of brain sciences to serve the public and private sectors of Thai society. Compared with the developed countries, Thailand has only a few postgraduate programs in Neuroscience despite an increasing need for neuroscience specialists. This Master Degree Program in Neuroscience is therefore opened to educate enrolled students to have strong knowledge and skills in neuroscience-related research.

1.2 Objectives of the Program

Graduate students entitled Neuroscience's Master program will merit these characteristics according to graduate-level qualification framework:

1.2.1 Demonstrate academic moral and ethical performance emphasizing the ethical conduct in research related to animal and human experimentations, academic honesty, anti-plagiarism, intellectual property, and copyright issue.

1.2.2 Comprehend theoretical and practical knowledge and be capable of describing trends and technological advancements in the field of neuroscience.

1.2.3 Apply neuroscientific knowledge to solve problems and create new findings in neuroscience and related fields.

1.2.4 Show appropriate interpersonal relationships, perform effectively as a leader and member of the team, be responsible for individual and teamwork.

1.2.5 Apply suitable mathematical and statistical analysis, good communication skills, and appropriately use information technology for searching, processing, compiling, analyzing, and presenting data.

1.3 Program Learning Outcomes (PLOs)

1.3.1 Comprehend an appropriate ethical code of conduct, moral responsibility, and academic regulation in scientific experimentation.

1.3.2 Understand the neuroscience aspect of human behavior and mental health.

1.3.3 Apply neuroscientific knowledge and integrate knowledge to solve new scientific problems.

1.3.4 Implement leadership skills and be capable of working collaboratively with members as a team.

1.3.5 Demonstrate effective transferable skills including basic statistical analysis, communication, information technology for searching, processing, compiling, analyzing, and presenting data.

2. Plan for Development and Improvement

Plan for Development/Revision	Strategies	EEvidenceIndexes
1. The curriculum is to be revised every five years based on the policy of the Thai Commission of Higher Education.	Follow and evaluate the proceeding of the program every 5 years on a part of - Satisfaction of employer/ entrepreneur/ or those who hire graduate students - Satisfaction of current students, new graduates, and alumni - Weak point analysis	1. Satisfactory evaluation report. 2. Program proceeding report.
2. The curriculum is to be evaluated every year based on the ASEAN University Network Quality Assurance (AUN-QA) of Mahidol University (MU)	- Follow and evaluate the AUN-QA Self-Assessment Report (SAR) by university and institute internal audits every year.	1. Report on the MU AUN-QA assessment at the program level

Section 3 Educational Management System, Curriculum Implementation, and Structure

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.

1.2 Summer Session: None

1.3 Credit Equivalence to Semester System: None

2. Curriculum Implementation

2.1 Teaching Schedule

Weekdays from Monday to Friday (09:00 A.M. – 4:00 P.M.)

- Semester 1 August – December
- Semester 2 January – May

2.2 Qualifications of Prospective Students

1) Hold a Bachelor of Science degree in medical science or related fields, which accredited by the Office of the Higher Education Commission

2) Have a cumulative GPA not less than 2.50

3) Pass an English Proficiency test according to the requirement of the Faculty of Graduate Studies

4) Applicants with other qualifications indicated from 2-3 may be considered by the Program Director, committee and the Dean of Faculty of Graduate Studies.

2.3 Problems Encountered by New Students

2.3.1 English skills

2.3.2 Problem to study in higher education

2.3.3 Financial support

2.3.4 Differences in prior background knowledge in neuroscience

2.4 Strategies for Problem Solving/Limited Requirement in No.2.3

Problems of New Students	Strategies for Problem Solving
1. English skills	1. Encourage to study extra courses in English of Faculty of Graduate Studies
2. Problem to study in higher education	2. Appoint academic advisor 3. Encourage to study online or prerequisite courses in Neuroscience such as Foundation of Neuroscience (mux.mahidol.ac.th) or MBNS 610 Introductory Neuroscience
3. Financial support	4. Provide source of Scholarships from inside and outside Mahidol University
4. Differences in prior background knowledge in neuroscience	5. Provide the introductory course to attend before the start of the first semester. The credits for this course are not included in the number of credits required to study throughout the program. It is a non-credit course and assessed with the symbol AU (Audit).

2.5 Five-Year-Plan for Recruitment and Graduation of Students

Academic Year	2022	2023	2024	2025	2026
1	10	10	10	10	10
2	-	10	10	10	10
total	10	20	20	20	20
Expected number of students graduated	-	10	10	10	10

2.6 Budget based on the plan

Estimated income per student

Registration fee

Tuition (25 credits x 9,000 Baht/credit)	xxx,xxx Baht
Thesis (12 credits x 1,500 Baht/credit)	xx,xxx Baht
Thesis research fee	xxx,xxx Baht
Total income per student	**xxx,xxx Baht**

Estimated expenses

Variable expenses per student

College/university allocation	xx,xxx Baht
Position allowance of thesis advisor and committee	xx,xxx Baht
Total variable expenses per student	**xx,xxx Baht**

Fixed expenses

Staff salary	xxx,xxx Baht
Teaching payment	xxx,xxx Baht
Utility fee	x,xxx Baht
Material fee	x,xxx Baht
Thesis research fee	xx,xxx Baht
Total Fixed expenses	**xxx,xxx Bath**
Number of students at break-even point	2 Persons
Cost of students at break-even point	716,400.00 Baht
Expenses per student per academic year	**179,100.00 Baht**

2.7 Educational System: Classroom Mode.

2.8 Transfer of Credits, Courses and Cross University Registration (If any)

Credits transferring must be in compliance with Mahidol University's regulations on Graduate Studies. Should you have more information, please visit the Faculty of Graduate study (FGS) website: www.grad.mahidol.ac.th.

3. Curriculum and Instructors

3.1 Curriculum

3.1.1 Number of credits (not less than) 36 credits

3.1.2 Curriculum Structure

The curriculum structure is set in compliance with the Announcement of Ministry of Education on the subject of Criteria and Standards of Graduate Studies B.E. 2558, Master Degree, Plan A2 as below:

1) Prerequisite Courses	Non credit (audit)
2) Required courses	19 credits
3) Elective courses not less than	5 credits
4) Thesis	12 credits
Total not less than	**36 credits**

3.1.3 Courses in the curriculum

1) Prerequisite Courses

Credits (lecture – practice – self-study)

MBNS 610 Introductory Neuroscience 1(1-0-2)

ชมปว ๖๑๐ ประสาทวิทยาศาสตร์เบื้องต้น#

MBNS 610 Introductory Neuroscience prerequisite course is required only for students without prior knowledge of neuroscience, or with a consent of faculty, to register before starting the 1st semester of the 1st academic year. The prerequisite course is a non-credit and will not count towards a requirement to complete the degree, and grant only "audit (AU)" grade for students who pass this course.

2) Required Courses 19 Credits

Credits (lecture – practice – self-study)

SCID 500 Cell & Molecular Biology 3(3-0-6)

วทคร ๕๐๐ ชีววิทยาระดับเซลล์และโมเลกุล

MBNS 600 Neurobiology 3(2-2-5)

ชมปว ๖๐๐ ประสาทชีววิทยา

MBNS 603 Neuropsycho Pharmacology 2(2-0-4)

ชมปว ๖๐๓ เภสัชวิทยาจิตประสาท

MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)

ชมปว ๖๐๔ เทคนิคและวิทยาระเบียบวิธีวิจัยทางประสาทวิทยาศาสตร์

MBNS 605 Neurochemistry 2(2-0-4)

ชมปว ๖๐๕ ประสาทเคมี

* MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2)

ชมปว ๖๐๘ หมุนเวียนฝึกงานในห้องปฏิบัติการทางประสาทวิทยาศาสตร์

MBNS 650 Developmental Neuroscience 2(2-0-4)

ชมปว ๖๕๐ ประสาทวิทยาศาสตร์เชิงพัฒนาการ

MBNS 691 Seminars in Neuroscience 1(1-0-2)

ชมปว ๖๙๑ สัมมนาทางประสาทวิทยาศาสตร์

MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)

ชมปว ๖๙๕ สัมมนาในการวิจัยปัจจุบันทางประสาทวิทยาศาสตร์

3) Elective Courses not less than 5 Credits

	Credits (lecture – practice – self-study)
MBNS 606 Current Topics in Neuroscience	2(2-0-4)
ชมปว ๖๐๖ หัวข้อปัจจุบันทางประสาทวิทยาศาสตร์	
* MBNS 658 Animal Experimentation in Neuroscience	1(0-2-1)
ชมปว ๖๕๘ การทดลองโดยใช้สัตว์ทดลองทางประสาทวิทยาศาสตร์	
* MBNS 659 Microtechniques in Neuroscience Research	1(0-2-1)
ชมปว ๖๕๙ ไมโครเทคนิคทางการวิจัยประสาทวิทยาศาสตร์	
MBNS 651 Neuroendocrinology	2(2-0-4)
ชมปว ๖๕๑ ประสาทชีววิทยาของระบบต่อมไร้ท่อ	
MBNS 655 Pathogenesis of Neurological Diseases	2(2-0-4)
ชมปว ๖๕๕ พยาธิกำเนิดของโรคทางระบบประสาท	

In addition to elective courses mentioned above, a student may register for other courses in the international program offered by other faculties equivalent to graduate studies, Mahidol University, or the ones offered by other universities according to the student's interest with the approval of the curriculum committee or the advisor.

4) Thesis

	Credits (lecture – practice – self-study)
MBNS 698 Thesis	12(0-36-0)
ชมปว ๖๙๘ วิทยานิพนธ์	

3.1.4 Research Project of the Program

Guidelines for conducting a research project are as follows:

1) Neurobiology and factor-related neurodegenerative diseases and aging
2) Nevelopmental neuroscience, fetal programming of neurodevelopmental disorders and neuropsychiatric disorders
3) Neuroinflammation induced by toxic substances, brain injury or stress environment: the implication on the therapeutic intervention
4) Acute and chronic neurotoxicity and their effects on neuronal fates and animal behaviors
5) Factors modulating cognitive function and brain physiology by electroencephalography (EEG) methods
6) Neurobiology and clinical signs and symptoms of psychological disorders related to anatomical, physiological and cellular, and molecular perspectives
7) Molecular and physiological basis of cardiovascular diseases and neuronal injury
8) Factors modulating sleep and its underlying clock gene regulation
9) Structural biology of proteins related to neurological and neuropsychiatric disorders

3.1.5 Definition of Course Codes

Four main alphabets are defined as follows:

The first two alphabets are abbreviations of the faculty offering the course.

ชม (MB) mean Institute of Molecular Biosciences

วท (SC) mean Faculty of Science

The latter two alphabets are abbreviations of the department or the major offering the course.

ปว (NS) mean Neuroscience

คร (ID) mean Inter-departmental Course

The 3 digits of numbers 5xx and 6xx indicate that the courses are for the graduate study level.

3.1.6 Study Plan

Year	Semester 1	Semester 2
1	SCID 500 Cell & Mol Biology 3(3-0-6) MBNS 600 Neurobiology 3(2-2-5) MBNS 605 Neurochemistry 2(2-0-4) Elective 4 credits **Total 12 credits**	MBNS 603 Neuropsycho Pharmacology 2(2-0-4) MBNS 650 Developmental Neuroscience 2(2-0-4) MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5) MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2) Elective 1 credits **Total 10 credits**
Year	**Semester 1**	**Semester 2**
2	MBNS 691 Seminar in Neuroscience 1(1-0-2) MBNS 698 Thesis 8(0-24-0) **Total 9 credits**	MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2) MBNS 698 Thesis 4(0-12-0) **Total 5 credits**

3.1.7 Course Description

Please see Appendix A.

3.3 Name, I.D. Number, Title and Degree of Instructors

3.2.1 Full-time instructors of the curriculum (Please see Appendix B**)**

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
1.	xxxxxxxxxxxxx Professor Dr. Banthit Chetsawang	Ph.D. (Neurosciences) Mahidol University: 1998 M.Sc. (Neurosciences) Mahidol University: 1989 B.Sc. (Medical Technology) Chiang Mai University: 1987	Research Center for Neuroscience, Institute of Molecular Biosciences
2.	xxxxxxxxxxxxx Associate Professor Dr. Nuanchan Chutabhakdikul	Ph.D. (Neurosciences) Mahidol University: 1998 M.Sc. (Neurosciences) Mahidol University: 1991 B.Sc. (Physical Therapy) Mahidol University 1987	Research Center for Neuroscience, Institute of Molecular Biosciences
3.	xxxxxxxxxxxxx Associate Professor Dr. Vorasith Siripornpanich, M.D.	Ph.D. (Neurosciences) Mahidol University: 2018 Diploma Thai Board (Pediatric Neurology) Mahidol University: 2008 Diploma Thai Board (Pediatrics) Mahidol University: 2006 M.D. (First-Class Honors) Mahidol University: 2000	Research Center for Neuroscience, Institute of Molecular Biosciences

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
4.	xxxxxxxxxxxxx Assistant Professor Dr. Sujira Mukda	Ph.D. (Neurosciences) Mahidol University: 2006 M.Sc. (Neurosciences) Mahidol University: 2001 B.Sc. (Occupational Therapy) Chiang Mai University: 1997	Research Center for Neuroscience, Institute of Molecular Biosciences
5.	xxxxxxxxxxxxx Assistant Professor Dr. Sukonthar Ngampramuan	Ph.D. (Neurosciences) Mahidol University: 2008 M.Sc. (Neurosciences) Mahidol University: 2002 B.Sc. (Physical Therapy) Srinakharinwirot University: 1997	Research Center for Neuroscience, Institute of Molecular Biosciences
6.	xxxxxxxxxxxxx Lecturer Dr. Jiraporn Panmanee	Ph.D. (Biological Sciences) University of Liverpool, United Kingdom: 2020 M.Sc. (Neurosciences) Mahidol University: 2015 B.Sc. (Biology) (First-Class Honors) Silpakorn University: 2012	Research Center for Neuroscience, Institute of Molecular Biosciences

3.2.2 Full-time instructors -

3.2.3 Part-time instructors

The part-time instructors will be appointed as appropriate

4. Details of Practicum: None

5. Thesis requirement

The research topic must cover research in neuroscience that aims to generate new findings in neuroscience or explore some research interests shown in section 3.1.4. The student individually conducts his/her research experiment and strictly submit progress reports timely indicated by the program.

5.1 Short Description

Identifying research topic; research proposal; conducting research with a concern of research ethics; data collection; analysis; interpretation of the result and report the result in terms of thesis.

5.2 Standard Learning Outcomes

Students are able to analyze core knowledge in the field of neuroscience and develop research proposals to be presented, and conduct experiments to generate new findings in neuroscience.

5.3 Time Frame

Semester 1 Academic Year 2

5.4 Number of credits 12 Credits

5.5 Preparation

Advising time must be provided including advice from advisors. Thesis information from official documents or websites must be continually revised and up-to-date.

5.6 Evaluation Process

The research process shall be evaluated by the advisor of the student's thesis every time of consultation during conducting the research. The final oral examination is systematically evaluated by the graduate committee following the standards of the Faculty of Graduate Studies, Mahidol University.

Section 4 Learning Outcome, Teaching Strategies and Evaluation

1. Development of Students' Specific Qualifications

Special Characteristics	Teaching Strategies or Student Activities
Demonstrate the characteristics of core values of Mahidol University M = Mastery A = Altruism H = Harmony I = Integrity D = Determination O = Originality L = Leadership	1. Organize and encourage students to join the activities promoting core values of Mahidol University by The Student Affairs Committee of Institute of Molecular Biosciences at least 2 activities/ semester such as - Wai Kru Ceremony (Teacher Appreciation Day) within the first semester - MB graduation party for distributing the graduated student's thesis work during September - Student seminar trip off-campus during October - Student's sport event arranged by the Faculty of Graduate Studies during second semester 2. Students participate in the national or international conferences to present their thesis work at least 1 conference before the graduation, for example TNS Thai Neuroscience Society conference, IBRO International brain research organization, SFN Society for Neuroscience meeting. 3. Students participate in soft skill activities arranged by Faculty of Graduate Studies at least 4 activities before taking thesis examination.

2. Development of Learning Outcome in Each Objective

Expected Outcome	Teaching Strategies	Evaluation Strategies
1. Morality and Ethics		
1.1 Display acts of honesty among themselves and colleagues, respect to organization's rules and regulations. 1.2 Follow academic code of ethics, including citing references with honesty and anti-plagiarism approach.	1) Describe and demonstrate the morality, ethics, and ethical code of conduct for researchers. 2) Encourage student's acts of honesty. 3) Give case examples of ethical and moral concerns in problem-solving. 4) Group discussion about problems related to morality and ethics. 5) Demonstrate the correct method of citing references, with case studies and assignments. 6) Assign research tasks, data collection, and presentation with an emphasis on honesty.	1) Evaluation from group activities. 2) Evaluation of student's punctuality in-class attendance and in presentations. 3) Evaluation from avoiding plagiarism in report submission. 4) Evaluation from research conducted by thesis supervisors.

Expected Outcome	Teaching Strategies	Evaluation Strategies
2. Knowledge		
2.1 Possess profound knowledge and comprehension in major principles and theories in the field of neuroscience. 2.2 Capable of searching trends in the body of knowledge.	1) Assign tasks for self-directed learning. 2) Lecture with emphasis on principles and theories, including experimental skills in the laboratory and self-directed learning. 3) Practicum and self-study. 4) Group discussion. 5) Self-directed research and writing reports.	1) Evaluation from the presentation of academic reports, research publications, answering of questions, and discussion between fellow students and instructors. 2) Evaluation from discussion of problems found in the thesis. 3) Evaluation from examination and laboratory performance. 4) Evaluation from submitted reports.
3. Intellectual Skill		
3.1 Apply knowledge and skills to solve problems appropriately. 3.2 Analyze and apply bodies of knowledge and be able to synthesize research articles, compiling experimental results by themselves, and generating new findings in neuroscience.	1) Assign topics for research and present research articles and publications. 2) Assign for a thesis proposal and conducting research. 3) Report results from research.	1) Evaluation from the presentation of assigned research articles and publications. 2) Written and oral examinations that permit students to explain concepts of problem-solving and apply knowledge in solving research questions. 3) Thesis defense examination

Expected Outcome	Teaching Strategies	Evaluation Strategies
4. Interpersonal Relationship and Responsibility		
4.1 Show appropriate interpersonal relationship with others. 4.2 Demonstrate responsibility in teamwork and individual assignment, display self-development, being a leader and a good member in group activities.	1) Group discussion and assignment 2) Assign case studies for a report. 3) Teaching from case studies with complex research questions that allow students to design and plan problem-solving methods as a group.	1) Evaluation from responsibility in assigned tasks. 2) Evaluation from direct observation during the group activity. 3) Evaluation from efficiency and efficacy of assigned tasks. 4) Evaluation of interpersonal skills from colleagues or related persons.
5. Mathematical Analytical Thinking, Communication Skills, and Information Technology Skills		
5.1 Utilize mathematical and statistical principles in the analysis of data. 5.2 Communicate and present research projects or academic works formally and informally. 5.3 Possess information technology skills for data mining, analyzing scientific data, and academic presentation.	1) Assign a presentation of analytical concepts in problem-solving by utilizing mathematical and statistical skills in problem analysis especially in the research process. 2) Practice writing original research articles and presenting research data. 3) Hands-on practice on information technology skills.	1) Evaluation from the academic presentation with suitable use of information technology, mathematical and statistical analyses in research articles and in student's research projects. 2) Evaluation from audience's satisfaction. 3) Evaluation from communication performance and from research proposal and thesis presentation. 4) Evaluation from the quality of presentation.

3. Curriculum Mapping

Please see Appendix C**.**

Section 5 Criteria for Student Evaluation

1. Grading System

The grading system and graduation shall be complied with the criteria stated in the Regulations of Mahidol University on Graduate studies. (For more information, visit FGS website www.grad.mahidol.ac.th)

2. Evaluation Process for the Learning Outcome of Students

2.1 Evaluation of the Learning Outcome

2.1.1 Evaluation at the courses level

The learning outcome of a student during taking the course is evaluated by written examination during mid-course and final examination, oral presentation, report, class observation, and thesis examination. The educational quality assurance system such as TQF and MU-AUN-QA was employed to evaluate the courses.

2.1.2 Evaluation at the program level

The educational quality assurance system such as TQF and MU-AUN-QA was employed to evaluate the learning outcome of students.

2.2 Evaluation of the Learning Outcome after Graduation

Provide students' learning outcomes from overall curriculum evaluation from employers' comments, and alumni's opinion.

3. Graduation Requirement

3.1 The study is accomplished followed the study plan

3.2 Students must complete courses as stated in the curriculum at least 24 credits and thesis 12 credits, in total 36 credits with a cumulative grade point average (CUM-GPA) at a minimum of 3.00.

3.3 Students must meet the English Competence Standard of Graduate Students, Mahidol University

3.4 Students must participate in professional and personal skills development activities, required by the Graduate Studies, Mahidol University.

3.5 Students must present the thesis and deliver the final oral defense to the Committee, appointed by the Faculty of Graduate Studies, and receive a "PASS". The final oral defense shall be open to the community.

3.6 Students must submit the final version of the thesis document following the Guidelines for the Submission and Format of Thesis by the Faculty of Graduate Studies.

3.7 The thesis or a part of the thesis are required to publish or accepted for publication in the national or international academic journal according to the regulation of the Thai Commission of Higher Education, or publish in the proceedings that are listed by the Faculty of Graduate Studies, Mahidol University.

Section 6 Faculty Development

1. The Orientation for New Faculty Members

1.1 First orientation is required for the new faculty members to know and understand the policies, philosophy of Mahidol University and the Institute.

1.2 The heads of programs are required to explain concerned disciplines, curriculum, the process of teaching, and assignments to the new faculty members.

1.3 To understand the process of mentoring and research, the new faculty members are encouraged to be a co-advisor of the thesis.

2. Skill and Knowledge Development for Faculty Members

2.1 Skills Development in Teaching and Evaluation

2.1.1 Provide workshops to develop skills on teaching and learning methods and quality assurance of the study program.

2.1.2 Allow the instructor to participate in the evaluation and revision of the curriculum and courses.

2.2 Other Academic and Professional Skill Development

2.2.1 Support instructors to do research, present or publish their research studies.

2.2.2 Support instructors to attend or participate in national/international meetings, training sessions, seminars, and conferences at other institutes and organizations.

Section 7 Quality Assurance

1. Regulatory Standard

1.1 The curriculum is implemented according to criteria set by the Thai Qualification Framework for Higher Education and quality assurance of Mahidol University

1.2 The instructors have academic degrees, knowledge, skill, and experience relevant to the knowledge content of the curriculum.

1.3 The teaching and learning evaluations have been evaluated in every course.

1.4 The thesis is published following the regulation of the Faculty of Graduate Studies.

1.5 The curriculum is revised and updated every 5 years.

2. Graduates

2.1 The students must pass all required and elective courses in the study plan and take thesis proposal examination, appoint thesis advisory committee, and take final thesis defense oral examination. The thesis defense examination committee must be appointed by the Faculty of Graduate Studies and composed of external and internal examiners. The thesis defense examination must be open to the public.

2.2 The thesis must comply with the regulations on thesis publishing for graduation in a Master's degree program announced by the Faculty of Graduate Studies.

2.3 The opinion and satisfaction of employers on M.Sc.'s graduates are evaluated.

3. Students

3.1 First orientation is required for the new students to know and understand the curriculum, study plan, and regulation or requirements of Mahidol University and Faculty of Graduate Studies.

3.2 The academic advisor is appointed to advise and support the students on studying and career path guidance. The academic advisor should set up office hours for meeting with the students. Moreover, the student affairs committee provides broad oversight and policy guidance to promote the co-curricular experience.

3.3 Complaints and Appeals Process on academic and other issues is available by person or document to the Dean of Faculty of Graduate Studies or the Director of the Institute.

3.4 Several activities are set up to promote and enhance the soft skills of the students.

4. Instructors

4.1 The recruitment of new faculty members must comply with the regulations of Mahidol University and the academic degree and qualifications of new faculty members must meet the criterion of the program, Institute, and Mahidol University.

4.2 Course coordinator and lecturers must have a meeting and discussion on teaching plan, student evaluation, and final grading approval in every course. Collective input information of need and expectation of students and stakeholders and teaching and learning evaluation is used to revise the curriculum and improve teaching and learning approaches which lead to achieving goal and objective of the curriculum, and desirable and special characteristics of the Ph.D. Graduates.

4.3 The students have the opportunity to explore more advanced knowledge and also to meet and interact with expert persons in the field by appointing the part-time instructors who have qualifications and experiences related to the knowledge contents of the courses. The part-time instructors must be considered by the program committee and approved by the program director.

5. Program, Study and Student Assessment

5.1 The quality and management of teaching and learning, open-close and revision of the curriculum and courses are directed by the program director and program committee.

5.2 The course coordinator is appointed in every course to coordinate lecturers and study programs to follow the course requirements, manage teaching and learning activities and evaluate the operation of the courses.

5.3 The full-time faculty staff is assigned to run the teaching and learning activities following the course requirements and develop the teaching plan and evaluation and assessment criteria.

5.4 The satisfaction on the study program and teaching and learning management are evaluated by Master graduates.

6. Learning Support

6.1 Faculty of Graduate Studies allocates budget to the study program for management and supporting learning and teaching activities.

6.2 Institute of Molecular Biosciences sufficiently provides lecture classrooms, research laboratories, research equipment facilities, and IT facilities.

6.3 Mahidol University Library and Knowledge Center provides textbooks, audiovisual materials, and electronic databases for students to search and update their knowledge. In addition, the Institute of Molecular Biosciences and study program provide specific textbooks for students to study during taking coursework and doing thesis research.

7. Key Performance Indicators

The neuroscience program, Research Center for Neuroscience divides key performance based on the curriculum that meets the standards of Thai Qualifications Framework following conditions: (1) the compulsory performance indicators (numbers 1-5) must pass beyond expectations and (2) the total number of performance indicators must reach their goal by no less than 80 percent each year. The Key Performance Indicators are as follows:

Key Performance Indicators	Academic Year				
	2022	2023	2024	2025	2026
1. At least 80% of all full-time instructors in each program have to participate in meetings that set up plans to evaluate and revise the curriculum.	√	√	√	√	√
2. The program must have the details of the curriculum according to TQF2 which is associated with the Thai Qualifications Framework or the standards of the program	√	√	√	√	√
3. The program must have course specifications and field experience specifications according to TQF3 before the beginning of each trimester	√	√	√	√	√
4. Instructors must produce course reports and file experience reports according to TQF5 within 30 days after the end of the trimester.	√	√	√	√	√
5. Instructors must produce program reports according to TQF7 within 60 days after the end of the academic year	√	√	√	√	√
6. Instructors must revise the grading of students according to learning standards indicated in TQF3 for at least 25 percent of courses that are offered each academic year.	√	√	√	√	√
7. Instructors must assess the development and/or improvement of teaching methods, teaching techniques or the grading system from the evaluation results in TQF 7 of the previous year.	–	√	√	√	√
8. Every new instructor has to participate in the orientation and receive adequate information on the college's teaching requirements.	√	√	√	√	√
9. Full-time instructors must demonstrate academic and/or professional improvement at least once a year.	√	√	√	√	√

Key Performance Indicators	Academic Year				
	2022	2023	2024	2025	2026
10. The number of supporting staff who demonstrate academic and/or professional improvement by at least 50 percent each year.	√	√	√	√	√
11. The level of satisfaction from the previous year's students and new graduates toward curriculum quality, with an average score of at least 3.5 out of 5	–	√	√	√	√
12. The level of satisfaction from employers of new graduates with an average score of at least 3.5 out of 5	–	–	√	√	√

Section 8 Evaluation and Improvement of the Curriculum Implementation

1. Evaluation on the Teaching Efficiency

1.1 Evaluation of Teaching Strategies

1.1.1 Analysis from students' evaluation towards courses and instructors

1.1.2 Analysis from the faculty meeting to exchange ideas or comments

1.1.3 Questionnaires from students

1.2 Evaluation of Instructors' Skills in Using Teaching Strategies

1.2.1 Analysis of students' evaluation towards courses and instructors

2. Overall Evaluation of the Curriculum

2.1 Survey on jobs of graduates

2.2 Curriculum evaluation from external expertise

2.3 Survey on employers' satisfaction with graduates

3. Evaluation of Curriculum Implementation in Accordance with the Curriculum

Evaluation is made annually by the chairman and instructors according to the key performance indicators of section 7, item 7. The curriculum committee must comprise 3

persons: 1) Program Director, 2) Program Secretary, and 3) Full-time Instructors. The criteria of curriculum revision are

"Fair" means the program does not cover the first 10 Key Performance Indicators,

"Good" means the program shows all first 10 Key Performance Indicators,

"Excellent" means the program has all Key Performance Indicators.

4. Review of the Evaluation and Plans for Improvement

4.1 Collecting all information, advice, and evaluations of the newly graduates, employers, stakeholders, and experts

4.2 Review and analyze the above information by the faculty member in-charge of the program

4.3 Presenting the improvement plan for the program

Appendix A
Course Description

1) Prerequisite Course

Credits (lecture – practice – self-study)

MBNS 610 Introductory Neuroscience 1(1-0-2)

ชมปว ๖๑๐ ประสาทวิทยาศาสตร์เบื้องต้น

Definitions and scope of neuroscience; the basic knowledge of neuron and the nervous tissue; generations of nerve impulse; neurotransmitters and hormones; an introduction to neuroanatomy; the external structure of the central nervous system; the early development of the nervous system; basic principles of the neuroscience research

นิยามและขอบเขตของประสาทวิทยาศาสตร์ ความรู้พื้นฐานเกี่ยวกับเนื้อเยื่อประสาทและระบบส่วนต่าง ๆ การสร้างกระแสประสาท สารสื่อประสาทและฮอร์โมน บทนำสู่ประสาทกายวิภาคศาสตร์ โครงสร้างภายนอกของระบบประสาทส่วนกลาง การพัฒนาขั้นต้นของระบบประสาท หลักการพื้นฐานของการวิจัยประสาทวิทยาศาสตร์

2) Required Courses

SCID 500 Cell & Molecular Biology 3(3-0-6)

วทคร ๕๐๐ ชีววิทยาระดับเซลล์และโมเลกุล

Cell structure and function; life and information flow in cell, energy flow in biosystem; cell signaling; cell division; cellular differentiation; cell death and development

โครงสร้างและหน้าที่ของเซลล์ ชีวิตและการส่งผ่านข้อมูลภายในเซลล์ การส่งผ่านพลังงานในระบบชีวภาพ การส่งสัญญาณของเซลล์ การแบ่งตัวของเซลล์ การพัฒนาเป็นเซลล์ชนิดจำเพาะ การตายและการพัฒนาของเซลล์

Credits (lecture – practice – self-study)

MBNS 600 Neurobiology 3(2-2-5)

ชมปว ๖๐๐ ประสาทชีววิทยา

Current theories and laboratory practice on the human nervous system; the relationship between the nervous system and behaviors; the ultrastructure of cells in the nervous tissue; cellular functions of neurons and glial cells; electrophysiology of the neuron; supporting structures of the central nervous system; the internal organization of the spinal cord, brainstem, cerebellum, and forebrain; the motor system and the control of movement; the sensory system and special sensory organs; brain and the control of homeostasis; emotion and motivation; memory and learning; higher cognitive functions of the cerebrum, language and the executive function; the evolution of the nervous system

ทฤษฎีปัจจุบันและการฝึกปฏิบัติการในระบบประสาทของมนุษย์ ความสัมพันธ์ระหว่างระบบประสาทและพฤติกรรม โครงสร้างระดับละเอียดของเซลล์ในเนื้อเยื่อประสาท การทำงานระดับเซลล์ของเซลล์ประสาทและเซลล์เกลีย สรีรวิทยาไฟฟ้าของเซลล์ประสาท โครงสร้างค้ำจุนของระบบประสาทส่วนกลาง การจัดโครงสร้างภายในไขสันหลัง ก้านสมอง เซรีเบลลัม และสมองส่วนหน้า ระบบสั่งการและการควบคุมการเคลื่อนไหว ระบบการรับความรู้สึกและอวัยวะรับสัมผัสพิเศษ สมองกับการควบคุมภาวะธำรงดุล อารมณ์และแรงจูงใจ การจดจำเรียนรู้ หน้าที่ด้านการรู้คิดระดับสูงของสมอง วิวัฒนาการของระบบประสาท

MBNS 603 Neuropsycho Pharmacology 2(2-0-4)

ชมปว ๖๐๓ เภสัชวิทยาจิตประสาท

Drug actions on the nervous system comprising areas of the investigation of critical importance to science and medicine; the mechanisms by which drugs alter brain functions; medications used to treat a wide range of neurological and psychiatric disorders as well as drugs of abuse

การออกฤทธิ์ของยาต่อระบบประสาท ส่วนของการตรวจสอบความสำคัญเชิงวิพากษ์ที่มีต่อทางวิทยาศาสตร์และการแพทย์ กลไกการออกฤทธิ์ของยาต่อการทำงานของสมอง การใช้ยาการรักษาโรคความผิดปกติทางจิตประสาท และการติดสารเสพติดในวงกว้าง

Credits (lecture – practice – self-study)

MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)

ชมปว ๖๐๔ เทคนิคและวิทยาระเบียบวิธีวิจัยทางประสาทวิทยาศาสตร์

The principles and methods used in the research process in neuroscience; fundamental skills required to assess the data generation and collecting; research ethics; research strategy and design; research practice; writing up research proposals; data analyses and interpretation; and presentations of the research results

หลักการและวิธีการที่ใช้ในการวิจัยทางประสาทวิทยาศาสตร์ ทักษะพื้นฐานที่จำเป็นในการวิเคราะห์ข้อมูล จรรยาบรรณการวิจัย กลยุทธ์และการออกแบบการวิจัย ฝึกปฏิบัติการทำวิจัย การเขียนข้อเสนอโครงการวิจัย การวิเคราะห์และแปลผลข้อมูล และการนำเสนอผลการวิจัย

MBNS 605 Neurochemistry 2(2-0-4)

ชมปว ๖๐๕ ประสาทเคมี

Principles of the chemical transmission; the second messenger; the signaling transduction; neurotransmitters; neurotransmitter receptors; the nuclear hormone receptor signaling; advances in the neuronal stem cells research and the molecular modeling for neuroscience

หลักการของการสื่อสารด้วยสารเคมี สารสื่อสัญญาณตัวที่สอง วิถีการนำส่งสัญญาณ สารสื่อประสาท ตัวต้อนรับสารสื่อประสาท สัญญาณของตัวต้อนรับฮอร์โมนที่นิวเคลียส ความก้าวหน้าในการวิจัยของเซลล์ประสาทต้นกำเนิดและแบบจำลองระดับโมเลกุลสำหรับประสาทวิทยาศาสตร์

MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2)

ชมปว ๖๐๘ หมุนเวียนฝึกงานในห้องปฏิบัติการทางประสาทวิทยาศาสตร์

Rotation training in different neuroscience’s laboratories; experimental design; performing experiments with research ethics awareness; analyzing and interpreting the experimental data; presentations of the results via a short seminar; research report

หมุนเวียนฝึกงานในห้องปฏิบัติการทางประสาทวิทยาศาสตร์ ออกแบบการทดลอง ดำเนินการทดลองอย่างมีจริยธรรม การสังเคราะห์ข้อมูลและการแปลผลที่ได้จากการทดลอง การนำเสนอข้อมูลในรูปแบบสัมมนาสั้น ๆ การเขียนรายงาน

Credits (lecture – practice – self-study)

MBNS 650 Developmental Neuroscience 2(2-0-4)

ชมปว ๖๕๐ ประสาทวิทยาศาสตร์เชิงพัฒนาการ

Current concepts concerning the cellular and molecular mechanisms of the brain development e.g., the neural induction and neurulation; the neural patterning; the neurogenesis; the neural determination and differentiation; the neural migration and cortical lamination; the axonal growth and guidance; the synapse formation and refinement; the programmed cell death; Roles of neurotrophic factors in brain development; the development of interneurons; the development of glial cells; the development of the neural crest; neural regeneration and repair; the neural correlate of the behavioral development; and factors affecting the brain development

แนวคิดปัจจุบันและความรู้เกี่ยวกับกลไกระดับเซลล์และโมเลกุลของการพัฒนาสมอง ขบวนการเหนี่ยวนำให้เกิดระบบประสาทและการปิดของท่อประสาท การกำหนดขอบเขตของสมองส่วนต่างๆ การเกิดของเซลล์ชนิดต่าง ๆ ในระบบประสาท การอพยพของเซลล์ประสาทและการเกิดชั้นในเปลือกสมอง การงอกของเส้นใยประสาท การสร้างจุดเชื่อมต่อสัญญาณประสาทและการปรับแต่งวงจรประสาท การตายของเซลล์ประสาทในระหว่างพัฒนาการ บทบาทของสารกระตุ้นการเจริญเติบโตของเซลล์ประสาทต่อการพัฒนาสมอง พัฒนาการของเซลล์เกลีย พัฒนาการของเซลล์นิวรัลเครส การฟื้นฟูและซ่อมแซมระบบประสาท ความสัมพันธ์ระหว่างการพัฒนาสมองกับพฤติกรรม และปัจจัยที่ส่งผลต่อการพัฒนาสมอง

MBNS 691 Seminars in Neuroscience 1(1-0-2)

ชมปว ๖๙๑ สัมมนาทางประสาทวิทยาศาสตร์

Presentations and discussions articles from technical journals; the content area of the thesis conduction in neuroscience; morality and ethics of being a neuroscientist

การนำเสนอและอภิปรายบทความจากวารสารวิชาการ ขอบเขตของเนื้อหาเกี่ยวกับการทำวิทยานิพนธ์ทางด้านประสาทวิทยาศาสตร์ คุณธรรม จริยธรรมของการเป็นนักประสาทวิทยาศาสตร์

MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)

ชมปว ๖๙๕ สัมมนาในการวิจัยปัจจุบันทางประสาทวิทยาศาสตร์

Presenting and discussing articles about the current research in neuroscience; the research articles integration; the correlation of selected research topics with the thesis research

การนำเสนอและอธิบายบทความจากวารสารวิชาการเกี่ยวกับการวิจัยในปัจจุบันทางประสาทวิทยาศาสตร์ บูรณาการบทความวิจัย ความสัมพันธ์ของหัวข้อวิจัยที่ถูกเลือกกับการวิจัยวิทยานิพนธ์

2) Elective courses

Credits (lecture – practice – self-study)

MBNS 606 Current Topics in Neuroscience 2(2-0-4)

ชมปว ๖๐๖ หัวข้อปัจจุบันทางประสาทวิทยาศาสตร์

Interpretations; critical reviews and discussions of recent special articles, reviewing articles or research articles related to the current knowledge and technology in neuroscience

การแปลผล วิเคราะห์และวิจารณ์ข้อมูลจากบทความพิเศษ บทความฟื้นฟูวิชาการหรือบทความวิจัยที่เกี่ยวข้องกับความรู้และวิทยาการใหม่ ๆ ทางด้านประสาทวิทยาศาสตร์

MBNS 658 Animal Experimentation in Neuroscience 1(0-2-1)

ชมปว ๖๕๘ การทดลองโดยใช้สัตว์ทดลองทางประสาทวิทยาศาสตร์

Practice animal research techniques in neuroscience, ethical conduct following animal ethic rules, comprehensive knowledge in animal research techniques to solve scientific research questions.

ฝึกปฏิบัติเทคนิคการใช้สัตว์ทดลองในการวิจัยทางประสาทวิทยาศาสตร์ จริยธรรมในการทำวิจัยในสัตว์ ความรู้เชิงลึกเกี่ยวกับเทคนิคในการทำวิจัยในสัตว์ทดลองเพื่อแก้ปัญหาวิจัยเชิงวิทยาศาสตร์

MBNS 659 Microtechniques in Neuroscience Research 1(0-2-1)

ชมปว ๖๕๙ ไมโครเทคนิคทางการวิจัยประสาทวิทยาศาสตร์

Practical sessions of the paraffin method, cryosectioning and immunohistochemical techniques; the analyses and discussions of results

การฝึกปฏิบัติการเตรียมชิ้นเนื้อโดยเทคนิคพาราฟิน การตัดชิ้นเนื้อแช่แข็งและเทคนิคทางอิมมูโนฮิสโตเคมี การวิเคราะห์และอภิปรายผลงาน

MBNS 651 Neuroendocrinology 2(2-0-4)

ชมปว ๖๕๑ ประสาทชีววิทยาของระบบต่อมไร้ท่อ

Theoretical and experimental studies of the relationships between the nervous system and the endocrine glands; neural controls of endocrine functions; endocrine and hormonal influences on the development and function of the nervous system and their behavioural correlates to organs

ทฤษฎีและการศึกษาทดลองถึงความสัมพันธ์ระหว่างระบบประสาทกับต่อมไร้ท่อ กลไกการควบคุมการทำงาน ของฮอร์โมน ผ่านระบบประสาท เพื่อควบคุมการทำงานของร่างกาย และพฤติกรรม และอิทธิพลของฮอร์โมนต่อการเจริญเติบโต พัฒนาการและการทำงานของระบบประสาทควบคุมการทำงานของอวัยวะ

Credits (lecture – practice – self-study)

MBNS 655 Pathogenesis of Neurological Diseases 2(2-0-4)

ชมปว ๖๕๕ พยาธิกำเนิดของโรคทางระบบประสาท

Mechanism of neurological diseases; inflammation; neural and glia response to the injury; the pathological investigation; brain edema and hydrocephalus; neurogenetic diseases; aging and neurodegenerative diseases; autoimmune diseases of the control nervous the system; the cerebrovascular disease; the brain tumor; the CNS infection; the congenital control nervous the system malformation; brain and spinal cord injuries; toxic and metabolic diseases of the nervous system; neurocutaneous syndromes; clinico-pathological correlation

กลไกของโรคทางระบบประสาท การอักเสบ การตอบสนองของเซลล์ประสาทและเซลล์เกลียต่ออันตราย การตรวจทางพยาธิวิทยา ภาวะสมองบวมและน้ำไขสันหลังคั่งในสมอง โรคพันธุกรรมทางระบบประสาท ความชราและกลุ่มโรคความเสื่อมของระบบประสาท กลุ่มโรคแพ้ภูมิตนเองของระบบประสาท โรคหลอดเลือดสมอง เนื้องอกสมอง การติดเชื้อของระบบประสาทส่วนกลาง ความผิดปกติของระบบประสาทส่วนกลางตั้งแต่กำเนิด การได้รับบาดเจ็บของสมองและไขสันหลัง สารพิษและโรคทางเมตาบอลิคของระบบประสาท กลุ่มโรคระบบประสาทที่มีอาการแสดงทางผิวหนัง ความเชื่อมโยงระหว่างอาการทางคลินิกและพยาธิวิทยา

(3) Thesis

Credits (lecture – practice – self-study)

MBNS 698 Thesis 12(0-36-0)

ชมปว ๖๙๘ วิทยานิพนธ์

Identifying research proposals; conducting research with a concern of research ethics; data collections; analyses; interpretating of the results and reporting the results in terms of theses; presenting and publishing research in standard journals or conference’s proceedings

การกำหนดโครงการวิจัย การเสนอเค้าโครงวิจัย การศึกษาวิจัยอย่างมีจริยธรรม การคัดกรองข้อมูล การวิเคราะห์ข้อมูล การสังเคราะห์และวิพากษ์ผลการวิจัย การนำผลการวิจัยมาเรียบเรียงเป็นวิทยานิพนธ์ การนำเสนอวิทยานิพนธ์ การเรียบเรียงผลงานวิจัยเพื่อเผยแพร่ การเผยแพร่ผลงานวิจัยในวารสารหรือสิ่งพิมพ์ทางวิชาการ หรือเสนอต่อที่ประชุมวิชาการ จริยธรรมในการเผยแพร่ผลงานวิจัย

Appendix B

Curriculum Vitae of the Faculty in Charge of the Program

1. Name Professor Dr. Banthit Chetsawang

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Neurosciences	Mahidol University	1998
M.Sc.	Neurosciences	Mahidol University	1989
B.Sc.	Medical Technology	Chiang Mai University	1987

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. Neuroscience
2. Molecular Neurobiology

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Published research work	Premratanachai A, Suwanjang W, Govitrapong P, Chetsawang J, **Chetsawang B.** Melatonin prevents calcineurin-activated the nuclear translocation of nuclear factor of activated T-cells in human neuroblastoma SH-SY5Y cells undergoing hydrogen peroxide-induced cell death. J Chem Neuroanat. 2020;106:101793.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Metasuk A, Kitiyanant N, **Chetsawang B.** Expression of nano-ferritin in neuronal cells encompassed by minimal Arc promoter system. Biochem Biophys Res Commun. 2020;526(3):574-79.	12, 1	2020
	Hein ZM, Kraiwattanapirom N, Mukda S, **Chetsawang B.** The induction of Neuron-Glial2 (NG2) expressing cells in methamphetamine toxicity-induced neuroinflammation in rat brain are averted by melatonin. J Neuroimmunol. 2020;344:577232.	12, 1	2020
	Phonchai R, Phermthai T, Kitiyanant N, Suwanjang W, Kotchabhakdi N, **Chetsawang B.** Potential effects and molecular mechanisms of melatonin on the dopaminergic neuronal differentiation of human amniotic fluid mesenchymal stem cells. Neurochem Int. 2019;124:82-93.	12, 1	2019
	Chetsawang J, Nudmamud-Thanoi S, Kraiwattanapirom N, Siripornpanich V, Unharasamee W, **Chetsawang B.** The effect of methamphetamine-induced neurodegeneration and psychiatric disorders on cognitive impairment in methamphetamine abusers in Thailand. J Public Hlth Dev. 2019;17(1):15-29.	13, 0.8	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Abubakar Z, Chetsawang J, **Chetsawang B.** Roles of calpastatin overexpression on methamphetamine toxicity-induced mitochondrial dysfunction and cell degeneration in human neuroblastoma SH-SY5Y cells. SMJ. 2019;71(Suppl 1):S180-S186.	13, 0.8	2019
	Muangsab J, Prommeenate P, **Chetsawang B**, Chonpathompikunlert P, Sukketsiri W, Hutamekalin P. Protective effect of valproic acid on MPP+-induced neurotoxicity in dopaminergic SH-SY5Y cells through Cdk5/p35/Erk signaling cascade. Trop J Pharm Res 2019;18 (11):2255-61.	12, 1	2019
	Suwanjang W, Wu KLH, Prachayasittikul S, **Chetsawang B**, Charngkaew K. Mitochondrial Dynamics Impairment in Dexamethasone-Treated Neuronal Cells. Neurochem Res. 2019;44(7):1567-81.	12,1	2019
	Chatchaisak D, **Chetsawang B**, Chetsawang J. Effects of melatonin on dexamethasone-induced inflammation in trigeminal ganglion of mice. SMJ. 2019;71(Suppl 1):S175-S179.	13, 0.8	2019
	Wisessmith W, Shimizu T, Li J, Abe M, Sakimura K, **Chetsawang B**, Tanaka KF, Suzumura A, Tohyama K, Ikenaka K. Cathepsin C Modulates Myelin Oligodendrocyte Glycoprotein-induced Experimental Autoimmune Encephalomyelitis. J Neurochem. 2019;148(3):413-25.	12,1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Chetsawang J, Nudmamud-Thanoi S, Phonchai R, Abubakar Z, Govitrapong P, **Chetsawang B**. Methamphetamine toxicity-induced calcineurin activation, nuclear translocation of nuclear factor of activated T-cells and elevation of cyclooxygenase 2 levels are averted by calpastatin overexpression in neuroblastoma SH-SY5Y cells. Neurotoxicology. 2018;67:287-95.	12,1	2018
	Chatchaisak D, Connor M, Srikiatkhachorn A, **Chetsawang B.** The potentiating effect of calcitonin gene-related peptide on transient receptor potential vanilloid-1 activity and the electrophysiological responses of rat trigeminal neurons to nociceptive stimuli. J Physiol Sci. 2018;68(3):261-68	12, 1	2018

Current Teaching Load

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 603 Neuropsycho Pharmacology 2(2-0-4)
3. MBNS 605 Neurochemistry 2(2-0-4)
4. MBNS 607 Advanced Research Project in Neuroscience 3(0-9-3)
5. MBNS 691 Seminars in Neuroscience 1(1-0-2)
6. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
7. MBNS 650 Developmental Neuroscience 2(2-0-4)
8. MBNS 606 Current Topics in Neuroscience 1(1-1-2)
9. MBNS 656 Behavioral and Cognitive Neuroscience 3(3-0-6)
10. MBNS 698 Thesis 12(0-48-0)

Assigned Teaching Load for the Revised Program

1. MBNS 610 Introductory Neuroscience	1(1-0-2)
2. MBNS 600 Neurobiology	3(2-2-5)
3. MBNS 603 Neuropsycho Pharmacology	2(2-0-4)
4. MBNS 605 Neurochemistry	2(2-0-4)
5. MBNS 608 Laboratory Rotation Training in Neuroscience	2(0-4-2)
6. MBNS 691 Seminars in Neuroscience	1(1-0-2)
7. MBNS 695 Seminars in Current Research in Neuroscience	1(1-0-2)
8. MBNS 650 Developmental Neuroscience	2(2-0-4)
9. MBNS 651 Neuroendocrinology	2(2-0-4)
10.MBNS 606 Current Topics in Neuroscience	2(2-0-4)
11.MBNS 698 Thesis	12(0-36-0)

2.Name: Associate Professor Dr. Nuanchan Chutabhakdikul

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Neurosciences	Mahidol University	1998
M.Sc.	Neurosciences	Mahidol University	1991
B.Sc.	Physical Therapy	Mahidol University	1987

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. Molecular mechanisms of early life stress on brain development
2. Pre- and Postnatal Programming of Brain Development and possibility to reprogramed
3. Development of Executive function, metacognition, and Self-regulation in children and adolescence
4. Neuroscience and Education

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Published research work	Lertladaluck K, Suppalarkbunlue W, Moriguchi Y, **Chutabhakdikul N**. School-Based Mindfulness Intervention Improves Executive Functions and Self-Regulation in Preschoolers at Risk. TJBS. 2021;16(2):58-72.	12, 1	2021
	Kolaka R, Vanichviriyakit R, **Chutabhakdikul N.** Effects of maternal stress on Reelin signaling	9, 0.6	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	and migration of GABAergic interneurons in the prefrontal cortex of postnatal rats. JMHS. 2021;28(1):40-54.		
	Chounchay S**, Chutabhakdikul N.** Effects of deferoxamine on the survival of the neuroblastoma SH-SY5Y cells and neuroimmune response in the BV-2 microglial cells. JMHS. 2020;7(3):100-11.	9, 0.6	2020
	Lukseng T, Siripornpanich, V, **Chutabhakdikul N.** Long-Term Vipassana Meditation Enhances Executive Function in Adult Meditators. SMJ. 2020;72(4):343-51.	12, 1	2020
	Lertladaluck K, **Chutabhakdikul N**, Chevalier N, Moriguchi Y. Effects of social and nonsocial reward on executive function in preschoolers. Brain Behav. 2020:e01763	12,1	2020
	Chounchay S, Noctor SC, **Chutabhakdikul N**. Microglia enhances proliferation of neural progenitor cells in an in vitro model of hypoxic-ischemic injury. EXCLI J. 2020;19:950-61.	12, 1	2020
	Siripornpanich V, Visudtibhan A, Kotchabhakdi N, **Chutabhakdikul N.** Delayed cortical maturation at the centrotemporal brain regions in patients with benign childhood epilepsy with centrotemporal spikes (BCECTS). Epilepsy Res. 2019;154:124-31.	12, 1	2019
	Kolaka R, Chotwiwatthanakun C, **Chutabhakdikul N.** Fetal exposure to high	12, 1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	levels of maternal glucocorticoids alters reelin signaling in the prefrontal cortex of rat pups. Int J Dev Neurosci. 2019;78:185-90.		
	Seamkhumhom D, Nookong A, Somsiri Rungamornrat S, **Chutabhakdikul N.** Factors Related to Executive Functions in Preschool-Aged Children. JTNMC. 2019;34(4):80-94.	9, 0.6	2019
	Siripornpanich V, Sampoon K, Chaithirayanon S, Kotchabhakdi N, and **Chutabhakdikul N.** Enhancing Brain Maturation Through a Mindfulness-Based Education in Elementary School Children: a Quantitative EEG Study. Mindfulness. 2018;9(6):1877-84.	12, 1	2018

Current Teaching Load

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 605 Neurochemistry 2(2-0-4)
3. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
4. MBNS 691 Seminars in Neuroscience 1(1-0-2)
5. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
6. MBNS 650 Developmental Neuroscience 2(2-0-4)
7. MBNS 656 Behavioral and Cognitive Neuroscience 3(2-2-5)
8. MBNS 606 Current Topics in Neuroscience 1(1-0-2)
9. MBNS 607 Advanced Research Project in Neuroscience 3(0-9-3)

Assigned Teaching Load for the Revised Program

1. MBNS 610 Introductory Neuroscience	1(1-0-2)
2. MBNS 600 Neurobiology	3(2-2-5)
3. MBNS 604 Research Methodology and Techniques in Neuroscience	3(2-2-5)
4. MBNS 605 Neurochemistry	2(2-0-4)
5. MBNS 608 Laboratory Rotation Training in Neuroscience	2(0-4-2)
6. MBNS 650 Developmental Neuroscience	2(2-0-4)
7. MBNS 651 Neuroendocrinology	2(2-0-4)
8. MBNS 691 Seminars in Neuroscience	1(1-0-2)
9. MBNS 695 Seminars in Current Research in Neuroscience	11-0-2)
10.MBNS 606 Current Topics in Neuroscience	2(2-0-4)
11.MBNS 698 Thesis	12(0-36-0)

3. Name Associate Professor Dr. Vorasith Siripornpanich

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Neurosciences	Mahidol University	2018
Diploma Thai Board	Pediatric Neurology	Mahidol University	2008
Diploma Thai Board	Pediatrics	Mahidol University	2006
M.D. (First-Class Honors)	-	Mahidol University	2000

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. Factors affecting cognitive functions especially for the ways to improve cognitive ability
2. The biological and electrophysiological markers of neurological, psychiatric and brain developmental disorders for using in diagnosis, prognosis, and follow-up of these diseases
3. Pathogenesis of neurological and psychiatric disorders

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Published research work	Ajjimaporn A, Ramyarangsi P, **Siripornpanich V**. Effects of a 20-min nap after sleep deprivation on brain activity and soccer performance. Int J Sports Med. 2020;41(14): 1009-16.	12, 1	2020
	Kaewcum N, **Siripornpanich V**. An electroencephalography (EEG) study of short-	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	term electromyography (EMG) biofeedback training in patients with myofascial pain syndrome in the upper trapezius. J Phys Ther Sci. 2020;32(10):674-79.		
	Siripornpanich V, Rachiwong S, Ajjimaporn A. A pilot study on salivary cortisol secretion and auditory P300 event-related potential in patients with physical disability-related stress. Int J Neurosci. 2020;130(2):170-75.	12, 1	2020
	Lukseng T, **Siripornpanich V**, Chutabhakdikul N. Long-term Vipassana meditation enhances executive function in adult meditators. SMJ. 2020;72(4):343-51.	12, 1	2020
	Siripornpanich V, Sampoon K, Chaithirayanon, Kotchabhakdi N, Chutabhakdikul N. Enhancing brain maturation through a mindfulness-based education in elementary school children: a quantitative EEG study. Mindfulness. 2018;9:1877–84.	12, 1	2018
	Sayorwan W, Phianchana N, Permpoonputtana K, **Siripornpanich V**. A study of the correlation between VEP and clinical severity in children with autism spectrum disorder. Autism Res Treat. 2018;2018:5093016.	12, 1	2018
	Kaewcum N, **Siripornpanich V**. The effects of unilateral Swedish massage on the neural activities measured by quantitative electroencephalography (EEG). J Health Res. 2018;32(1):36-46.	12, 1	2018

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Ajjimaporn A, Rachiwong S, **Siripornpanich V**. Effects of 8 weeks of modified hatha yoga training on resting-state brain activity and the P300 ERP in patients with physical disability-related stress. J Phys Ther Sci. 2018;30(9):1187-92.	12, 1	2018

Current Teaching Load

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 603 Neuropsycho Pharmacology 2(2-0-4)
3. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
4. MBNS 606 Current Topics in Neuroscience 1(1-0-2)
5. MBNS 607 Advanced Research Project in Neuroscience 3(0-9-3)
6. MBNS 650 Developmental Neuroscience 2(2-0-4)
7. MBNS 651 Neuroendocrinology 2(2-0-4)
8. MBNS 655 Pathogenesis of Neurological Diseases 3(3-0-6)
9. MBNS 690 Seminars in Advanced Neuroscience 1(1-0-2)
10. MBNS 691 Seminars in Neuroscience 1(1-0-2)
11. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
12. MBNS 698 Thesis 12(0-48-0)

Assigned Teaching Load for the Revised Program

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 610 Introductory Neuroscience 1(1-0-2)
3. MBNS 603 Neuropsycho Pharmacology 2(2-0-4)
4. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
5. MBNS 606 Current Topics in Neuroscience 2(2-0-4)
6. MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2)
7. MBNS 650 Developmental Neuroscience 2(2-0-4)

8. MBNS 651 Neuroendocrinology 2(2-0-4)
9. MBNS 655 Pathogenesis of Neurological Diseases 2(2-0-4)
10. MBNS 691 Seminars in Neuroscience 1(1-0-2)
11. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
12. MBNS 698 Thesis 12(0-36-0)

4. Name: Assistant Professor Dr. Sujira Mukda

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Neurosciences	Mahidol University	2006
M.Sc.	Neurosciences	Mahidol University	2001
B.Sc.	Occupational Therapy	Chiang Mai University	1997

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. The therapeutic potential of melatonin
2. Neurobiology of drug addiction
3. Neurobiological consequences of cerebrovascular disease
4. Molecular aspect of cognitive impairments as consequences of aging and neurodegeneration
5. Circadian rhythm and Clock genes

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Published research work	Veschsanit N, Yang JL, Ngampramuan S, Viwatpinyo K, Pinyomahakul J, Lwin T, Chancharoen P, Rungruang S, Govitrapong P, **Mukda S**. Melatonin reverts methamphetamine-induced learning and memory impairments and hippocampal alterations in mice. Life Sci. 2021;265:118844.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Lwin T, Yang JL, Ngampramuan S, Viwatpinyo K, Chancharoen P, Veschsanit N, Pinyomahakul J, Govitrapong P, **Mukda S**. Melatonin ameliorates methamphetamine-induced cognitive impairments by inhibiting neuroinflammation via suppression of the TLR4/MyD88/NFkappaB signaling pathway in the mouse hippocampus. Prog Neuropsychopharmacol Biol Psychiatry. 2021:110109.	12, 1	2021
	Hsu SY, **Mukda S**, Leu S. Expression and distribution pattern of Pnn in ischemic cerebral cortex and cultured neural cells exposed to oxygen-glucose deprivation. Brain Sci. 2020;10(10):E708.	12, 1	2020
	Yang JL, Chen WY, **Mukda S**, Yang YR, Sun SF, Chen SD. Oxidative DNA damage is concurrently repaired by base excision repair (BER) and apyrimidinic endonuclease1 (APE1)-initiated nonhomologous end joining (NHEJ) in cortical neurons. Neuropathol Appl Neurobiol. 2020;46(4):375-90.	12, 1	2020
	Hein ZM, Kraiwattanapirom N, **Mukda S,** Chetsawang B. The induction of Neuron-Glial2 (NG2) expressing cells in methamphetamine toxicity-induced neuroinflammation in rat brain are averted by melatonin. J Neuroimmunol. 2020;344:577232.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Mukda S, Tsai CY, Leu S, Yang JL, Chan SHH. Pinin protects astrocytes from cell death after acute ischemic stroke via maintenance of mitochondrial anti-apoptotic and bioenergetics functions. J Biomed Sci. 2019;26(1):43.	12, 1	2019
	Rangphueng J, Kongkachuichai R, **Mukda S,** Sirivarasai J, Sae-chew P, Srisala S, et al. Effects of alcoholic extracts of sweet-fruited tamarind (*Tamarindus indica L.*) and banana (*Musa sapientum L.*) on Hydrogen peroxide-induced cytotoxicity in Human Neuroblastoma SH-SY5Y cells. Thai J Toxicol. 2018;32(2):63-81.	12, 1	2018
	Yang JL, **Mukda S,** Chen SD. Diverse roles of mitochondria in ischemic stroke. Redox Biol. 2018;16:263-75.	12, 1	2018
	Permpoonputtana K, Tangweerasing P, **Mukda S,** Boontem P, Nopparat C, Govitrapong P. Long-term administration of melatonin attenuates neuroinflammation in the aged mouse brain. EXCLI J. 2018;17:634-46.	12, 1	2018
	Ngampramuan S, Tungtong P, **Mukda S,** Jariyavilas A, Sakulisariyaporn C. Evaluation of Autonomic Nervous System, Saliva Cortisol Levels, and Cognitive Function in Major Depressive Disorder Patients. Depress Res Treat. 2018;2018:7343592.	12, 1	2018

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Jenwitheesuk A, Park S, Wongchitrat P, Tocharus J, **Mukda S,** Shimokawa I, et al. Comparing the Effects of Melatonin with Caloric Restriction in the Hippocampus of Aging Mice: Involvement of Sirtuin1 and the FOXOs Pathway. Neurochem Res. 2018;43(1):144-52.	12, 1	2018

Current Teaching Load

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 603 Neuropsycho Pharmacology 2(2-0-4)
3. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
4. MBNS 605 Neurochemistry 2(2-0-4)
5. MBNS 606 Current Topics in Neuroscience 1(1-0-2)
6. MBNS 607 Advanced Research Project in Neuroscience 3(0-9-3)
7. MBNS 650 Developmental Neuroscience 2(2-0-4)
8. MBNS 655 Pathogenesis of Neurological Diseases 3(3-0-6)
9. MBNS 690 Seminars in Advanced Neuroscience 1(1-0-2)
10. MBNS 691 Seminar in Neuroscience 1(1-0-2)
11. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
12. MBNS 698 Thesis 12(0-48-0)

Assigned Teaching Load for the Revised Program

1. MBNS 610 Introductory Neuroscience 1(1-0-2)
2. MBNS 600 Neurobiology 3(2-2-5)
3. MBNS 603 Neuropsychopharmacology 2(2-0-4)
4. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
5. MBNS 605 Neurochemistry 2(2-0-4)
6. MBNS 606 Current Topics in Neuroscience 2(2-0-4)
7. MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2)

8. MBNS 650 Developmental Neuroscience 2(2-0-4)
9. MBNS 651 Neuroendocrinology 2(2-0-4)
10. MBNS 655 Pathogenesis of Neurological Diseases 2(2-0-4)
11. MBNS 658 Animal Experimentation in Neuroscience 1(0-2-1)
12. MBNS 659 Microtechniques in Neuroscience Research 1(0-2-1)
13. MBNS 691 Seminars in Neuroscience 1(1-0-2)
14. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
15. MBNS 698 Thesis 12(0-36-0)

5. Name Assistant Professor Dr. Sukonthar Ngampramuan

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Neurosciences	Mahidol University	2008
M.Sc.	Neurosciences	Mahidol University	2002
B.Sc.	Physical Therapy	Srinakarinwirot University	1997

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. Stress response in ANS and cognitive neuroscience
2. Animal model and behavioural studies
3. Behavior studies aspect of cognitive impairments of aging and neurodegeneration
4. Neuropsychiatry

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Published research work	Veschsanit N, Yang JL, **Ngampramuan S**, Viwatpinyo K, Pinyomahakul J, Lwin T, Chancharoen P, Rungruang S, Govitrapong P, Mukda S. Melatonin reverts methamphetamine-induced learning and memory impairments and hippocampal alterations in mice. Life Sci. 2021;265:118844.	12, 1	2021
	Lwin T, Yang JL, **Ngampramuan S**, Viwatpinyo K, Chancharoen P, Veschsanit N, Pinyomahakul J, Govitrapong P, Mukda S. Melatonin	12,1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	ameliorates methamphetamine-induced cognitive impairments by inhibiting neuroinflammation via suppression of the TLR4/MyD88/NFkappaB signaling pathway in the mouse hippocampus. Prog Neuropsychopharmacol Biol Psychiatry. 2021:110109.		
	Ngampramuan S, Tungtong P, Mukda S, Jariyavilas A, Sakulisariyaporn C. Evaluation of Autonomic Nervous System, Saliva Cortisol Levels, and Cognitive Function in Major Depressive Disorder Patients. Depress Res Treat. 2018;2018:7343592.	12,1	2018
Academic articles	Ajariyaporn,W., Tanya, R., Mukda, S., & **Ngampramuan, S**. Heart rate and heart rate variability reflect on stress response in Trier social stress test (TSST). Proceedings of The 23rd Thai Neuroscience Society Conference 2019. Dec 11, 2019, Bangkok, Thailand. p 62-69	10,0.4	2019
	Maluangwong, K., **Ngampramuan, S.** & Mukda, S. A study of the correlation between resilience and stress responses. Proceedings of Graduate Research Forum 2018. May 10-11, 2018, Bangkok, Thailand. p 1-8	10,0.4	2018
	Veschsanit, N., Chancharoen, P., **Ngampramuan, S**., Govitrapong, P. & Mukda, S. Melatonin improves spatial learning and memory impairment in mice after methamphetamine administration. Proceedings of Graduate	10,0.4	2018

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Research Forum 2018. May 10-11, 2018, Bangkok, Thailand. p 26-31		

Current Teaching Load

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
3. MBNS 606 Current Topics in Neuroscience 1(1-0-2)
4. MBNS 650 Developmental Neuroscience 2(2-0-4)
5. MBNS 651 Neuroendocrinology 2(2-0-4)
6. MBNS 654 Selected Topics in Contemporary Neuroscience 1(1-0-2)
7. MBNS 655 Pathogenesis of Neurological Diseases 3(3-0-6)
8. MBNS 690 Seminars in Advanced Neuroscience 1(1-0-2)
9. MBNS 691 Seminars in Neuroscience 1(1-0-2)
10. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
11. MBNS 698 Thesis 12(0-48-0)

Assigned Teaching Load for the Revised Program

1. MBNS 600 Neurobiology 3(2-2-5)
2. MBNS 610 Introductory Neuroscience 1(1-0-2)
3. MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5)
4. MBNS 606 Current Topics in Neuroscience 2(2-0-4)
5. MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2)
6. MBNS 691 Seminars in Neuroscience 1(1-0-2)
7. MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2)
8. MBNS 650 Developmental Neuroscience 2(2-0-4)
9. MBNS 651 Neuroendocrinology 2(2-0-4)
10. MBNS 655 Pathogenesis of Neurological Diseases 2(2-0-4)
11. MBNS 658 Animal Experimentation in Neuroscience 1(0-2-1)
12. MBNS 698 Thesis 12(0-36-0)

6. Name Lecturer Dr. Jiraporn Panmanee

Education

Degree	Degree Name	Institute	Year of Graduation
Ph.D.	Biological Sciences	University of Liverpool, United Kingdom	2020
M.Sc.	Neuroscience	Mahidol University	2015
B.Sc.	Biology (First-Class Honors)	Silpakorn University	2012

Affiliation: Research Center for Neuroscience, Institute of Molecular Biosciences, Mahidol University

Interesting Research Topics or Specialties

1. Neurotoxicity of commonly used pesticides
2. Structural neurobiology and drug discovery
3. Neurobiology of aging and neurodegenerative diseases

Academic work as not part of the study for degree certificate and published and disseminated in accordance with the stipulated criteria regarding academic rank appointment in five retrospective years

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
Academic articles	Wiboonkiat K, Vejsureeyakul N, Pornthanamongkol C, Auychinda C, **Panmanee J**, Mukda S. In silico repurposing studies of first-and second-generation antipsychotic drugs in methamphetamine addiction treatment. Proceedings of the 16th International Online Mini-Symposium of the Protein Society of Thailand. November 17-18, 2021, Bangkok, Thailand. p 145-53	10, 0.4	2021

Current Teaching Load

1. MBNS 600 Neurobiology	3(2-2-5)
2. MBNS 603 Neuropsycho Pharmacology	2(2-0-4)
3. MBNS 604 Research Methodology and Techniques in Neuroscience	3(2-2-5)
4. MBNS 605 Neurochemistry	2(2-0-4)
5. MBNS 606 Current Topics in Neuroscience	1(1-0-2)
6. MBNS 651 Neuroendocrinology	2(2-0-4)
7. MBNS 690 Seminars in Advanced Neuroscience	1(1-0-2)
8. MBNS 691 Seminar in Neuroscience	1(1-0-2)
9. MBNS 695 Seminars in Current Research in Neuroscience	1(1-0-2)

Assigned Teaching Load for the Revised Program

1. MBNS 610 Introductory Neuroscience	1(1-0-2)
2. MBNS 600 Neurobiology	3(2-2-5)
3. MBNS 603 Neuropsychopharmacology	2(2-0-4)
4. MBNS 604 Research Methodology and Techniques in Neuroscience	3(2-2-5)
5. MBNS 605 Neurochemistry	2(2-0-4)
6. MBNS 606 Current Topics in Neuroscience	2(2-0-4)
7. MBNS 651 Neuroendocrinology	2(2-0-4)
8. MBNS 608 Laboratory Rotation Training in Neuroscience	2(0-4-2)
9. MBNS 691 Seminars in Neuroscience	1(1-0-2)
10. MBNS 695 Seminars in Current Research in Neuroscience	1(1-0-2)
12. MBNS 659 Microtechniques in Neuroscience Research	1(0-2-1)
13. MBNS 698 Thesis	12(0-36-0)

Appendix C

Curriculum Mapping

● Major responsibility ○ Minor responsibility

Subjects	Morality and Ethics		Knowledge		Intellectual skills		Interpersonal relationship and Responsibility		Mathematical Analytical thinking		
	1	2	1	2	1	2	1	2	1	2	3
1. Prerequisite Courses											
MBNS 610 Introductory Neuroscience	●	●	●	●	●		●	○	●	○	●
2. Required courses											
SCID 500 Cell & Molecular Biology	●	●	●	●	●		●		●	○	●
MBNS 600 Neurobiology	●	●	●	●	●	●	●	●		○	●
MBNS 603 Neuropsycho Pharmacology	●	●	●	●	●		●	●	○	●	●
MBNS 604 Research Methodology and Techniques in Neuroscience	●	●	●	●	●	○	●	●	●	●	●
MBNS 605 Neurochemistry	●	●	●	●	●	●	●	○	○	●	●
MBNS 608 Laboratory Rotation Training in Neuroscience	●	●	●	●	●	●	●	●	●	●	●
MBNS 650 Developmental Neuroscience	●	○	●	●	●	●	●	●	○	●	●
MBNS 691 Seminar in Neuroscience	●	●	●	●	●	●	●	●	●	●	●

Subjects	Morality and Ethics		Knowledge		Intellectual skills		Interpersonal relationship and Responsibility		Mathematical Analytical thinking		
	1	2	1	2	1	2	1	2	1	2	3
MBNS 695 Seminars in Current Research in Neuroscience	●	●	●	●	●	●	●	●	●	●	●
3. Elective courses											
MBNS 606 Current Topics in Neuroscience	●	●	●	●	●	○	●	●		●	●
MBNS 658 Animal Experimentation in Neuroscience	●	●	○	●	●	●	●	●	●	●	●
MBNS 659 Microtechniques in Neuroscience Research	●	●	●	●	●	●	●	●	●	●	●
MBNS 651 Neuroendocrine	●	○	●	●	●	○	●	●		●	●
MBNS 655 Pathogenesis of Neurological Diseases	●	●	●	○	●	●	●	○		●	●
4. Thesis											
MBNS 698 Thesis	●	●	●	●	●	●	●	●	●	●	●

*****MBNS 610 Introductory Neuroscience prerequisite course is required only for students without prior knowledge of neuroscience, or with a consent of faculty, and grant only “audit (AU)” grade for students who pass this course.

Table of Relationship between Learning Outcomes of the Program and Core Value of Mahidol University

Learning Outcomes (as stated in Section 4, item no. 2)	Core value of Mahidol University
1. Morality and Ethics	
1.1 Display acts of honesty among themselves and colleagues, respect to organization's rules and regulations	Integrity
1.2 Follow academic code of ethics, including citing references with honesty and anti-plagiarism approach	Integrity Originality
2. Knowledge	
2.1 Possess profound knowledge and comprehension in major principles and theories in the field of neuroscience	Mastery
2.2 Capable of searching trends in the body of knowledge	Mastery Determination
3. Intellectual Skills	
3.1 Apply knowledge and skills to solve problems appropriately	Mastery Determination
3.2 Analyze and apply bodies of knowledge and be able to synthesize research articles for developing a research project, compiling experimental results by themselves, and generating new findings in neuroscience	Mastery Determination Originality
4. International Relationship and responsibility	
4.1 Show appropriate interpersonal relationship with others	Altruism Harmony
4.2 Demonstrate responsibility in teamwork and individual assignment, display self-development, being a leader and a good member in group activities.	Altruism Harmony Leadership

Learning Outcomes (as stated in Section 4, item no. 2)	Core value of Mahidol University
5. Mathematical Analytical, Communication Skills, and Information Technology	
5.1 Utilize mathematical and statistical principles in the analysis of data	Mastery
5.2 Communicate and present research projects or academic works both formally and informally through academic conferences and dissertation	Mastery
5.3 Possess information technology skills for data mining, analyzing scientific data, or academic presentation	Mastery Harmony

Appendix D

Program Learning Outcomes

Table 1: Comparison between before and after revised objective of the program

Objective of the Program 2017	Revised Objective of the Program 2022
1. To demonstrate high scholastic morals and ethical standards in all aspects of their daily.	Graduate students entitled Neuroscience's Master program will merit these characteristics according to graduate-level qualification framework: 1. Demonstrate academic moral and ethical performance emphasizing the ethical conduct in research related to animal and human experimentations, academic honesty, anti-plagiarism, intellectual property, and copyright issue
2. To possess comprehensive knowledge and skill in Neuroscience.	2. Comprehend theoretical and practical knowledge and be capable of describing trends and technological advancements in the field of neuroscience.
3. To conduct experimental scientific research to obtain new findings in neuroscience to solve behavioral and mental health problems.	3. Apply neuroscientific knowledge to solve problems and create new findings in neuroscience and related fields
4. To maintain and develop strong leadership of academic excellence and effectively participate as a good team member.	4. Show appropriate interpersonal relationships, perform effectively as a leader and member of the team, be responsible for individual and teamwork.
5. Demonstrate developed transferable skills including mathematic, communication, information technology and academic presentation.	5. Apply suitable mathematical and statistical analysis, good communication skills, and appropriately use information technology for searching, processing, compiling, analyzing, and presenting data.

Table 2: Relationship between objective of the program and program learning outcome

Objective of the Program	Program Learning Outcome*				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
1. Demonstrate academic moral and ethical performance emphasizing the ethical conduct in research related with animal and human experimentations, academic honesty, anti-plagiarism, intellectual property, and copyright issue.	✓				
2. Comprehend theoretical and practical knowledge and be capable of describing trends and technological advancements in the field of neuroscience.		✓			
3. Apply neuroscientific knowledge to solve problems and create new findings in neuroscience and related fields			✓		
4. Show appropriate interpersonal relationships, perform effectively as a leader and member of the team, be responsible for individual and teamwork.				✓	
5. Apply suitable mathematical and statistical analysis, good communication skills, and appropriately use information technology for searching, processing, compiling, analyzing, and presenting data					✓

Program Learning Outcome*

PLO1 Comprehend an appropriate ethical code of conduct, moral responsibility, and academic regulation in scientific experimentation

PLO2 Understand the neuroscience aspect of human behavior and mental health

PLO3 Apply neuroscientific knowledge and integrate knowledge to solve new scientific problems

PLO4 Implement leadership skills and be capable of working collaboratively with members as a team

PLO5 Demonstrate effective transferable skills including basic statistical analysis, communication, information technology for searching, processing, compiling, analyzing, and presenting data.

Table 3: Standard domains of learning outcome and Program Learning Outcomes

Domains	Standard Learning Outcomes (TQF)	Program Learning Outcomes				
		PLO1	PLO2	PLO3	PLO4	PLO5
Morality and Ethics	1.1 Display acts of honesty among themselves and colleagues, respect to organization's rules and regulations	✓				
	1.2 Follow academic code of ethics, including citing references with honesty and anti-plagiarism approach	✓				
Knowledge	2.1 Possess profound knowledge and comprehension in major principles and theories in the field of neuroscience		✓			
	2.2 Capable of searching trends in the body of knowledge		✓			
Intellectual Development	3.1 Apply knowledge and skills to solve problems appropriately			✓		
	3.2 Analyze and apply bodies of knowledge and be able to synthesize research articles for developing a research project, compiling experimental results by themselves, and generating new findings in neuroscience			✓		
Interpersonal Relationship and Responsibility	4.1 Show appropriate interpersonal relationship with others				✓	
	4.2 Demonstrate responsibility in teamwork and individual assignment, display self-development, being a leader and a good member in group activities.				✓	

Domains	Standard Learning Outcomes (TQF)	Program Learning Outcomes				
		PLO1	PLO2	PLO3	PLO4	PLO5
Math, Communication, IT Skills	5.1 Utilize mathematical and statistical principles in the analysis of data.					✓
	5.2 Communicate and present research projects or academic works both formally and informally through academic conferences and dissertation					✓
	5.3 Possess information technology skills for data mining, analyzing scientific data, and academic presentation					✓

Table 4: Learning and Assessment Strategies for Program Learning Outcomes Evaluation

PLOs	Learning Method	Assessment
PLO1 Comprehend an appropriate ethical code of conduct, moral responsibility, and academic regulation in scientific experimentation.	1) Describe and demonstrate the morality, ethics, and ethical code of conduct for researchers. 2) Encourage student's acts of honesty. 3) Give case examples of ethical and moral concerns in problem-solving. 4) Group discussion about problems related to morality and ethics.	1) Evaluation from group activities. 2) Evaluation from student's punctuality in-class attendance and in presentations. 3) Evaluation from avoiding plagiarism in report submission. 4) Evaluation from research conduct by thesis supervisors.

PLOs	Learning Method	Assessment
	5) Demonstrate correct method of citing references, with case studies and assignments. 6) Assign research tasks, data collection, and presentation with an emphasis on honesty.	
PLO2 Understand the neuroscience aspect of human behavior and mental health.	1) Lecture with emphasis on principles and theories, including experimental skills in laboratory and self-directed learning. 2) Assign tasks for self-directed learning. 3) Practicum and self-study 4) Group discussion 5) Self-directed research and writing reports.	1) Evaluation from the presentation of academic reports, research publications, answering of questions, and discussion between fellow students and instructors. 2) Evaluation from discussion of problems found in the thesis. 3) Evaluation from examination and laboratory performance. 4) Evaluation from submitted reports.
PLO3 Apply neuroscientific knowledge and integrate knowledge to solve new scientific problems.	1) Assign topics for research and present research articles and publications. 2) Qualifying examination 3) Assign for a thesis proposal and conducting research. 4) Report results from research	1) Evaluation from the presentation of assigned research articles and publications. 2) Written and oral examinations that permit students to explain concepts of problem-solving and apply

PLOs	Learning Method	Assessment
		knowledge in solving research questions. 3) Thesis defense examination.
PLO4 Implement leadership skills and be capable of working collaboratively with members as a team.	1) Group discussion and assignment 2) Assign case studies for the report. 3) Teaching from case studies with complex research questions that allow students to design and plan problem-solving methods as a group.	1) Evaluation from responsibility in assigned tasks. 2) Evaluation from direct observation during the group activity. 3) Evaluation from efficiency and efficacy of assigned tasks. 4) Evaluation of interpersonal skills from colleagues or related persons.
PLO5 Demonstrate effective transferable skills including basic statistical analysis, communication, information technology for searching, processing, compiling, analyzing, and presenting data.	1) Assign a presentation of analytical concepts in problem-solving, utilizing mathematical and statistical skills in problem analysis especially in the research process. 2) Practice writing original research articles and presenting research data. 3) Hands-on practice on information technology skills.	1) Evaluation from the academic presentation with suitable use of information technology, mathematical and statistical analyses in research articles, and student's research project. 2) Evaluation from audience's satisfaction. 3) Evaluation from communication performance, research proposal, and thesis presentation. 4) Evaluation from the quality of the presentation.

Table 5: Relationship between Courses of the Program and Program Learning Outcomes

Code	Name	Credits	PLOs				
			1	2	3	4	5
1. Prerequisite Courses							
MBNS 610	Introductory Neuroscience	1(1-0-2)	I	I	I	I	I
2. Required courses							
SCID 500	Cell & Molecular Biology	3(3-0-6)	I	I	I	I	I
MBNS 600	Neurobiology	3(2-2-5)	I	I	I	I	I
MBNS 603	Neuropsycho Pharmacology	2(2-0-4)	R	R	R	R	R
MBNS 604	Research Methodology and Techniques in Neuroscience	3(2-2-5)	R	P	P	P	P
MBNS 605	Neurochemistry	2(2-0-4)	I	R	R	R	R
MBNS 608	Laboratory Rotation Training in Neuroscience	2(0-4-2)	P	P	P	P	P
MBNS 650	Developmental Neuroscience	2(2-0-4)	R	R	R	R	R
MBNS 691	Seminars in Neuroscience	1(1-0-2)	P	P	P	P	P
MBNS 695	Seminars in Current Research in Neuroscience	1(1-0-2)	P	P	P	P	P
3. Elective courses							
MBNS 606	Current Topics in Neuroscience	2(2-0-4)	R	R	R	R	R
MBNS 658	Animal Experimentation in Neuroscience	1(0-2-1)	P	P	P	P	P
MBNS 659	Microtechniques in Neuroscience Research	1(0-2-1)	P	P	P	P	P
MBNS 651	Neuroendocrinology	2(0-4-2)	R	R	R	R	R
MBNS 655	Pathogenesis of Neurological Diseases	2(2-0-4)	R	R	R	R	R
4. Thesis							
MBNS 698	Thesis	12(0-36-0)	M	M	M	M	M

I = ELO is introduced & assessed R = ELO is reinforced & assessed

P = ELO is practiced & assessed M = Level of Mastery is assessed

Table 6: The expectation of learning outcomes at the end of the academic year

M.Sc. program (2 years of study)

Year of study	Knowledge, skills, and any other expected learning outcomes
1	Understand the neuroscience aspect of human behavior and mental health, perform effectively as a leader and member of teamwork, and demonstrate effective transferable skills including communication, information technology, and academic presentation.
2	Understand the neuroscience aspect of human behavior and mental health, apply neuroscientific knowledge to plan and develop a research project, comprehend and appropriately demonstrate ethical code of conduct, moral responsibility, and academic regulation in scientific experimentation, perform effectively as a leader and member of the teamwork, and demonstrate effective transferable skills including communication, information technology, and academic presentation

Appendix E

The Revision of Master of Science Program in Neuroscience

(International Program)

In the Year 2020

Institute of Molecular Biosciences

and Faculty of Graduate Studies, Mahidol University

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1. The Curriculum was approved by the Office of the Higher Education Commission on July 1, 2020

2. The Mahidol University Council has approved this revised curriculum in the 584 meeting on September 21, 2022

3. The revised curriculum will be effective with student class 2022 from the 1st semester of the Academic Year 2022 onwards.

4. Rationale of revision

4.1 The curriculum is revised to be in accordance with the Thai Qualification Framework for Higher Education B.E. 2552.

4.2 The curriculum is revised to update the courses to be more modern.

4.3 The Full-time instructors of the curriculum and faculty in charge of the program is revised to update.

5. The details of the revision

5.1 Update The Faculty in Charge of the program and Full-time instructors of the curriculum

Name	Current		Revising	
	The Faculty in Charge of the program	Full-time instructors of the curriculum	The Faculty in Charge of the program	Full-time instructors of the curriculum
Professor Emeritus Dr. Piyarat Govitrapong	–	✓	–	–
Associate Professor Dr. Wipawan Thangnipon	✓	✓	–	–
Professor Dr. Banthit Chetsawang	✓	✓	✓	✓
Associate Professor Dr. Nuanchan Chutabhakdikul	✓	✓	✓	✓
Associate Professor Dr. Vorasith Siripornpanich	–	✓	✓	✓
Assistant Professor Dr. Sujira Mukda	✓	✓	✓	✓
Assistant Professor Dr. Sukonthar Ngampramuan	–	✓	✓	✓
Assistant Professor Dr. Kittikun Viwatpinyo	-	✓	-	-
Lecturer Dr. Chutikorn Nopparat	-	✓	-	-
Lecturer Dr. Jiraporn Panmanee	-	-	-	✓

5.2 The Comparison Table of Courses between the Current Program and Revising Program

Courses of the Current Program	Courses of the Revising Program	Remark
	Prerequisite Course	
--	MBNS 610 Introductory Neuroscience 1(1-0-2) ชมปว ๖๑๐ ประสาทวิทยาศาสตร์เบื้องต้น	new course
Required Courses (15 credits)	**Required Courses** (19 credits)	
--	SCID 500 Cell & Molecular Biology 3(3-0-6) วทคร ๕๐๐ ชีววิทยาระดับเซลล์และโมเลกุล	added a course
SIID 501 Molecular and Cellular Basis of Biomedicine 3(2-2-5) ศรคร ๕๐๑ ชีวเวชศาสตร์พื้นฐานระดับโมเลกุลและเซลล์	--	course cancellation
MBNS 600 Neurobiology 3(2-2-5) ชมปว ๖๐๐ ประสาทชีววิทยา	MBNS 600 Neurobiology 3(2-2-5) ชมปว ๖๐๐ ประสาทชีววิทยา	updated course description
MBNS 603 Neuropsycho Pharmacology 2(2-0-4) ชมปว ๖๐๓ เภสัชวิทยาของจิตประสาท	MBNS 603 Neuropsycho Pharmacology 2(2-0-4) ชมปว ๖๐๓ เภสัชวิทยาจิตประสาท	updated course description
MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5) ชมปว ๖๐๔ เทคนิคและวิทยาระเบียบวิธีวิจัยทางประสาทวิทยาศาสตร์	MBNS 604 Research Methodology and Techniques in Neuroscience 3(2-2-5) ชมปว ๖๐๔ เทคนิคและวิทยาระเบียบวิธีวิจัยทางประสาทวิทยาศาสตร์	updated course description
MBNS 605 Neurochemistry 2(2-0-4) ชมปว ๖๐๕ ประสาทเคมี	MBNS 605 Neurochemistry 2(2-0-4) ชมปว ๖๐๕ ประสาทเคมี	updated course description
--	MBNS 650 Developmental Neuroscience 2(2-0-4) ชมปว ๖๕๐ ประสาทวิทยาศาสตร์เชิงพัฒนาการ	moved from elective courses to required courses, and updated course description

-	MBNS 608 Laboratory Rotation Training in Neuroscience 2(0-4-2) ชมปว ๖๐๘ หมุนเวียนฝึกงานในห้องปฏิบัติการทางประสาทวิทยาศาสตร์	New course
MBNS 691 Seminars in Neuroscience 1(1-0-2) ชมปว ๖๙๑ สัมมนาทางประสาทวิทยาศาสตร์	MBNS 691 Seminars in Neuroscience 1(1-0-2) ชมปว ๖๙๑ สัมมนาทางประสาทวิทยาศาสตร์	updated course description
MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2) ชมปว ๖๙๕ สัมมนางานวิจัยปัจจุบันทางประสาทวิทยาศาสตร์	MBNS 695 Seminars in Current Research in Neuroscience 1(1-0-2) ชมปว ๖๙๕ สัมมนาในการวิจัยปัจจุบันทางประสาทวิทยาศาสตร์	Renamed course title and updated course description
Elective courses (9 Credit)	**Elective courses** (5 Credit)	
SIPS 603 Behavioral Neuroscience ศรสร ๖๐๓ ประสาทวิทยาศาสตร์เชิงพฤติกรรม	--	a course cancellation
MBNS 650 Developmental Neuroscience 2(2-0-4) ชมปว ๖๕๐ ประสาทวิทยาศาสตร์เชิงพัฒนาการ	--	moved to required course
--	MBNS 651 Neuroendocrinology 2(2-0-4) ชมปว ๖๕๑ ประสาทชีววิทยาของระบบต่อมไร้ท่อ	added a course
MBNS 655 Pathogenesis of neurological Diseases 3(3-0-6) ชมปว ๖๕๕ พยาธิกำเนิดของโรคทางระบบประสาท	MBNS 655 Pathogenesis of neurological Diseases 2(2-0-4) ชมปว ๖๕๕ พยาธิกำเนิดของโรคทางระบบประสาท	reduced credits and updated course description

SIPS 603 Behavioral Neuroscience 2(2-0-4) ศรสร ๖๐๓ ประสาทวิทยาศาสตร์เชิงพฤติกรรม	--	a course cancellation
MBNS 606 Current Topics in Neuroscience 1(1-0-2) ชมปว ๖๐๖ หัวข้อปัจจุบันทางประสาทวิทยาศาสตร์	MBNS 606 Current Topics in Neuroscience 2(2-0-4) ชมปว ๖๐๖ หัวข้อปัจจุบันทางประสาทวิทยาศาสตร์	increased credits and updated course description
MBNS 607 Advanced Research Project in Neuroscience 3(0-9-3) ชมปว ๖๐๗ โครงการวิจัยทางประสาทวิทยาศาสตร์ขั้นสูง	-	a course cancellation
--	MBNS 658 Animal Experimentation in Neuroscience 1(0-2-1) ชมปว ๖๕๘ การทดลองโดยใช้สัตว์ทดลองทางประสาทวิทยาศาสตร์	new course
--	MBNS 659 Microtechniques Neuroscience Research 1(0-2-1) ชมปว ๖๕๙ ไมโครเทคนิคทางการวิจัยประสาทวิทยาศาสตร์	new course
Thesis (12 Credit)	**Thesis** (12 Credit)	
MBNS 698 Thesis 12(0-48-0) ชมปว ๖๙๘ วิทยานิพนธ์	MBNS 698 Thesis 12(0-36-0) ชมปว ๖๙๘ วิทยานิพนธ์	Updated the course credit (according to the program structure)

6. The Comparison Table of the Curriculum Structure between the Current Program and Revised Program Based on Criteria on Graduate Studies B.E. 2558 (set by Ministry of Education)

<table>
<tr><th colspan="2" rowspan="2">Course Category</th><th colspan="3">Credits</th></tr>
<tr><th>Criteria on Graduate Studies B.E. 2558</th><th>Curriculum Structure of the Current Program</th><th>Curriculum Structure of the Revised Program</th></tr>
<tr><th>Current Program</th><th>Revised Program</th><th></th><th></th><th></th></tr>
<tr><td></td><td>1. Prerequisite Course</td><td></td><td>-</td><td>No credit (audit)</td></tr>
<tr><td>1. Required courses</td><td>2. Required courses</td><td rowspan="2">Not less than 12</td><td>15</td><td>19</td></tr>
<tr><td>2. Elective courses</td><td>3. Elective courses</td><td>Not less than 9</td><td>Not less than 5</td></tr>
<tr><td>3. Thesis</td><td>4. Thesis</td><td>12</td><td>12</td><td>12</td></tr>
<tr><td colspan="2">Total credits (not less than)</td><td>36</td><td>36</td><td>36</td></tr>
</table>