หลักสูตรปรัชญาดุษฎีบัณฑิต
สาขาวิชาชีววิทยา
(หลักสูตรนานาชาติ / หลักสูตรปรับปรุง พ.ศ. ๒๕๖๖)

DOCTOR OF PHILOSOPHY PROGRAM
IN
BIOLOGY
(INTERNATIONAL PROGRAM / REVISED PROGRAM IN 2023)

FACULTY OF SCIENCE

AND

FACULTY OF GRADUATE STUDIES

MAHIDOL UNIVERSITY

CONTENT

Appendix

Doctor of Philosophy Program in Biology
(International Program)
Revised Program in 2023

Name of Institution Mahidol University

Campus/Faculty/Department Faculty of Science, Department of Biology

Section 1 General Information

1. Curriculum Name

Thai หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาชีววิทยา (หลักสูตรนานาชาติ)

English Doctor of Philosophy Program in Biology (International Program)

2. Name of Degree and Major

Full Title Thai: ปรัชญาดุษฎีบัณฑิต (ชีววิทยา)

Abbreviation Thai: ปร.ด. (ชีววิทยา)

Full Title English: Doctor of Philosophy (Biology)

Abbreviation English: Ph.D. (Biology)

3. Major Subjects (if any): none

4. Required Credits

Plan 1.1 For students with Master's Degree: not less than 48 credits

Plan 1.2 For students with Bachelor's Degree: not less than 72 credits

Plan 2.1 For students with Master's Degree: not less than 48 credits

Plan 2.2 For students with Bachelor's Degree: not less than 72 credits

5. Curriculum Characteristics

5.1 **Curriculum Type/Model:** Doctor of Philosophy

5.2 **Language:** English

5.3 **Recruitment:** Both Thai and 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 with one major

6. Curriculum Status and Curriculum Approval

6.1 Revised Program Year 2023

6.2 Starting in semester 1, academic year 2023 onwards

6.3 Curriculum screening committee approved the program in its meeting 6/2022 on February 21, 2022

6.4 The Mahidol University Council approved the program in its meeting 586 on 16 November, 2022

7. Readiness to Implement/Promote the Curriculum

The curriculum from the program is readily implemented and promoted its quality and standard according to criteria set by Thai Qualification Framework for Higher Education in academic year 2026 (3 years after implementation).

8. Career Opportunities of the Graduates

8.1 Researchers and specialists in biology in government, private sectors, and non-profit organizations

8.2 Specialists in biology in middle and high schools, and institutes of higher education

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.	x xxxx xxxxxx xx x Associate Professor Dr.Arunee Ahantarig	Ph.D. (Biology) University of Texas at San Antonio, U.S.A.: 2003 M.Sc. (Biology) University of Texas at San Antonio, U.S.A.: 1996 B.Sc. (Medical Technology)	Department of Biology Faculty of Science

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
		Chulalongkorn University: 1992	
2.	x xxxx xxxxxx xx x Associate Professor Dr.Surang Chankhamhaengdecha	Ph.D. (Biotechnology) Mahidol University: 2003 M.Sc. (Biotechnology) Mahidol University: 1999 B.Sc. (Microbiology) Burapha University: 1997	Department of Biology Faculty of Science
3.	x xxxx xxxxxx xx x Assistant Professor Dr.Ekgachai Jeratthitikul	D.Sc. (Biological Sciences) Kyoto University, Japan: 2013 M.Sc. (Biological Sciences) Kyoto University, Japan: 2009 B.Sc. (Zoology) Chulalongkorn University: 2006	Department of Biology Faculty of Science
4.	x xxxx xxxxxx xx x Assistant Professor Dr.Jenjit Khudamrongsawat	Ph.D. (Biology) University of Alabama, U.S.A.: 2007 M.Sc. (Botany and Plant Sciences) University of California-Riverside, U.S.A.: 2002 B.Sc. (Biology) Rochester Institute of Technology, U.S.A.: 2000	Department of Biology Faculty of Science

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
5.	x xxxx xxxxxx xx x Assistant Professor Dr.Phurt Harnvoravongchai	D.Eng. (Bioengineering) Tokyo Institute of Technology, Japan: 2015 M.Eng. (Bioengineering) Tokyo Institute of Technology, Japan: 2012 B.Sc. (Biotechnology) Mahidol University: 2010	Department of Biology Faculty of Science

10. Venue for Instruction

Buildings B and N, Department of Biology, Faculty of Science, Phayathai Campus and building SC-2, Department of Biology, Faculty of Science, Salaya Campus

11. External Factors to Be Considered in Curriculum Planning

11.1 Economic Situation/Development

The global trends of bioeconomy and current biological crises such as emerging diseases, global pandemic and climate change have significantly transformed our planet and society. Immediate responses and long- term adaptations to such changes require profound understanding and integration among various disciplines in science and technology, especially biology that serves as fundamental grounds for solutions. We realize that biological knowledge offers opportunities to utilize natural resources under sustainable development model and supports bio-circular-green economy (BCG). The revision of the Doctor of Philosophy Program in Biology by Department of Biology, Faculty of Science, Mahidol University thus responds to the current trends and social demands.

11.2 Social and Cultural Situation/Development

Society is experiencing biological crises and rapid transformation in the digital era that quickly delivers immense information to people. Without sufficient biological knowledge, misunderstanding messages create fears and anxiety to the publics. The program expects our graduate to be able apply their expertise and soft skills for knowledgeable, sustainable, and

ethical development of society and culture as university graduates are important components of the society.

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 items 11 and 11.2, the Doctor of Philosophy program in biology revises the curriculum to prepare the students with knowledge and soft skills for such challenges so that students are able to work in organizations effectively.

12.2 Relevance to the Missions of the University/Institution

This curriculum supports the mission of the university on the part of academic excellency in medical, science and technological innovation and aims to enhance students with knowledge in biology, scientific skills in biological researches as well as soft skills so that students are competent and efficient in their career and lifelong learning.

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

This curriculum shares some required and elective courses (SCID courses) with other curricula in Faculty of Science, Mahidol University.

Section 2 Information of the Curriculum

1. Philosophy, Justification, and Objectives of the Curriculum

1.1 Philosophy and Justification of the Curriculum

Our Ph.D. program in biology aims to produce ethical, moral and professional graduate students who are knowledgeable and skillful in biological research to become leaders in academics and research for scientific advancement. Not only in academic related fields, as current global trends favor the development of bioeconomy and bio-circular-green economy (BCG), our graduates have potential to initiate and pursue their own business based on their biological expertise. They are also responsible for environmental sustainability as biologists who recognize the relationships among components in the ecosystem.

The curriculum allows students to explore the diverse applications in biology and encourage them to think, discuss, and develop their research projects as well as business ideas through provided intensive courses and active research environment. The diverse research topics led by faculty members also expose students to real experiences in research and provide an opportunity to develop their entrepreneurship. The program also recognizes the importance of human relations and offers courses that students could develop their leadership and team-working skills.

1.2 Objectives of the Program

By the end of the study in Doctor of Philosophy Program in Biology, graduates will have attributes that meet the qualifications framework for graduate education, as following:

1.2.1 Students are able to demonstrate moral and ethical conduct in academic and the scientific profession.

1.2.2 Students are able to explain important biological principles and theories in depth, and integrate them to current situations and for their own life-long learning attitudes.

1.2.3 Students are able to synthesize biological principles and knowledge, and implement scientific research to develop new knowledge and/or innovation in biology.

1.2.4 Students are able to demonstrate responsibility, good human relations, and effective team working skills.

1.2.5 Students are able to perform numerical analyses, communicate effectively and appropriately, apply information technology to search for works and presentation.

1.3 Program Learning Outcomes (PLOs)

1.3.1 Students demonstrate moral and ethical conduct in academic and the scientific profession.

1.3.2 Students explain important biological principles and theories in depth.

1.3.3 Students integrate biological principles and theories in modern biological research, current situations, and for their own life-long learning attitudes.

1.3.4 Students are able to synthesize biological principles and knowledge to conduct research for the development of new knowledge and/or innovation in biology.

1.3.5 Students demonstrate good leadership and cooperative skills, good human relations, and responsibility for their work, themselves, and others.

1.3.6 Students are able to select numerical analyses for statistical and data analyses appropriately; utilize information technology for literature search, analysis, data processing, and presentation correctly and systematically; and communicate and exchange academic knowledge and opinions effectively and appropriately.

2. Plan for Development and Improvement

Plan for Development/ Revision	Strategies	Evidences/Indexes
The curriculum is to be evaluated in order to maintain our standard and follow modern global trends every year	1. Annual evaluation of the program by stakeholders	1. Annual report on an evaluation of satisfaction level of stakeholders 2. Appointment of curriculum committee for program development every year
The curriculum is to be revised every five years based on stakeholders' demands	1. Revision and improvement of the program every five years 2. Analysis and assessment with international standard 3. Follow up and evaluate the performance of the curriculum in terms of satisfaction of employer, entrepreneur, and doctoral users	1. Documents of program revision every five years 2. Reports of stakeholder's satisfaction level
The curriculum is to provide support and encouragement new faculty members to	1. Encouragement new faculty members to apply for research grants 2. Supply new faculty members with equipment as necessary	1. Increase of international publications with Q1 or Q2 ranking at least 1-2 articles per year

Plan for Development/ Revision	Strategies	Evidences/Indexes
become research leaders and high-quality teachers	3. Mentoring system	2. Increase of number of research grants within 2 years for new faculty members 3. Increase of research equipment by applying for equipment grant offered by Faculty of Science for new faculty members 4. Increase of number of students working with new faculty members by 3 years

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: The program does not offer summer session.

1.3 Credit Equivalence to Semester System: None

2. Curriculum Implementation

2.1 Teaching Schedule

Weekdays from Monday to Friday (08:30 A.M. – 4.30 P.M.)

Semester 1 August – December

Semester 2 January – May

2.2 Qualifications of Prospective Students

2.2.1 Plan 1.1 For student with Master's Degree

2.2.1.1 Holding a master' s degree in biology, life sciences or related academic fields which is accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation

2.2.1.2 Having at least 1 published or accepted research article that is indexed in accepted journal database (e.g. PubMed, Scopus, Web of Science, or Thai Citation Index tier 1) in which the prospective student is the major author and/or corresponding author; or patent in which the prospective student is a major contributor

2.2.1.3 Having cumulative GPA not less than 3.50

2.2.1.4 Having a research plan and letter of acceptance issued by a prospective academic advisor

2.2.1.5 Having an English Proficiency Examination score as specified by Graduate School regulation

2.2.1.6 Applicants whose credentials differ from qualification in 2.2.1.3 to 2. 2. 1. 5 may be able to apply to the program if the permission is granted by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies

2.2.2 Plan 1.2 For student with Bachelor's Degree

2.2.2.1 Holding a bachelor' s degree in biology, life sciences or related academic fields which is accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation

2.2.2.2 Having at least 1 published or accepted research article that is indexed in accepted journal database (e.g. PubMed, Scopus, Web of Science, or Thai Citation Index tier 1) in which the prospective student is the major author and/or corresponding author; or patent in which the prospective student is a major contributor

2.2.2.3 Having cumulative GPA not less than 3.50

2.2.2.4 Having research plan and letter of acceptance issued by prospective academic advisor

2.2.2.5 Having an English Proficiency Examination score as specified by Graduate School regulation

2.2.2.6 Applicants whose credentials differ from qualification in 2.2.2.3 to 2. 2. 2. 5 may be able to apply to the program if the permission is granted by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies

2.2.3 Plan 2.1 For student with Master's Degree

2.2.3.1 Holding a master' s degree in biology, life sciences or a related academic field which is accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation

2.2.3.2 Having cumulative GPA not less than 3.50

2.2.3.3 Having an English Proficiency Examination score as specified by Graduate School regulation

2.2.3.4 Applicants whose credentials differ from qualification in 2. 2. 3. 2 to 2. 2. 3. 3 may be able to apply to the program if the permission is granted by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies

2.2.4 Plan 2.2 For student with Bachelor's Degree

2.2.4.1 Holding a bachelor' s degree in biology, life sciences or related academic fields which is accredited by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation

2.2.4.2 Having cumulative GPA not less than 3.25.

2.2.4.3 Having an English Proficiency Examination score as specified by Graduate School regulation

2.2.4.4 Applicants whose credentials differ from qualification in 2. 2. 4. 2 to 2. 2. 4. 3 may be able to apply to the program if the permission is granted by the Program Administrative Committee and the Dean of the Faculty of Graduate Studies

2.3 Problems Encountered by New Students

2.3.1 Insufficient basis knowledge in biology

2.3.2 Insufficient research experiences

2.3.3 Insufficient English language skills for Ph.D. study and research

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

Problems of New Students	Strategies for Problem Solving
Insufficient basis knowledge in biology	The program provides basic courses as requirements for students with Bachelor's degree to take, which are SCID 500 and the selection of 1 out of 3 courses (SCBI 586, 587, 609). Students with Master's degree are encouraged to take these courses when necessary.
Insufficient research experiences	Students are encouraged to take SCBI 579 (Advance Research Techniques in Biological Science) and/or SCBI 581 Special Problems in Biology as elective courses to be acquainted with research.
Insufficient English language skills for Ph.D. study and research	Students are required to take English language courses offered by Graduate School, as well as participation in seminar classes and writing reports/ essay exams in all classes offered by the program.

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

Plan 1.1 For student with Master's Degree

Academic Year	2023	2024	2025	2026	2027
1st	5	5	5	5	5
2nd	-	5	5	5	5
3rd	-	-	5	5	5
Cumulative numbers	5	10	15	15	15
Expected number of students graduated	-	-	-	5	5

Plan 1.2 For student with Bachelor's Degree

Academic Year	2023	2024	2025	2026	2027
1st	5	5	5	5	5
2nd	-	5	5	5	5
3rd	-	-	5	5	5
4th	-	-	-	5	5
Cumulative numbers	5	10	15	20	20
Expected number of students graduated	-	-	-	5	5

Plan 2.1 For student with Master's Degree

Academic Year	2023	2024	2025	2026	2027
1st	5	5	5	5	5
2nd	-	5	5	5	5
3rd	-	-	5	5	5
Cumulative numbers	5	10	15	15	15
Expected number of students graduated	-	-	-	5	5

Plan 2.2 For student with Bachelor's Degree

Academic Year	2023	2024	2025	2026	2027
1st	5	5	5	5	5
2nd	-	5	5	5	5
3rd	-	-	5	5	5
4th	-	-	-	5	5
Cumulative numbers	5	10	15	20	20
Expected number of students graduated	-	-	-	5	5

2.6 Budget based on the plan

Budget: The budget is from Department of Biology, Faculty of Science, Mahidol University.

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 our website: www.grad.mahidol.ac.th.

3. Curriculum and Instructors

3.1 Curriculum

3.1.1 Number of credits

Plan 1.1 For students with Master's Degree: not less than 48 credits

Plan 1.2 For students with Bachelor's Degree: not less than 72 credits

Plan 2.1 For students with Master's Degree: not less than 48 credits

Plan 2.2 For students with Bachelor's Degree: not less than 72 credits

3.1.2 Curriculum Structure

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

	***Plan 1.1 For students with Master's Degree**	***Plan 1.2 For students with Bachelor's Degree**	
1) Required courses	-	-	credits
2) Elective courses not less than	-	-	Credits
3) Dissertation	48	72	Credits
Total not less than	**48**	**72**	**Credits**

*** Note**: For Plan 1.1 and Plan 1.2, students may take additional non-credit courses based on recommendation of the Program Administrative Committee.

	Plan 2.1 For students with Master's Degree	Plan 2.2 For students with Bachelor's Degree	
1) Required courses	6	18	credits
2) Elective courses not less than	6	6	Credits
3) Dissertation	36	48	Credits
Total not less than	**48**	**72**	**Credits**

3.1.3 Courses in the curriculum

1) Required Courses

Plan 2.1 For students with Master's Degree 6 credits

Credits (lecture – practice – self-study)

*SCBI 616 Integrated Biology for Frontier Research 2 (2-0-4)
วทชว ๖๑๖ ชีววิทยาเชิงบูรณาการสำหรับงานวิจัยแนวหน้า

*SCBI 618 Advanced Research Methodology in Biology 2 (0-6-3)
วทชว ๖๑๘ วิทยาระเบียบวิธีวิจัยขั้นสูงทางชีววิทยา

SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2)
วทชว ๖๔๒ สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยา

SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2)
วทชว ๖๔๓ สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยาขั้นสูง

Plan 2.2 For students with Bachelor's Degree 18 credits

Credits (lecture – practice – self-study)

*SCBI 585 Trends and Advances in Biology 3 (3-0-6)
วทชว ๕๘๕ แนวโน้มและความก้าวหน้าทางชีววิทยา

**SCBI 586 Systematic Biology 3 (3-0-6)
วทชว ๕๘๖ การจัดระบบทางชีววิทยา

**SCBI 587 Ecology and Evolutionary Biology 3 (3-0-6)
วทชว ๕๘๗ นิเวศวิทยาและชีววิทยาเชิงวิวัฒนาการ

**SCBI 609 Molecular Genetics 3 (3-0-6)
วทชว ๖๐๙ พันธุศาสตร์ระดับโมเลกุล

*SCBI 616	Integrated Biology for Frontier Research	2 (2-0-4)
วทชว ๖๑๖	ชีววิทยาเชิงบูรณาการสำหรับงานวิจัยแนวหน้า	
*SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
วทชว ๖๑๘	วิทยาระเบียบวิธีวิจัยขั้นสูงทางชีววิทยา	
SCBI 640	Research Seminar in Biology	1 (1-0-2)
วทชว ๖๔๐	สัมมนาการวิจัยทางชีววิทยา	
SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
วทชว ๖๔๑	สัมมนาการวิจัยทางชีววิทยาขั้นสูง	

**New course*

***Students must select at least 1 of these courses (3 credits) under suggestion from advisor or program director*

Credits (lecture – practice – self-study

SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
วทชว ๖๔๒	สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยา	
SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
วทชว ๖๔๓	สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยาขั้นสูง	
SCID 500	Cell and Molecular Biology	3 (3-0-6)
วทคร ๕๐๐	ชีววิทยาระดับเซลล์และโมเลกุล	
SCID 518	Generic Skills in Science Research	1 (1-0-2)
วทคร ๕๑๘	ทักษะทั่วไปในการวิจัยทางวิทยาศาสตร์	

2) Elective Courses

Plan 2.1 For students with Master's Degree not less than 6 credits

Credits (lecture – practice – self-study)

SCBI 501	Molecular Entomology	3 (3-0-6)
วทชว ๕๐๑	กีฏวิทยาระดับโมเลกุล	
SCBI 502	Medical Entomology	3 (2-3-5)
วทชว ๕๐๒	กีฏวิทยาทางการแพทย์	
SCBI 506	Insect Taxonomy	3 (2-3-5)
วทชว ๕๐๖	อนุกรมวิธานของแมลง	
SCBI 532	Basic Principles of Sociobiology	3 (3-0-6)
วทชว ๕๓๒	หลักชีววิทยาเชิงสังคม	

SCBI 545	Cytogenetics	3 (2-3-5)
วทชว ๕๔๕	เซลล์พันธุศาสตร์	
SCBI 546	Population and Ecological Genetics	3 (3-0-6)
วทชว ๕๔๖	พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	
SCBI 581	Special Problems in Biology	2 (0-6-3)
วทชว ๕๘๑	ปัญหาพิเศษทางชีววิทยา	
SCBI 589	Advance Research Techniques in Biological Science	2 (0-6-3)
วทชว ๕๘๙	เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพขั้นสูง	
SCBI 607	Evolutionary Genetics	3 (3-0-6)
วทชว ๖๐๗	พันธุศาสตร์เชิงวิวัฒนาการ	
* SCBI 617	Biological Laboratory Design and Demonstration	1 (0-2-4)
วทชว ๖๑๗	การออกแบบปฏิบัติการชีววิทยาและการสาธิต	
SCBI 637	Molecular Ecology	3 (3-0-6)
วทชว ๖๓๗	นิเวศวิทยาระดับโมเลกุล	
*SCBI 644	Bioeconomy	1 (0-3-2)
วทชว ๖๔๔	เศรษฐกิจชีวภาพ	
SCID 502	Cell Science	2 (2-6-4)
วทคร ๕๐๒	วิทยาศาสตร์เรื่องเซลล์	
SCID 503	Systematic Bioscience	3 (3-0-6)
วทคร ๕๐๓	วิทยาศาสตร์ชีวภาพเชิงระบบ	
SCID 506	Concept of Molecular Bioscience	3 (2-0-4)
วทคร ๕๐๖	หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	
SCID 508	Biomolecular and Spectroscopy Techniques	1 (0-2-1)
วทคร ๕๐๘	เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	
SCID 510	Immunological Methods	1 (0-2-1)
วทคร ๕๑๐	ระเบียบวิธีวิทยาภูมิคุ้มกัน	
SCID 513	Animal Cell Culture Techniques	1 (0-2-1)
วทคร ๕๑๓	เทคนิคการเพาะเลี้ยงเซลล์สัตว์	
SCID 514	Animal Experimentation in Biomedical Research	1 (0-2-1)
วทคร ๕๑๔	การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	

Plan 2.2 For students with Bachelor's Degree not less than 6 credits

Credits (lecture – practice – self-study)

SCBI 501	Molecular Entomology	3 (3-0-6)
วทชว ๕๐๑	กีฏวิทยาระดับโมเลกุล	
SCBI 502	Medical Entomology	3 (2-3-5)
วทชว ๕๐๒	กีฏวิทยาทางการแพทย์	
SCBI 506	Insect Taxonomy	3 (2-3-5)
วทชว ๕๐๖	อนุกรมวิธานของแมลง	
SCBI 530	Conservation Biology	3 (3-0-6)
วทชว ๕๓๐	ชีววิทยาเชิงอนุรักษ์	
SCBI 532	Basic Principles of Sociobiology	3 (3-0-6)
วทชว ๕๓๒	หลักชีววิทยาเชิงสังคม	
SCBI 539	Techniques in Ecology and Conservation	2 (0-6-3)
วทชว ๕๓๙	เทคนิคการวิจัยทางนิเวศวิทยาและการอนุรักษ์	
SCBI 545	Cytogenetics	3 (2-3-5)
วทชว ๕๔๕	เซลล์พันธุศาสตร์	
SCBI 546	Population and Ecological Genetics	3 (3-0-6)
วทชว ๕๔๖	พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	
SCBI 589	Advance Research Techniques in Biological Science	2 (0-6-3)
วทชว ๕๘๙	เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพขั้นสูง	
SCBI 581	Special Problems in Biology	2 (0-6-3)
วทชว ๕๘๑	ปัญหาพิเศษทางชีววิทยา	
SCBI 607	Evolutionary Genetics	3 (3-0-6)
วทชว ๖๐๗	พันธุศาสตร์เชิงวิวัฒนาการ	
*SCBI 617	Biological Laboratory Design and Demonstration	1 (0-2-4)
วทชว ๖๑๗	การออกแบบปฏิบัติการชีววิทยาและการสาธิต	
SCBI 637	Molecular Ecology	3 (3-0-6)
วทชว ๖๓๗	นิเวศวิทยาระดับโมเลกุล	
*SCBI 644	Bioeconomy	1 (0-3-2)
วทชว ๖๔๔	เศรษฐกิจชีวภาพ	

SCID 502	Cell Science	2 (2-6-4)
วทคร ๕๐๒	วิทยาศาสตร์เรื่องเซลล์	
SCID 503	Systematic Bioscience	3 (3-0-6)
วทคร ๕๐๓	วิทยาศาสตร์ชีวภาพเชิงระบบ	
SCID 506	Concept of Molecular Bioscience	3 (2-0-4)
วทคร ๕๐๖	หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	
SCID 508	Biomolecular and Spectroscopy Techniques	1 (0-2-1)
วทคร ๕๐๘	เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	
SCID 510	Immunological Methods	1 (0-2-1)
วทคร ๕๑๐	ระเบียบวิธีวิทยาภูมิคุ้มกัน	
SCID 513	Animal Cell Culture Techniques	1 (0-2-1)
วทคร ๕๑๓	เทคนิคการเพาะเลี้ยงเซลล์สัตว์	
SCID 514	Animal Experimentation in Biomedical Research	1 (0-2-1)
วทคร ๕๑๔	การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	

**New course*

In addition to elective courses mentioned above, a student may register other courses in 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.

3) Dissertation

		Credits (lecture – practice – self-study)
SCBI 699	Dissertation	36 (0-108-0)
วทชว ๖๙๙	วิทยานิพนธ์	
SCBI 799	Dissertation	48 (0-144-0)
วทชว ๗๙๙	วิทยานิพนธ์	
*SCBI 898	Dissertation	48 (0-144-0)
วทชว ๘๙๘	วิทยานิพนธ์	
*SCBI 899	Dissertation	72 (0-216-0)
วทชว ๘๙๙	วิทยานิพนธ์	

**New course*

3.1.4 Research Project of the Program

Guidelines for conducting a research project are as follows:

(1) Systematics and population genetics of animals
(2) Conservation biology and mngement of threatened wildlife animals
(3) Biology and ecology of birds
(4) Mosquito biology and biological control
(5) Biology of microorganisms in vectors and their roles for vector control
(6) Toxicological mechanisms of organic substances and heavy metals
(7) Bioremediation of organic substances and heavy metal in environment
(8) Biophysics and molecular biology for the study of protein membrane and effects of nano-molecule of cells
(9) Biology and molecular biology of ticks, tick-borne diseases
(10) Response mechanisms of cells on toxins in the environment
(11) Bioengineering of bacteria and the control of destructive or disturbing insects using engineering proteins

3.1.5 Definition of Course Codes

Four main alphabets are defined as follows:
The first two alphabets are abbreviation of the faculty offering the course.
SC is Faculty of Science.

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

ID means inter-department or programs
BI means Department of Biology

3 digits of number are 5XX, 6XX, 7xx and 8xx indicate that the courses are in the graduate study level.

3.1.6 Study Plan

Plan 1.1 For students with Master's Degree*

Year	Semester 1	Semester 2
1	SCBI 898 Dissertation 6 (0-18-0) *Qualifying Examination* **Total 6 credits**	SCBI 898 Dissertation 6 (0-18-0) *Proposal Presentation* **Total 6 credits**
2	SCBI 898 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 898 Dissertation 9 (0-27-0) **Total 9 credits**
3	SCBI 898 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 898 Dissertation 9 (0-27-0) **Total 9 credits**

**Note: Students may take additional non-credit courses based on recommendation of the Program Administrative Committee.*

Plan 1.2 For students with Bachelor's Degree*

Year	Semester 1	Semester 2
1	SCBI 899 Dissertation 9 (0-27-0) *Qualifying Examination* **Total 9 credits**	SCBI 899 Dissertation 9 (0-27-0) *Proposal Presentation* **Total 9 credits**
2	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**
3	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**
4	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 899 Dissertation 9 (0-27-0) **Total 9 credits**

**Note: Students may take additional non-credit courses based on recommendation of the Program Administrative Committee.*

Plan 2.1 For students with Master's Degree

Year	Semester 1		Semester 2	
1	SCBI 618 Advanced Research Methodology in Biology	2 (0-6-3)	SCBI 616 Integrated Biology for Frontier Research	2 (2-0-4)
	SCBI 642 Doctoral Research Seminar in Biology	1 (1-0-2)	SCBI 643 Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
	Elective	3 credits	SCBI 699 Dissertation	3 (0-9-0)
			Elective	3 credits
			Qualifying Examination	
	Total 6 credits		**Total 9 credits**	
2	SCBI 699 Dissertation	6 (0-18-0)	SCBI 699 Dissertation	9 (0-27-0)
	Proposal Presentation			
	Total 6 credits		**Total 9 credits**	
3	SCBI 699 Dissertation	9 (0-27-0)	SCBI 699 Dissertation	9 (0-27-0)
	Total 9 credits		**Total 9 credits**	

Plan 2.2 For students with Bachelor's Degree

Year	Semester 1		Semester 2	
1	SCBI 640 Research Seminar in Biology	1 (1-0-2)	SCBI 616 Integrated Biology for Frontier Research	2 (2-0-4)
	SCID 500 Cell and Molecular Biology	3 (3-0-6)	SCBI 618 Advanced Research Methodology in Biology	2 (0-6-3)
	SCID 518 Generic Skills in Science Research	1 (1-0-2)	SCBI 641 Advanced Research Seminar in Biology	1 (1-0-2)
	*SCBI 586 Systematic Biology	3 (3-0-6)	Elective	3 credits
	*SCBI 587 Ecology and Evolutionary Biology	3 (3-0-6)	*Qualifying Examination*	
	*SCBI 609 Molecular Genetics	3 (3-0-6)		
	**Student select at least 1 course*			
	Total 8 credits		**Total 8 credits**	
2	SCBI 585 Trends and Advances in Biology	3 (3-0-6)	SCBI 643 Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
	SCBI 642 Doctoral Research Seminar in Biology	1 (1-0-2)	SCBI 799 Dissertation	6 (0-9-0)
	Elective	3 credits		
	Proposal Presentation			
	Total 7 credits		**Total 7 credits**	

Year	Semester 1	Semester 2
3	SCBI 799 Dissertation 9 (0-27-0) **Total 9 credits**	SCBI 799 Dissertation 9 (0-27-0) **Total 9 credits**
4	SCBI 799 Dissertation 12 (0-36-0) **Total 12 credits**	SCBI 799 Dissertation 12 (0-36-0) **Total 12 credits**

3.1.7 Course Description

Please see Appendix A.

3.2 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.	x xxxx xxxxxx xx x Associate Professor Dr.Arunee Ahantarig	Ph.D. (Biology) University of Texas at San Antonio, U.S.A.: 2003 M.Sc. (Biology) University of Texas at San Antonio, U.S.A.: 1996 B.Sc. (Medical Technology) Chulalongkorn University: 1992	Department of Biology Faculty of Science
2.	x xxxx xxxxxx xx x Associate Professor Dr.Surang Chankhamhaengdecha	Ph.D. (Biotechnology) Mahidol University: 2003 M.Sc. (Biotechnology) Mahidol University: 1999 B.Sc. (Microbiology) Burapha University: 1997	Department of Biology Faculty of Science
3.	x xxxx xxxxxx xx x Assistant Professor Dr.Chalita Kongrit	Ph.D. (Biology) Mahidol University: 2010 B.Sc. (Biology) Mahidol University: 2002	Department of Biology Faculty of Science

No.	Identification Card Number Academic Position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
4.	x xxxx xxxxxx xx x Assistant Professor Dr.Ekgachai Jeratthitikul	D.Sc. (Biological Sciences) Kyoto University, Japan: 2013 M.Sc. (Biological Sciences) Kyoto University, Japan: 2009 B.Sc. (Zoology) Chulalongkorn University: 2006	Department of Biology Faculty of Science
5.	x xxxx xxxxxx xx x Assistant Professor Dr.Jenjit Khudamrongsawat	Ph.D. (Biology) University of Alabama, U.S.A.: 2007 M.Sc. (Botany and Plant Sciences) University of California-Riverside, U.S.A.: 2002 B.Sc. (Biology) Rochester Institute of Technology, U.S.A.: 2000	Department of Biology Faculty of Science
6.	x xxxx xxxxxx xx x Assistant Professor Dr.Metha Meetam	Ph.D. (Horticulture) Purdue University, U.S.A.: 2006 B.A. (Biology) Washington University, U.S.A.: 1999	Department of Biology Faculty of Science
7.	x xxxx xxxxxx xx x Assistant Professor Dr.Parinda Thayanukul	Ph.D. (Urban Engineering) The University of Tokyo, Japan: 2012 M.Sc. (Urban Engineering) The University of Tokyo, Japan: 2009 B.Sc. (Biotechnology) Mahidol University: 2006	Department of Biology Faculty of Science
8.	x xxxx xxxxxx xx x Assistant Professor Dr.Patompong Saengwilai	Ph.D. (Plant Biology) Pennsylvania State University, U.S.A.: 2013	Department of Biology Faculty of Science

No.	Identification Card Number Academic Position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
		B.Sc. (Biology) Mahidol University: 2007	
9.	x xxxx xxxxxx xx x Assistant Professor Dr.Phurt Harnvoravongchai	D.Eng. (Bioengineering) Tokyo Institute of Technology, Japan: 2015 M.Eng. (Bioengineering) Tokyo Institute of Technology, Japan: 2012 B.Sc. (Biotechnology) Mahidol University: 2010	Department of Biology Faculty of Science
10.	x xxxx xxxxxx xx x Assistant Professor Dr.Prinpida Sonthiphand	Ph.D. (Biology) University of Waterloo, Canada: 2014 M.Sc. (Environment Management) Chulalongkorn University: 2009 B.Sc. (Biochemistry) Chulalongkorn University: 2005	Department of Biology Faculty of Science
11.	x xxxx xxxxxx xx x Assistant Professor Dr. Puey Ounjai	Ph.D. (Molecular Genetics and Genetic Engineering) Mahidol University: 2007 B.Sc. (Biotechnology) King Mongkut's Institute of Technology Ladkrabang: 2001	Department of Biology Faculty of Science
12.	x xxxx xxxxxx xx x Assistant Professor Dr.Supeecha Kumkate	Ph.D. (Biology) University of York, U.K.: 2004 M.Sc. (Environmental Biology) Mahidol University: 1999 B.Sc. (Microbiology) Chulalongkorn University: 1995	Department of Biology Faculty of Science

No.	Identification Card Number Academic Position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
13.	x xxxx xxxxxx xx x Assistant Professor Dr.Wachareeporn Trinachartvanit	Ph.D. (Ecology, Ethology, and Evolution) University of Illinois at Urbana-Champaign, U.S.A.: 2004 M.Sc. (Environmental Biology) Mahidol University: 1995 B.Sc. (Biology) Mahidol University: 1992	Department of Biology Faculty of Science
14.	x xxxx xxxxxx xx x Lecturer Dr. Alisa Damnernsawad	Ph.D. (Cancer Biology) University of Wisconsin-Madison, U.S.A.: 2015 B.Sc. (Biology) Mahidol University: 2007	Department of Biology Faculty of Science
15.	x xxxx xxxxxx xx x Lecturer Dr.Pahol Kosiyachinda	Ph.D. (Plant Pathology) Cornell University, U.S.A.: 2002 B.Sc. (Biology) Mahidol University: 1996	Department of Biology Faculty of Science
16.	x xxxx xxxxxx xx x Lecturer Dr.Siravit Sitprija	Ph.D. (Physiology) Chulalongkorn University: 2003 M.Sc. (Industrial Microbiology) Chulalongkorn University: 1999 B.Sc. (Biology) Kasetsart University: 1996	Department of Biology Faculty of Science

No.	Identification Card Number Academic Position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
17.	x xxxx xxxxxx xx x Lecturer Dr.Thitinun Sumranwanich	Ph.D. (Horticulture) Pennsylvania State University, U.S.A.: 2003 B.Sc. (Biology) Chiang Mai University: 1997	Department of Biology Faculty of Science
18.	x xxxx xxxxxx xx x Lecturer Dr. Toemthip Poolpak	Ph.D. (Biology) Mahidol University: 2008 M.Sc. (Environmental Biology) Mahidol University: 2002 B.Sc. (Biology) Mahidol University: 1998	Department of Biology Faculty of Science
19.	x xxxx xxxxxx xx x Lecturer Dr.Warut Siriwut	Ph.D. (Biological Science) Chulalongkorn University: 2016 B.Sc. (Biology) Khon Kaen University: 2010	Department of Biology Faculty of Science

3.2.2 Full time instructors

No.	Identification Card Number Academic position - Name – Surname	Degree (Field of Study) University: Year of graduate	Department
1.	x xxxx xxxxxx xx x Lecturer Dr.Intanon Kolasartsanee	Ph.D. (Biology) Mahidol University: 2014 B.Sc. (Biology) Mahidol University: 2006	Department of Biology Faculty of Science

3.2.3 Part time instructors

The program will invite special instructors upon necessities.

4. Details of Practicum (if any)

None

5. Dissertation requirement

5.1 Short Description

Considering dissertation, it must be relevant to knowledge of biology as suggested by the program (see 3.1.4). Students are required to develop research proposal related to the topic, conducting the research including research ethics, data collection, synthesis, analysis, interpretation of the result and dissertation report, presenting and publishing research in the journals within specified time frame.

5.2 Standard Learning Outcomes

Students are able to gain core knowledge and research experiences in the field of biology and apply those knowledges to develop new ideas and innovation using available equipment and resources.

5.3 Time Frame

Plan 1.1 For students with Master's Degree: Semester 1 Academic Year 1 onwards

Plan 1.2 For students with Bachelor's Degree: Semester 1 Academic Year 1 onwards

Plan 2.1 For students with Master's Degree: Semester 2 Academic Year 1 onwards

Plan 2.2 For students with Bachelor's Degree: Semester 2 Academic Year 2 onwards

5.4 Number of credits

Plan 1.1 For students with Master's Degree: 48 Credits

Plan 1.2 For students with Bachelor's Degree: 72 Credits

Plan 2.1 For students with Master's Degree: 36 Credits

Plan 2.2 For students with Bachelor's Degree: 48 Credits

5.5 Preparation

Advising time must be provided to introduce students to faculty members and research topics in the department. Students will be provided with information related to current research topics, publications as well as examples of dissertation in departmental website that is regularly updated.

5.6 Evaluation Process

Research progress will be evaluated by the advisor and committee of student's dissertation every semester during conducting the research. The final oral examination is systematically evaluated by the graduate committee, and the research work or part(s) of the student's dissertation must be published or accepted to be published in international academic journals 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
1. Determination to create new findings or applications of existing knowledge for the development of innovations	1. Special seminars by inviting researchers and specialists in other disciplines or institutes to share experiences with students at least one time per semester 2. Presentations of outstanding researches of faculty members or students in the program at least one time per semester 3. Short research training by faculty members at least one time per semester
2. Being skillful for using modern scientific tools to conduct research in biology	1. Training with faculty members, researchers or specialists from companies to use scientific tools at least one time per semester

Special Characteristics	Teaching Strategies or Student Activities
3. Proficiency of English language for correct scientific communication	1. Taking addition English language courses offered by Graduate School at least one-time during study 2. Participations in academic writing workshops at least one-time during study 3. Presentations of dissertation progress in English at the end of the semester 4. Participations in international conferences at least one-time during study
4. Having good attitude and personality towards team-working in organizations and society	1. Extracurriculum activities such as Sports Day, Mahidol Day, Open House activity, exhibitions, and other annual cultural activities at least one time per year

2. Development of Learning Outcome in Each Objective

Expected Outcome	Teaching Strategies	Evaluation Strategies
1. Morality and Ethics 1.1. Express morals and ethical conduct in research and scientific profession 1.2. Follow regulations	(1) Students are required to attend classes and turn-in assignments on time. (2) Evaluate students' assignments and dissertations based on their morality, honesty, professionalism towards research ethics that shows originality and no plagiarism, and following international standard, especially in SCBI 636 and special problems (3) Students are encouraged to follow research ethical guideline, such as the protocol for animal use, and regulations of the organization, such as in the central laboratory.	(1) Checking students' attendance and punctuality in classes. (2) Checking the punctuality for turning-in and check for plagiarism of students' assignments. (3) Students' dissertation are evaluated following international standard and scientific profession and are checked for plagiarism by using Turn-it-in and faculty members. (4) Students are evaluated based on their behaviors during the use of central laboratory and the conduct of research.

Expected Outcome	Teaching Strategies	Evaluation Strategies
2. Knowledge 2.1 Critical understand biological principles and theories in depth 2.2 Implement biological knowledges for their own life-long learning attitudes	(1) Group lectures, discussions, presentations, specialist invitation for short lectures, and laboratory practices (2) Practice of writing research proposals based on core principle and theories (3) Assign students to do literature review on topic related to their research and their own interests from up-to-date sources, and prepare for a presentation (4) Qualifying exams (5) Seminars	(1) Assess students' achievement by examination, assignments reports, presentations, laboratory results. Evaluation of student proposals (2) Assess students' reports and presentations for its correction, demonstration of integration and application of their achieved knowledge, properly review, and with up-to-date information. (3) Assess students' achievement by qualifying exams. (4) Evaluated students' seminars based on their performance on presentation skills, with specified criteria.
3. Intellectual Development 3.1 Integrate biological principles and theories in modern biological research and current situations 3.2 Synthesize biological principles and knowledge 3.3 Design and conduct research for the development of new knowledge and/or innovation in biology	(1) Mini projects such as special problems in biology in order to develop their intellectual skills before conducting their dissertation (2) Dissertation	(1) Assess the completement of special problems according to the standard scientific research method. (2) Dissertation defenses (3) Quality of dissertation based on the standards

Expected Outcome	Teaching Strategies	Evaluation Strategies
4. Interpersonal Relationship and Responsibility 4.1 Demonstrate interpersonal relationship, good leadership and cooperative skills 4.2 Take responsibility for their work, themselves, and others 4.3 Express self-development 4.4 Exchange academic knowledge and opinions effectively and appropriately	(1) Students are assigned to work in groups such as during laboratory practice or mini projects. (2) Students serve as teaching assistants in SCBI 626 (3) Student participations in extra curriculum activities such as Sports Day, Open House, and other cultural activities (4) Students are required to attend or present their research projects in scientific conference	(1) Students are evaluated based on project outcomes and outputs as well as their behaviors during group working (2) Students are evaluated based on comments during their service as teaching assistants (3) Student behaviors and roles in extra curriculum activities (4) Student behaviors during discussions
5. Mathematical Analytical Thinking, Communication Skills, and Information Technology Skills 5.1 Appropriately select numerical analyses for statistical and data analyses 5.2 Utilize informative technology for literature search, analyses, data processing, and presentation correctly and systematically	(1) Students are assigned to evaluate, process, and discuss statistical information from published articles in international scientific journals (2) Students are assigned to use information technology to prepare their assignments, literature review, and conduct research (3) Students are required to report their dissertation	(1) Assess students' reports based on correction and suitability of information in their reports (2) Assess students' outputs based on correction and suitability of using information technology as well as presentation (3) Quality of presentations and class discussions and evaluations by faculty

Expected Outcome	Teaching Strategies	Evaluation Strategies
5.3 Report and communicate academic knowledge correctly and appropriately	progress at the end of each semester (4) Preparing manuscripts from results or parts of dissertation for publication in international journals	members and peers with specified criteria (4) Quality of publications based on the standards of the Faculty of Graduate Studies, Mahidol University

3. Curriculum Mapping

Please see Appendix C**.**

Section 5 Criteria for Student Evaluation

1. Grading System

Grading system and graduation shall be complied with the criteria stated in Regulations of Mahidol University on Graduate studies.

2. Evaluation Process for the Learning Outcome of Students

Accomplishments of the learning outcomes are assessed by courses using both written and oral examinations: (passing score is 75%) for students attending Plan 1. The programs also employ none-coursework assessments such as progress report of student's dissertation (every semester), qualifying examination (in the second year), dissertation writing and defense within limited time frame.

3. Graduation Requirement

3.1 Plan 1.1 (Research only): For students with Master's degree

(1) Total time of study should not exceed the study plan.

(2) Students must complete 48 credits of dissertation and take additional non-credit courses based on recommendation of the Program Administrative Committee or advisor. Total credits acquired must not less than 48 credits.

(3) Students must meet the English Competency Standard set for graduate students as defined by the Faculty of Graduate Studies, Mahidol University.

(4) Students must pass the Qualifying Examination.

(5) Students must participate in and pass professional and personal (soft) skill development activities following the guidelines issued by the Faculty of Graduate Studies, Mahidol University.

(6) Students must submit dissertations and pass the dissertation defense by following Regulations of Mahidol University on Graduate Studies. The dissertation examination must be publicly open to general audiences.

(7) Dissertation or a part of dissertation is required to be published at least 2 articles in international peer-reviewed academic journals in compliance with Announce of the Higher Education Commission on the subject of Criteria and Regulation of Publishing, and according to the announcement of the Faculty of Graduate Studies, Mahidol University.

3.2 Plan 1.2 (Research only): For Students with Bachelor's degree

(1) Total time of study should not exceed the study plan.

(2) Students must complete 72 credits of dissertation and take additional non-credit courses based on recommendation of the Program Administrative Committee or advisor. Total credits acquired must not less than 72 credits.

(3) Students must meet the English Competency Standard set for graduate students as defined by the Faculty of Graduate Studies, Mahidol University.

(4) Students must pass the Qualifying Examination.

(5) Students must participate in and pass professional and personal (soft) skill development activities following the guidelines issued by the Faculty of Graduate Studies, Mahidol University.

(6) Students must submit dissertations and pass the dissertation defense by following Regulations of Mahidol University on Graduate Studies. The dissertation examination must be publicly open to general audiences.

(7) Dissertation or a part of dissertation is required to be published at least 2 articles in international peer-reviewed academic journals in compliance with Announce of the Higher Education Commission on the subject of Criteria and Regulation of Publishing, and according to the announcement of the Faculty of Graduate Studies, Mahidol University.

3.3 Plan 2.1 (Coursework and research): For students with Master's degree

(1) Total time of study should not exceed the study plan.

(2) Students must complete courses as stated in the curriculum at least 12 credits and dissertation 36 credits. The total is at least 48 credits.

(3) Students must have a minimum CUM-GPA of 3.00.

(4) Students must meet the English Competence Standard of Graduate Students, Mahidol University defined by the Faculty of Graduate Studies, Mahidol University.

(5) Students must pass the Qualifying Examination.

(6) Students must participate in and pass skill development activities of the Graduate Studies, Mahidol University

(7) Students must submit dissertations and pass the dissertation defense by following Regulations of Mahidol University on Graduate Studies. The dissertation examination must be publicly open to general audiences.

(8) Dissertation or a part of dissertation is required to be published in an international peer-reviewed academic journal in compliance with Announce of the Higher Education Commission on the subject of Criteria and Regulation of Publishing, and according to the announcement of the Faculty of Graduate Studies, Mahidol University.

3.4 Plan 2.2 (Coursework and research): For students with Master's degree

(1) Total time of study should not exceed the study plan.

(2) Students must complete courses as stated in the curriculum at least 24 credits and dissertation 48 credits. The total is at least 72 credits.

(3) Students must have a minimum CUM-GPA of 3.00.

(4) Students must meet the English Competence Standard of Graduate Students, Mahidol University defined by the Faculty of Graduate Studies, Mahidol University.

(5) Students must pass the Qualifying Examination.

(6) Students must participate in and pass skill development activities of the Graduate Studies, Mahidol University

(7) Students must submit dissertations and pass the dissertation defense by following Regulations of Mahidol University on Graduate Studies. The dissertation examination must be publicly open to general audiences.

(8) Dissertation or a part of dissertation is required to be published in an international peer-reviewed academic journal in compliance with Announce of the Higher Education Commission on the subject of Criteria and Regulation of Publishing, and according to the announcement of the Faculty of Graduate Studies, Mahidol University.

Section 6 Faculty Development

1. The Orientation for New Faculty Members

1.1 New faculty members have to attend an orientation that aims to provide knowledge and understanding about the policies of Mahidol University and the Faculty of Science.

1.2 New full-time and part-time faculty members are trained to acknowledge and understand the curriculum, including divisional activities by the program director.

1.3 New faculty members present their teaching materials to the committee and receive feedbacks and advice.

2. Skill and Knowledge Development for New Faculty Members

2.1 Skills Development in Teaching and Evaluation

2.1.1 New faculty members have to attend workshops to develop skills on teaching and learning methods as well as evaluation methods by Mahidol University.

2.1.2 New faculty members are encouraged to attend workshops or seminars related to teaching and learning methods from other organizations.

2.1.3 New faculty members are evaluated by students, fellow faculty members, and program director.

2.2 Other Academic and Professional Skill Development

2.2.1 New faculty members are encouraged to attend workshops or seminars related to textbook writing or research proposal writing.

2.2.2 New faculty members are encouraged to write research grants and submit to funding agencies.

2.2.3 New faculty members are encouraged to attend national and international conferences to present their research.

2.2.4 New faculty members are supported through the research mentoring system to establish their own research topic/lab.

Section 7 Quality Assurance

1. Regulatory Standard

The Doctor of Philosophy Program in Biology (International Program) has set a standard following the regulations of Graduate School and the Higher Education Commission as following:

1.1 The Faculty in Charge of the Program is appointed based on the qualification of Graduate School. The person must be knowledgeable in the field or related fields stated in the program and have continuous publications at international level as well as administering the program and teaching following the standard.

1.2 The program must plan course schedule in advance in order to meet the quality assurance corresponded to the Higher Education frame work.

1.3 The program must provide a report of activities and course work at the end of each semester in order to evaluate the process.

1.4 The program must have meetings to evaluate, follow and direct all program activities that should follow the program standard. Information from the meetings provides guidelines for further improvement and development of the program.

2. Graduates Students

Students who earn degree from the program must have the following characteristics.

2.1 Students exhibit moral and ethical conducts towards scientific profession as well as life-long learning attitude for the advancement in biological science.

2.2 Students are knowledgeable in biology and able to analyze, integrate and apply information to develop modern biological research and start-up or spin-off business.

2.3 Students are able to perform proper literature search, analyses, syntheses and problem-solving in order to develop new ideas to create new knowledge/findings.

2.4 Students are responsible and exhibit good human relations as well as team-working skills.

2.5 Students are adept at utilizing information technology in order to search and analyze information for appropriate communication and presentations.

3. Students

The program has an admission process, student orientation and preparation, student advisory system, and graduation process as well as evaluation of student satisfaction and appeal process.

3.1 Admission process

Applicants are selected based on academic/ research credentials and/ or written examination and interview according to rules and regulation of the Faculty of Graduate Studies, Mahidol University. Final judgment will be made under the consideration of the Administrative Program Committee in concurrence with the Dean of Faculty of Graduate Studies, Mahidol University.

3.2 Student orientation and preparation

Program director and committee prepare a protocol and recommendation for new students through orientation. New students are informed with program structure, courses, and suggested plans for graduation.

3.3 Student advisory system and graduation

The program assigns academic advisors to assist students with registration, research topic selection, and graduation as well as other personal problems such as financial problems.

3.4 Student satisfaction and appeal process

Evaluations of courses and activities are done every semester on reviews of student feedback and satisfaction surveys in order to evaluate all teaching and learning processes in our

program. In addition, students can send the formal appeal through the Faculty of graduate study system. Informal appeals or specific appeals regarding the coursework or course assessment can be made directly to the instructors and/ or course coordinators (as well as to the program director) . Students may approach instructors by e- mail or during their office hours and discuss their class performance as well as other issues that could improve their grades.

4. Instructors

The Department of Biology has its staff planning for new staff recruitment and development plan to retain high quality of teaching and training across four biological disciplines as well as advancing in their academic career.

1.1 Staff recruitment plan

All academic staff must hold a Ph. D. degree with an English proficiency test score as announced by the university. A candidate must only have at least one publication with his/her name as the first or corresponding author. Specific areas of expertise depend on the department agreement, which usually are similar or close to the expertise of the retired faculty members. In addition, the qualification of a candidate is also aligned with regulations on human resource development of MUSC and Mahidol University by which ethics and academic freedom for appointment, deployment and promotion are determined.

1.2 Training, career development and advancement

Academic staff is encouraged to attend training workshops for teaching methods, course evaluation, research methods, publications as well as professional ethics and regulations to improve their skills and quality to meet the standard.

5. Program, Study and Student Assessment

Program committee have plans in order to efficiently and effectively administer the program as following.

5.1 Study planning

The program is designed based on current economic and social development as stated in the National Plan of Economic and Social Development as well as the surveys from job markets and stakeholders including potential employers, alumni and current students so that program will be contemporary and match the demands of stakeholders.

5.2 Staff assignment and teaching strategies

Program committee and instructors have a meeting for assignments of course co-ordinators, which are based on expertise and experiences. Schedule of courses offered in each semester is also carefully planned to accommodate both instructors and students.

5.3 Student learning assessment

Student learning is evaluated based on course learning outcomes (ELOs) that follow the standard developed by the Department of Biology graduate program committee according to the requirement of the Commission of Higher Education. Course-coordinators are responsible for managing courses, following course activities, and evaluation as well as reporting all activities and suggestions to program committee.

6. Learning Support

Program committee and instructors have regular meetings to discuss about teaching and learning facilities and equipment as well as library materials to support education and research.

7. Key Performance Indicators

The Doctor of Philosophy Program in Biology, Department of Biology 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				
	2023	2024	2025	2026	2027
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 (if any)	✓	✓	✓	✓	✓
3. The program must have course specifications and field experience specifications (if any) according to	✓	✓	✓	✓	✓

Key Performance Indicators	Academic Year				
	2023	2024	2025	2026	2027
TQF3 and TQF4 before the beginning of each semester.					
4. Instructors must produce course reports and file experience reports (if any) according to TQF5 and TQF6 within 30 days after the end of the semester.	✓	✓	✓	✓	✓
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 and TQF4 (if any) 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 (if any) 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 profession improvement at least once a year.	✓	✓	✓	✓	✓
10. The number of supporting staff (if any) 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	-	-	✓	✓	✓
13. Instructors have been evaluated by students after teaching at 100 percent.	✓	✓	✓	✓	✓

Section 8 Evaluation and Improvement of the Curriculum Implementation

1. Evaluation on the Teaching Efficiency

1.1 Evaluation of Teaching Strategies

1.1.1 Students evaluate courses and instructors.

1.1.2 Students' evaluation towards courses and instructors is analyzed, and program director informs the instructors of the results

1.2 Evaluation of Instructors' Skills in Using Teaching Strategies

Instructors are evaluated by students, program committee or department head based on teaching strategies, punctuality, clarification of course objectives and learning outcomes as well as evaluation process, and use of proper teaching media.

2. Overall Evaluation of the Curriculum

2.1 Survey on alumni satisfaction towards utilization of knowledge and skills developed from entering the program in work.

2.2 Survey the number of alumni getting jobs directly related to the fields of study

2.3 Survey on employers' satisfaction with graduates and desired characteristics

2.4 Program evaluation from external expertise, academic qualified experts, and employers in order to brainstorm for ideas of improvement and development of the program

3. Evaluation of Curriculum Implementation in Accordance with the Curriculum

Annual evaluation is assigned as indicated in Section 7, number 7 with at least five evaluators including employers, and at least two academic qualified experts. The criteria are as following.

" unsatisfactory" means the program does not cover the first 10 Key Performance Indicators.

"good" means the program shows all first 10 Key Performance Indicators.

"very good" means the program has all Key Performance Indicators.

The university requires all programs to revise their curriculum to meet with contemporary changes and improving academic standards every 3 years and must be evaluated for new development and improvement every 5 years.

4. Review of the Evaluation and Plans for Improvement

4.1 Collecting all information, advices, and evaluations of the newly graduates, users/stakeholders, and experts

4.2 Evaluation of students' satisfaction towards course

4.3 Program revision and evaluation every 5 years

Appendix A

Course Description

Appendix A
Course Description

Credits (lecture – practice – self-study)

1. Required Courses

SCBI 585 Trends and Advances in Biology 3 (3-0-6)

วทชว ๕๘๕ แนวโน้มและความก้าวหน้าทางชีววิทยา

Concepts, principles, theories and integrations of current trends and advances in biology

แนวคิด หลักการ ทฤษฎี และการบูรณาการของแนวโน้มและความก้าวหน้าทางชีววิทยาในปัจจุบัน

SCBI 586 Systematic Biology 3 (3-0-6)

วทชว ๕๘๖ การจัดระบบทางชีววิทยา

History and development of theories in systematic biology; principles and philosophy of taxonomy; classification, identification and nomenclature of organisms; international code of zoological/botanical nomenclature; species concepts; methods of reconstruction of phylogenetic relationship; molecular systematics

ประวัติและพัฒนาการของทฤษฎีการจัดระบบทางชีววิทยา หลักการและปรัชญาของอนุกรมวิธาน การจัดหมวดหมู่ การจัดจำแนก และการตั้งชื่อสิ่งมีชีวิต กฎเกณฑ์สากลของการตั้งชื่อสัตว์และพืช คำจำกัดความของสปีชีส์ วิธีการวิเคราะห์ความสัมพันธ์เชิงวิวัฒนาการของสิ่งมีชีวิต การจัดระบบทางชีววิทยาในระดับโมเลกุล

SCBI 587 Ecology and Evolutionary Biology 3 (3-0-6)

วทชว ๕๘๗ นิเวศวิทยาและชีววิทยาเชิงวิวัฒนาการ

Physical and biological factors influencing ecosystems, climates and biome distribution; organism adaptations to the environment; population growth, population regulation; life histories; species interactions; community ecology, landscape ecology, biogeography, energy in ecosystems, biogeochemical cycles; human population; conservation; early evolutionary ideas, Darwin's theory, natural selection; genetics of populations; species concepts, speciation; historical biogeography; diversification of life; human evolution; phylogeny; sexual selection, cooperation, coevolution, and applied ecology and evolution

ปัจจัยทางกายภาพและชีวภาพที่มีอิทธิพลต่อระบบนิเวศภูมิอากาศและการกระจายตัวของชีวนิเวศ การปรับตัวของสิ่งมีชีวิตต่อสิ่งแวดล้อม การเติบโตของประชากร การควบคุมประชากร การดำเนินชีวิตของสิ่งมีชีวิต ปฏิสัมพันธ์ระหว่างสปีชีส์ นิเวศวิทยาชุมชน นิเวศวิทยาเชิงภูมิภาพ ชีวภูมิศาสตร์พลังงานในระบบนิเวศ

วัฏจักรชีวธรณีเคมี ประชากรมนุษย์ การอนุรักษ์ แนวคิดทางวิวัฒนาการในยุคแรกเริม ทฤษฎีของดาร์วิน การคัดเลือกทางธรรมชาติ พันธุศาสตร์ของประชากร แนวคิดของสปีชีส์ การเกิดสปีชีส์ใหม่ ประวัติชีวภูมิศาสตร์ การเกิดความหลากหลายของชีวิต วิวัฒนาการของมนุษย์ วงศ์วานวิวัฒนาการการคัดเลือกทางเพศ การร่วมมือกันของสิ่งมีชีวิต วิวัฒนาการร่วม และนิเวศวิทยาและวิวัฒนาการเชิงประยุกต์

SCBI 609 Molecular Genetics 3 (3-0-6)

วทชว ๖๐๙ พันธุศาสตร์ระดับโมเลกุล

Gene interactions; enzymatic control of metabolism; gene mutation and recombination; gene structure, gene function; genetic code; transcription and translation; process of gene regulation in prokaryotes and eukaryotes

ความสัมพันธ์ระหว่างยีน การควบคุมกระบวนการเมแทบอลิซึมโดยเอนไซม์ ปรากฏการณ์ยีนมิวเทชันและรีคอมบิเนชัน โครงสร้างของยีน การทำงานของยีน รหัสของยีน กระบวนการทรานสคริบชันและกระบวนการทรานสเลชัน กระบวนการควบคุมการทำงานของยีนในโพรแคริโอตและยูแคริโอต

SCBI 616 Integrated Biology for Frontier Research 2 (2-0-4)

วทชว ๖๑๖ ชีววิทยาเชิงบูรณาการสำหรับงานวิจัยแนวหน้า

Integrated in-depth biological knowledge; cutting edge technologies in biological fields of interest; integration of various biological concepts for research and applications; case studies in integrated biology and frontier research

ความรู้ทางชีววิทยาเชิงลึกแบบบูรณาการ วิทยาการล้ำสมัยในสาขาต่าง ๆ ทางชีววิทยาที่น่าสนใจ การบูรณาการแนวคิดทางชีววิทยาหลากสาขาสำหรับการวิจัยและการประยุกต์ใช้ กรณีศึกษาทางชีววิทยาเชิงบูรณาการและงานวิจัยแนวหน้า

SCBI 618 Advanced Research Methodology in Biology 2 (0-6-3)

วทชว ๖๑๘ วิทยาระเบียบวิธีวิจัยขั้นสูงทางชีววิทยา

Concepts, principles, and research methodology for advanced research in biology; academic literature searching, research ethics, research design, and research methodology; research proposal development, execution of experimental tests, data collection and analysis, research report writing

แนวคิด หลักการ และเทคนิคการวิจัยเพื่อการวิจัยขั้นสูง ทางชีววิทยา การสืบค้นและ รวบรวมข้อมูลทางวิชาการ จริยธรรมการวิจัย การออกแบบวิจัยและระเบียบวิธีวิจัย การพัฒนาโครงร่างวิจัย การฝึกการดำเนินการวิจัย การรวบรวมและวิเคราะห์ข้อมูล และการเขียนรายงานวิจัย

SCBI 640 Research Seminar in Biology 1 (1-0-2)

วทชว ๖๔๐ สัมมนาการวิจัยทางชีววิทยา

Seminar on current research in general topics in biology; techniques for scientific presentations; methods for analysis and summarization of scientific findings

การสัมมนาบทความวิจัยปัจจุบันในหัวข้อทั่วไปที่เกี่ยวข้องกับชีววิทยา เทคนิคการนำเสนอข้อมูลทางวิทยาศาสตร์ วิธีการวิเคราะห์และการสรุปผลการวิจัยทางวิทยาศาสตร์

SCBI 641 Advanced Research Seminar in Biology 1 (1-0-2)

วทชว ๖๔๑ สัมมนาการวิจัยทางชีววิทยาขั้นสูง

Seminar on current research in specialized topics in biology; analysis and application of scientific findings

การสัมมนาบทความวิจัยปัจจุบันในหัวข้อเฉพาะด้านที่เกี่ยวข้องกับชีววิทยา และการประยุกต์ผลการวิจัยทางวิทยาศาสตร์

SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2)

วทชว ๖๔๒ สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยา

Seminar on current research in biology; methods for in-depth analysis and application of scientific findings

การสัมมนาบทความวิจัยปัจจุบันทางชีววิทยา วิธีการวิเคราะห์เชิงลึกและการประยุกต์ผลการวิจัยทางวิทยาศาสตร์

SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2)

วทชว ๖๔๓ สัมมนาการวิจัยดุษฎีบัณฑิตทางชีววิทยาขั้นสูง

Seminar on current research in integrative biology; methods for in-depth analysis and application of scientific findings

การสัมมนาบทความวิจัยปัจจุบันทางชีววิทยาเชิงบูรณาการ วิธีการวิเคราะห์เชิงลึกและการประยุกต์ผลการวิจัยทางวิทยาศาสตร์

SCID 500 Cell and 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 การตาย และการพัฒนาของเซลล์

SCID 518 Generic Skills in Science Research 1 (1-0-2)

วทคร ๕๑๘ ทักษะทั่วไปในการวิจัยทางวิทยาศาสตร์

Qualities of a good researcher, effective searching of the scientific information, laboratory safety, biosafety, chemical safety, radiation safety and electrical safety, ethics of research in human subjects and experimental animals in science, Intellectual property rights, research misconduct attribution of credit and responsibility, techniques in formulating and writing dissertation proposals, research projects, grant applications, research reports and manuscript for publication

คุณสมบัติของนักวิจัยที่ดี การค้นหาข้อมูลในฐานข้อมูลทางวิทยาศาสตร์อย่างมีประสิทธิภาพ ความปลอดภัยในห้องปฏิบัติการ ความปลอดภัยทางชีวภาพ เคมี รังสี และไฟฟ้า จริยธรรมในการวิจัยในมนุษย์ และการทดลองสัตว์ในด้านวิทยาศาสตร์ สิทธิในทรัพย์สินทางปัญญา การกระทำผิดคุณลักษณะของความรับผิดชอบและการอ้างอิงผลงานวิจัย เทคนิคการสร้างและการเขียนโครงร่างโครงการวิจัย การเขียนขอทุนวิจัย การเขียนรายงานวิจัย และต้นฉบับเพื่อส่งตีพิมพ์

2. Elective Courses

SCBI 501 Molecular Entomology 3 (3-0-6)

วทชว ๕๐๑ กีฏวิทยาระดับโมเลกุล

Insect genome mapping; gene expression in insects; genetic manipulation of insect pests or vectors for control purposes

การสร้างแผนที่ยีนของแมลง การแสดงออกของยีนในแมลง การเปลี่ยนแปลงสายพันธุ์เพื่อ การควบคุมแมลงที่เป็นศัตรูพืชหรือพาหะนำโรค

SCBI 502 Medical Entomology 3 (2-3-5)

วทชว ๕๐๒ กีฏวิทยาทางการแพทย์

Classification, morphology, bionomics and ecology of medically important arthropods; epidemiology of arthropod-borne infections, control of transmissible diseases; host-parasite-vector relationships; medical entomological techniques

การจัดจำแนก สัณฐานวิทยา ชีวนิสัยและนิเวศวิทยาของสัตว์ขาข้อที่สำคัญทางการแพทย์ ระบาดวิทยาของโรคที่นำโดยสัตว์ขาข้อและการควบคุมโรค ความสัมพันธ์ของสัตว์ขาข้อกับปรสิต เทคนิคทางกีฏวิทยาการแพทย์

SCBI 506 Insect Taxonomy 3 (2-3-5)

วทชว ๕๐๖ อนุกรมวิธานของแมลง

Classification and identification of orders and families of Southeast Asian insects, identification of medically important insects to generic and specific levels, international rules of nomenclature; molecular phylogenetic analysis, cytotaxonomy; preservation, storage of collected insects

การจำแนกหมวดหมู่ของแมลงที่พบในเอเชียอาคเนย์ถึงระดับอันดับและวงศ์ การจำแนกแมลงที่มีความสำคัญทางการแพทย์ถึงระดับสกุลและสปีชีส์ การเรียกชื่อแมลงตามหลักนานาชาติ การวิเคราะห์ไฟโลเจเนติกระดับโมเลกุล อนุกรมวิธานระดับเซลล์ การเก็บรักษาตัวอย่างแมลง

SCBI 530 Conservation Biology 3 (3-0-6)

วทชว ๕๓๐ ชีววิทยาเชิงอนุรักษ์

The ecological and genetic concept for the conservation of species, populations and communities; goals and practical strategies for conservation

หลักการทางนิเวศวิทยาและพันธุศาสตร์ที่เป็นรากฐานในการอนุรักษ์สิ่งมีชีวิตในระดับสปีชีส์ ระดับประชากรและระดับชุมชนของสิ่งมีชีวิต จุดมุ่งหมายและแนวทางปฏิบัติในการอนุรักษ์ธรรมชาติ

SCBI 532 Basic Principles of Sociobiology 3 (3-0-6)

วทชว ๕๓๒ หลักชีววิทยาเชิงสังคม

Theory of evolution of social behavior and social systems in animals, insect societies, social communication; advantages of group living, cooperation, aggression, group selection, sexual selection, parent-offspring relations

ทฤษฎีการวิวัฒนาการของพฤติกรรมสัตว์และระบบสังคมในสัตว์ สังคมของแมลง การติดต่อสื่อสาร ข้อได้เปรียบของการอยู่ร่วมกันเป็นกลุ่ม การร่วมกันทำงาน พฤติกรรมก้าวร้าว การคัดเลือกแบบกลุ่ม การคัดเลือกทางเพศและความสัมพันธ์ระหว่างพ่อแม่และลูก

SCBI 539 Techniques in Ecology and Conservation 2 (0-6-3)

วทชว ๕๓๙ เทคนิคการวิจัยทางนิเวศวิทยาและการอนุรักษ์

Theories and practicals for assessment of biodiversity, monitoring changes in ecology; research techniques in ecology, ecological education concerning ecotourism, species management, habitat management; usage from biodiversity; balance between usage and conservation; policy research for conservation

ทฤษฎีและการปฏิบัติเพื่อการประเมินความหลากหลายทางชีวภาพ การติดตามการเปลี่ยนแปลงทางนิเวศวิทยา เทคนิคการวิจัยทางนิเวศวิทยา เทคนิคการให้การศึกษาและการดำเนินการเกี่ยวกับการท่องเที่ยวเชิงนิเวศ เทคนิคการจัดการสปีชีส์ การจัดการถิ่นที่อยู่อาศัย การใช้ประโยชน์จากความหลากหลายทางชีวภาพ ความสมดุลระหว่างการใช้ประโยชน์และการอนุรักษ์ การวิจัยเชิงนโยบายเพื่อการอนุรักษ์

SCBI 545 Cytogenetics 3 (2-3-5)

วทชว ๕๔๕ เซลล์พันธุศาสตร์

Molecular biology of heredity; mechanisms of mitosis, meiosis, chromosome pairing, recombination, chromosomal changes; cytotaxonomy; chromosomal evolution

ชีววิทยาระดับโมเลกุลของการถ่ายทอดทางกรรมพันธุ์ กลไกการเกิดไมโทซิส ไมโอซิส การจับคู่ของโครโมโซม การแลกเปลี่ยนส่วนของโครโมโซม และการเปลี่ยนแปลงของโครโมโซม การจำแนกสิ่งมีชีวิตเชิงเซลล์พันธุศาสตร์ การวิวัฒนาการของโครโมโซม

SCBI 546 Population and Ecological Genetics 3 (3-0-6)

วทชว ๕๔๖ พันธุศาสตร์เชิงประชากรและเชิงนิเวศ

Concepts of population and ecological genetics; changes of gene frequency in population; effects of population size, genetic variation in populations in relation to environmental changes; environmental adaptation, natural selection; applications of ecological genetics on medicine and biological conservation; evolutionary effects of pest control and reduction of atmospheric pollution

แนวความคิดของประชากรและนิเวศในเชิงพันธุศาสตร์ การเปลี่ยนแปลงสัดส่วนยีนในประชากร อิทธิพลของขนาดประชากร การแปรผันองค์ประกอบทางพันธุกรรมที่สัมพันธ์กับการเปลี่ยนแปลงสภาพแวดล้อม การปรับตัวให้เข้ากับสภาพแวดล้อม การคัดเลือกทางธรรมชาติ การประยุกต์ใช้ความรู้ทางนิเวศวิทยาเชิงพันธุศาสตร์ในทางการแพทย์และการอนุรักษ์ทรัพยากรธรรมชาติผลกระทบของการควบคุมศัตรูพืชและการลดระดับมลภาวะของบรรยากาศต่อการวิวัฒนาการ

SCBI 581 Special Problems in Biology 2 (0-6-3)

วทชว ๕๘๑ ปัญหาพิเศษทางชีววิทยา

Specific problems in biology; independent short-term research; experimental planning, research techniques, interpretation and analysis of research data

หัวข้อปัญหาเฉพาะทางด้านชีววิทยา การทำวิจัยอิสระระยะสั้น การวางแผนการวิจัย เทคนิคการวิจัย การแปลและวิเคราะห์ผลการวิจัย

SCBI 589 Advanced Research Techniques in Biological Science 2 (0-6-3)

วทชว ๕๘๙ เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพขั้นสูง

Advanced techniques in collecting samples, research methodology and data analysis in the fields of biological biology; moral and ethics in conduction of research

เทคนิคขั้นสูงในการเก็บตัวอย่าง ขั้นตอนการดำเนินงานวิจัย และการวิเคราะห์ผลทางวิทยาศาสตร์ชีวภาพคุณธรรมและจริยธรรมในการดำเนินงานวิจัย

SCBI 607 Evolutionary Genetics 3 (3-0-6)

วทชว ๖๐๗ พันธุศาสตร์เชิงวิวัฒนาการ

Evolution by natural selection, Darwin's theory; genetic drift, founder effect; variability of natural populations; evolution at more than one locus; evolution of prokaryotes, evolution of the eukaryotic genome, evolution of genetic systems; macroevolution, species and speciation; quantitative genetics; molecular evolution; reconstruction of evolutionary history

วิวัฒนาการโดยการคัดเลือกทางธรรมชาติ ทฤษฎีของดาร์วิน เจเนติกดริฟท์ ฟาวน์เดอร์ เอฟเฟกท์ การแปรผันของประชากรธรรมชาติ การวิวัฒนาการของยีนตั้งแต่สองตำแหน่งขึ้นไป วิวัฒนาการของพวกโพรแคริโอต วิวัฒนาการของจีโนมของพวกยูแคริโอต วิวัฒนาการของระบบต่าง ๆ ทางพันธุกรรม วิวัฒนาการมหภาค สปีชีส์และกำเนิดสปีชีส์ใหม่ พันธุศาสตร์เชิงปริมาณ วิวัฒนาการของโมเลกุล การสร้างประวัติวิวัฒนาการ

SCBI 617 Biological Laboratory Design and Demonstration 1 (0-2-4)

วทชว ๖๑๗ การออกแบบปฏิบัติการชีววิทยาและการสาธิต

Educational activities design in biological laboratory; learning assessment and evaluation; evaluation and analysis to optimize laboratory activities; inter-personal skills to interact with people from various backgrounds; laboratory demonstration practices in biological laboratory

การออกแบบการจัดกิจกรรมการเรียนรู้ปฏิบัติการชีววิทยา การวัดและการประเมินผลการเรียนรู้ การประเมินและวิเคราะห์เพื่อปรับปรุงการจัดกิจกรรมปฏิบัติการ ทักษะการปฏิสัมพันธ์กับคนที่มาจากหลากหลายพื้นฐาน การฝึกสาธิตปฏิบัติการในรายวิชาปฏิบัติการชีววิทยา

SCBI 637 Molecular Ecology 3 (3-0-6)

วทชว ๖๓๗ นิเวศวิทยาระดับโมเลกุล

Molecular genetics and DNA markers in ecology; genetic diversity; population genetics, genetics and extinction, natural selection, gene flow among populations; genetic differentiation; quantitative trait loci; phylogeography; hybridization; behavioral ecology, conservation genetics, genetic management of wild and captive populations

พันธุศาสตร์โมเลกุลและเครื่องหมายดีเอ็นเอในการศึกษานิเวศวิทยา ความหลากหลายทางพันธุกรรม พันธุศาสตร์ประชากร พันธุศาสตร์กับการสูญพันธุ์ การคัดเลือกโดยธรรมชาติ การถ่ายเทเคลื่อนย้ายยีนระหว่างประชากร ความแตกต่างทางพันธุกรรม ตำแหน่งยีนที่ควบคุมลักษณะเชิงปริมาณสายวิวัฒนาการเชิงภูมิศาสตร์ การเกิดลูกผสม นิเวศวิทยาทางพฤติกรรม พันธุศาสตร์เชิงอนุรักษ์ การจัดการพันธุกรรมของประชากรในธรรมชาติและประชากรเพาะเลี้ยง

SCBI 644 Bioeconomy 1(0-3-2)

วทชว ๖๔๔ เศรษฐกิจชีวภาพ

Principle and application of bioeconomy; critical and systematic thinking that leads to problem solving in natural resource crises; developing skills in design thinking in development of bioeconomy; utilization of knowledge, technology and innovation in biology to extend ideas in bioeconomy from bioresources

หลักการและการประยุกต์ใช้เศรษฐกิจชีวภาพ การคิดอย่างมีวิจารณญาณและเป็นระบบที่นำไปสู่การแก้ไขปัญหาภาวะวิกฤติของทรัพยากรชีวภาพ พัฒนาทักษะการคิดเชิงออกแบบในการพัฒนาเศรษฐกิจชีวภาพ การนำความรู้ เทคโนโลยี และนวัตกรรมทางชีววิทยามาพัฒนาต่อยอดเศรษฐกิจชีวภาพจากฐานทรัพยากรชีวภาพ

SCID 502 Cell Science 2 (2-0-4)

วทคร ๕๐๒ วิทยาศาสตร์เรื่องเซลล์

Mechanism of cellular trafficking and processing among organelles, cellular communication, recognition, adhesion and interaction, cell cycle and controls of cellular differentiation and cancer, cellular signal transduction, cellular response to stress, cell injury, senescence, and cell death, cell-microbe interaction, cellular immune responses, molecular pathogenesis of some diseases

กลไกของเซลล์ในการขนส่งและแปรรูปชีวโมเลกุลไปยังอวัยวะเซลล์ การติดต่อสื่อสาร การรับรู้ การเกาะเกี่ยวกัน และการปฏิสัมพันธ์ระหว่างเซลล์ วัฏจักรของเซลล์และการควบคุมการเปลี่ยนสภาพของเซลล์และมะเร็ง การส่งสัญญาณภายในเซลล์ การตอบสนองของเซลล์ต่อภาวะเครียด การบาดเจ็บ การชราและการตายของเซลล์ การปฏิสัมพันธ์ระหว่างเซลล์กับจุลชีพ การตอบสนองของระบบภูมิคุ้มกันของเซลล์ พยาธิกำเนิดในระดับโมเลกุลของโรคบางชนิด

SCID 503 Systematic Bioscience 3 (3-0-6)

วทคร ๕๐๓ วิทยาศาสตร์ชีวภาพเชิงระบบ

Homeostasis, integumentary and immune systems, nervous system, musculoskeletal system, cardiovascular system, respiratory system, urinary system, the digestive system, endocrine system, reproductive system, integration of systemic bioscience

สภาวะสมดุลของร่างกาย ระบบผิวหนังและภูมิคุ้มกัน ระบบประสาท ระบบโครงร่างกล้ามเนื้อ ระบบหัวใจและหลอดเลือด ระบบทางเดินหายใจ ระบบทางเดินปัสสาวะ ระบบย่อยอาหาร ระบบต่อมไร้ท่อ ระบบสืบพันธุ์ บูรณาของวิทยาศาสตร์ชีวภาพเชิงระบบ

SCID 506 Concept of Molecular Bioscience 2 (2-0-4)

วทคร ๕๐๖ หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล

Biochemical and biophysical knowledge underlying various processes of living systems, structures and functions of biological molecules, manipulation of energy and metabolites are in biological systems, regulation and expression process of genetic materials

ความรู้ทางชีวเคมีและชีวฟิสิกส์ของกระบวนการต่าง ๆ ในสิ่งมีชีวิต โครงสร้างและหน้าที่ของชีวโมเลกุล การสร้างและการใช้พลังงานในกระบวนการต่าง ๆ ของสิ่งมีชีวิต กระบวนการควบคุมและการแสดงออกของสารพันธุกรรม

SCID 508 Biomolecular and Spectroscopic Techniques 1 (0-2-1)

วทคร ๕๐๘ เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี

Absorbance and fluorescence spectroscopy, mass spectroscopy, nuclear magnetic resonance (NMR) spectroscopy and biomolecular spectroscopy, laboratory rules and regulations

สเปกโทรสโกปีชนิดดูดกลืนแสงและฟลูออเรสเซนท์ แมสสเปคโทรสโกปี สเปกโทรสโกปีชนิดนิวเคลียร์แมกเนติกเรโซแนนซ์ และสเปกโทรสโกปีทางชีวโมเลกุลคู่ กฎและระเบียบการใช้ห้องปฏิบัติการ

SCID 510 Immunological Methods 1 (0-2-1)

วทคร ๕๑๐ ระเบียบวิธีวิทยาภูมิคุ้มกัน

Basic principles and applications of immunological methods enzyme-linked immunosorbent assay, SDS-PAGE and immunoblotting, direct and indirect immunofluorescence assays, immunoelectron microscopy, immunoprecipitation, peripheral blood mononuclear cell preparation, flow cytometry and cell sorting, laboratory rules and regulations

หลักการพื้นฐานและการประยุกต์ระเบียบวิธีทางวิทยาภูมิคุ้มกัน เอนไซม์ลิงค์อิมมูนโนสอร์เบนท์ เอสดีเอส-เพจ และ การทำอิมมูนโนบลอท การทำอิมมูนโนฟลูโอเรสเซน ตรง และ อ้อม การทำอิมมูนโนอิเล็กตรอนไมโครสโคปี การทำอิมมูนโนพรีซิพพิเทชั่น ปฏิบัติการเตรียมเซลล์นิวเคลียสเดี่ยวจากเลือดปฏิบัติการโฟลไซโตเมททรี และ การแยกเซลล์ กฎและระเบียบการใช้ห้องปฏิบัติการ

SCID 513 Animal Cell Culture Techniques 1 (0-2-1)

วทคร ๕๑๓ เทคนิคการเพาะเลี้ยงเซลล์สัตว์

Basic techniques for cultivation of anchorage-dependent and anchorage -independent cells, mass production of animal cells, propagation, determination of cell growth and maintenance of cell lines, cryo-preservation of cells and determination of cell survival after cold storage, effect of certain parameters on the growth of anchorage-independent cell line, laboratory rules and regulations

เทคนิคขั้นพื้นฐานในการเพาะเลี้ยงเซลล์ชนิดที่เจริญแบบเกาะติดและที่เจริญแบบไม่เกาะติด การเพาะเลี้ยงเซลล์สัตว์ในปริมาณสูง การขยายพันธุ์เซลล์ การเจริญของเซลล์และการคงสภาพสายพันธุ์เซลล์ การถนอมเซลล์โดยใช้ความเย็น และการตรวจเซลล์ที่รอดชีวิตหลังแช่แข็ง ผลของตัวแปรบางอย่างต่อการเจริญของสายพันธุ์เซลล์แบบไม่เกาะติด กฎและระเบียบการใช้ห้องปฏิบัติการ

SCID 514 Animal Experimentation in Biomedical Research 1 (0-2-1)

วทคร ๕๑๔ การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์

Ethics on animal experimentation, selection of animal model, standard animal care, basic techniques for animal experimentation, special techniques in animal experiments, laboratory rules and regulations

จริยธรรมการทดลองโดยใช้สัตว์ การเลือกรูปแบบสัตว์ มาตรฐานการดูแลสัตว์ เทคนิคพื้นฐานสำหรับการทดลองที่ใชสัตว์ เทคนิคพิเศษในการทดลองในสัตว์ กฎและระเบียบการใช้ห้องปฏิบัติการ

3. Dissertation

SCBI 699 Dissertation 36 (0-108-0)

วทชว ๖๙๙ วิทยานิพนธ์

Research design, research methodology; research proposal presentation; research ethics; data collection, data analysis, interpretation and discussion of research results; scientific manuscript writing for publication; dissertation writing, dissertation presentation

การออกแบบวิจัย ระเบียบวิธีวิจัย การเสนอโครงร่างวิจัย จริยธรรมการวิจัย การรวบรวมข้อมูล การวิเคราะห์ข้อมูล การแปลและวิพากษ์ผลการวิจัย การเขียนบทความวิจัยทางวิทยาศาสตร์เพื่อการตีพิมพ์เผยแพร่ การเขียนวิทยานิพนธ์ การนำเสนอวิทยานิพนธ์

SCBI 799 Dissertation 48 (0-144-0)

วทชว ๗๙๙ วิทยานิพนธ์

Research design, research methodology; research proposal presentation; research ethics; data collection, data analysis, interpretation and discussion of research results; scientific manuscript writing for publication; dissertation writing, dissertation presentation

การออกแบบวิจัย ระเบียบวิธีวิจัย การเสนอโครงร่างวิจัย จริยธรรมการวิจัย การรวบรวมข้อมูล การวิเคราะห์ข้อมูล การแปลและวิพากษ์ผลการวิจัย การเขียนบทความวิจัยทางวิทยาศาสตร์เพื่อการตีพิมพ์เผยแพร่ การเขียนวิทยานิพนธ์ การนำเสนอวิทยานิพนธ์

SCBI 898 Dissertation 48 (0-144-0)

วทชว ๘๙๘ วิทยานิพนธ์

Research design, research methodology; research proposal presentation; research ethics; data collection, data analysis, interpretation and discussion of research results; scientific manuscript writing for publication; dissertation writing, dissertation presentation

การออกแบบวิจัย ระเบียบวิธีวิจัย การเสนอโครงร่างวิจัย จริยธรรมการวิจัย การรวบรวมข้อมูล การวิเคราะห์ข้อมูล การแปลและวิพากษ์ผลการวิจัย การเขียนบทความวิจัยทางวิทยาศาสตร์เพื่อการตีพิมพ์เผยแพร่ การเขียนวิทยานิพนธ์ การนำเสนอวิทยานิพนธ์

SCBI 899 Dissertation 72 (0-216-0)

วทชว ๘๙๙ วิทยานิพนธ์

Research design, research methodology; research proposal presentation; research ethics; data collection, data analysis, interpretation and discussion of research results; scientific manuscript writing for publication; dissertation writing, dissertation presentation

การออกแบบวิจัย ระเบียบวิธีวิจัย การเสนอโครงร่างวิจัย จริยธรรมการวิจัย การรวบรวมข้อมูล การวิเคราะห์ข้อมูล การแปลและวิพากษ์ผลการวิจัย การเขียนบทความวิจัยทางวิทยาศาสตร์เพื่อการตีพิมพ์เผยแพร่ การเขียนวิทยานิพนธ์ การนำเสนอวิทยานิพนธ์

Appendix B

Curriculum Vitae of the Faculty in Charge of the Program

Appendix B

Curriculum Vitae of the Faculty in Charge of the Program

1. Name Associate Professor Dr.Arunee Ahantarig

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	University of Texas at San Antonio, U.S.A.	2003
M.Sc.	Biology	University of Texas at San Antonio, U.S.A.	1996
B.Sc.	Medical Technology	Chulalongkorn University	1992

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Biology and molecular biology of tick and tick-borne diseases
2. Vector-borne 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
Published research work	Apanaskevich DA, Apanaskevich MA, Nooma W, **Ahantarig A**, Trinachartvanit W. Reinstatement of *Dermacentor tricuspis* (Schulze, 1933) n. comb., n. stat. (Acari: Ixodidae) as a valid species, synonymization of *D. atrosignatus* Neumann, 1906 and description of a new species from Indonesia, Malaysia and Thailand. Syst Parasitol. 2021;98(3):207-230.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Nooroong P, Trinachartvanit W, Baimai V, Anuracpreeda P, **Ahantarig A.** Partial DnaK protein expression from *Coxiella*-like endosymbiont of *Rhipicephalus annulatus* tick. PLoS One. 2021;16(4):e0249354.	12, 1	2021
	Kaenkan W, Nooma W, Chelong IA, Baimai V, Trinachartvanit W, **Ahantarig A.** Reptile-associated *Borrelia* spp. in *Amblyomma* ticks, Thailand. Ticks Tick Borne Dis. 2020;11(1): 101315.	12,1	2020

Current Teaching Load

1.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
4.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
5.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
6.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
7.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
8.	SCBI 699	Dissertation	36 (0-108-0)
9.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 501	Molecular Entomology	3 (3-0-6)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
4.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
5.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
6.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
7.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
8.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)

10.	SCBI 699	Dissertation	36 (0-108-0)
11.	SCBI 799	Dissertation	48 (0-144-0)
12.	SCBI 898	Dissertation	48 (0-144-0)
13.	SCBI 899	Dissertation	72 (0-216-0)

2. Name Associate Professor Dr.Surang Chankhamhaengdecha

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biotechnology	Mahidol University	2003
M.Sc.	Biotechnology	Mahidol University	1999
B.Sc.	Microbiology	Burapha University	1997

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Antimicrobial drug discovery
2. Bacteriophage-based biocontrol
3. Molecular biology

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	Sridapan T, Tangkawsakul W, Janvilisri T, Kiatpathomchai W, Dangtip S, Ngamwongsatit N, Nacapricha D, Ounjai P, **Chankhamhaengdecha S**. Rapid detection of *Clostridium perfringens* in food by loop-mediated isothermal amplification combined with a lateral flow biosensor. PLoS One. 2021;16(1):e0245144.	12, 1	2021
	Wongkuna S, Ghimire S, **Chankhamhaengdecha S**, Janvilisri T, Scaria J. *Mediterraneibacter catenae* SW178 sp. nov., an intestinal bacterium of feral chicken. PeerJ. 2021;9: e11050.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Wongkuna S, Ghimire S, Janvilisri T, Doerner K, **Chankhamhaengdecha S**, Scaria J. Taxono-genomics description of *Olsenella lakotia* SW165 T sp. nov., a new anaerobic bacterium isolated from cecum of feral chicken. F1000Res. 2020;9:1103.	12, 1	2020
	Harnvoravongchai P, Singwisut R, Ounjai P, Aroonnual A, Kosiyachinda P, Janvilisri T, **Chankhamhaengdecha S**. Isolation and characterization of thermophilic cellulose and hemicellulose degrading bacterium, *Thermoanaerobacterium* sp. R63 from tropical dry deciduous forest soil. PLoS One. 2020;15(7):e0236518.	12, 1	2020
	Dowdell P, **Chankhamhaengdecha S**, Panbangred W, Janvilisri T, Aroonnual A. Probiotic activity of *Enterococcus faecium* and *Lactococcus lactis* isolated from Thai fermented sausages and their protective effect against *Clostridium difficile*. Probiotics Antimicrob Proteins. 2020;12(2):641-648.	12, 1	2020
	Wongkuna S, Ghimire S, Antony L, **Chankhamhaengdecha S**, Janvilisri T, Scaria J. *Sellimonas caecigallum* sp. nov., description and genome sequence of a new member of the *Sellimonas* genus isolated from the cecum of feral chicken. New Microbes New Infect. 2020;33:100626.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Phanchana M, Phetruen T, Harnvoravongchai P, Raksat P, Ounjai P, **Chankhamhaengdecha S**, Janvilisri T. Repurposing a platelet aggregation inhibitor ticagrelor as an antimicrobial against *Clostridioides difficile*. Sci Rep. 2020;10:6497.	12, 1	2020
	Thomas M, Wongkuna S, Ghimire S, Kumar R, Antony L, Doerner KC, Singery A, Nelson E, Woyengo T, **Chankhamhaengdecha S**, Janvilisri T, Scaria J. Gut microbial dynamics during conventionalization of germfree chicken. mSphere. 2019;4(2):e00035-19.	12, 1	2019
	Kampeera J, Pasakon P, Karuwan C, Arunrut N, Sappat A, Sirithammajak S, Nipaphorn Dechokiattawan, Sumranwanich T, Chaivisuthangkura P, Ounjai P, **Chankhamhaengdecha S**, Wisitsoraat A, Tuantranont A, Wansika K. Point-of-care rapid detection of Vibrio parahaemolyticus in seafood using loop-mediated isothermal amplification and graphene-based screen-printed electrochemical sensor. Biosens Bioelectron. 2019;132:271-278.	12, 1	2019

Current Teaching Load

1.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 582	Current Topics in Biology	3 (3-0-6)
4.	SCBI 609	Molecular Genetics	3 (3-0-6)
5.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
6.	SCBI 699	Dissertation	36 (0-108-0)
7.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 609	Molecular Genetics	3 (3-0-6)
5.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
6.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
7.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
8.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
10.	SCBI 699	Dissertation	36 (0-108-0)
11.	SCBI 799	Dissertation	48 (0-144-0)
12.	SCBI 898	Dissertation	48 (0-144-0)
13.	SCBI 899	Dissertation	72 (0-216-0)

3. Name Assistant Professor Dr.Chalita Kongrit

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	Mahidol University	2010
B.Sc.	Biology	Mahidol University	2002

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Wildlife genetics and conservation
2. Population genetics and ecology of wild populations

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	Promnun P, Tandavanit, N, **Kongrit C**, Kongsatree K, Kongpraphan P, Dongkumfu W, Kumsuan D, Khudamrongsawat J. Phylogeography and ecological niche modeling reveal evolutionary history of *Leiolepis ocellata* (Squamata, Leiolepidae). Ecol Evol. 2021;11:2221-2233.	12,1	2021
	Promnun P, **Kongrit** C, Tandavanit N, Techachoochert S, Khudamrongsawat J. Predicting potential distribution of an endemic butterfly lizard, *Leiolepis ocellata* (Squamata: Agamidae). Trop Nat Hist. 2020;20(1):60-71.	12,1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Kongrit C, Markviriya D, Laithong P, Khudamrongsawat J. Species identification and unlocking hidden genetic diversity of confiscated slow lorises (*Nycticebus* spp.) based on mitochondrial DNA markers. Folia Primatol. 2020;91:1-14.	12,1	2020

Current Teaching Load

1.	SCBI 546	Population and Ecological Genetics	3 (3-0-6)
2.	SCBI 582	Current Topics in Biology	2 (2-0-4)
3.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
4.	SCBI 637	Molecular Ecology	3 (3-0-6)
5.	SCBI 699	Dissertation	36 (0-108-0)
6.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 546	Population and Ecological Genetics	3 (3-0-6)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
4.	SCBI 587	Ecology and Evolutionary Biology	3 (2-3-5)
5.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
6.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
7.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
8.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
9.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
10.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
11.	SCBI 637	Molecular Ecology	3 (3-0-6)
12.	SCBI 699	Dissertation	36 (0-108-0)
13.	SCBI 799	Dissertation	48 (0-144-0)
14.	SCBI 898	Dissertation	48 (0-144-0)
15.	SCBI 899	Dissertation	72 (0-216-0)

4. Name Assistant Professor Dr.Ekgachai Jeratthitikul

Education

Degree	Degree Name	Institute	Year
D.Sc.	Biological Sciences	Kyoto University, Japan	2013
M.Sc.	Biological Sciences	Kyoto University, Japan	2009
B.Sc.	Zoology	Chulalongkorn University	2006

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Systematics and biogeography of invertebrates
2. Molecular phylogeny
3. DNA barcoding

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	**Jeratthitikul E**, Paphatmethin S, Zieritz A, Lopes-Lima M., Ngor PB. *Hyriopsis panhai*, a new species of freshwater mussel from Thailand (Bivalvia: Unionidae). Raffles Bull Zool. 2021;69:124-136.	12, 1	2021
	Macharoenboon K, Siriwut W, **Jeratthitikul E**. A review of the taxonomy of spiny-backed orb-weaving spiders of the subfamily Gasteracanthinae (Araneae, Araneidae) in Thailand. ZooKeys. 2021;1032:17-62.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Sutcharit C, **Jeratthitikul E**, Tongkerd P, Panha S. Reassessment and systematic position of the sinistral snails of genus *Hemiplecta* from Thailand (Eupulmonata: Ariophantidae), with description of two new species. Contrib Zool. 2021;90(2):183-215.	12, 1	2021
	Siriwut W, **Jeratthitikul E**, Panha S, Chanabun R, Ngor PB, Sutcharit C. Evidence of cryptic diversity in freshwater *Macrobrachium* prawns from Indochinese riverine systems revealed by DNA barcode, species delimitation and phylogenetic approaches. PLoS ONE. 2021;16(6):e0252546.	12, 1	2021
	Pholyotha A, Sutcharit C, Tongkerd P, **Jeratthitikul E**, Panha S. Integrative systematics reveals the new land-snail genus *Taphrenalla* (Eupulmonata: Ariophantidae) with a description of nine new species from Thailand. Contrib Zool. 2021;90:21-69.	12, 1	2021
	Jeratthitikul E, Jiranuntskul P, Nakano T, Sutcharit C, Panha S. A new species of buffalo leech in the genus *Hirudinaria* Whitman, 1886 (Arhynchobdellida, Hirudinidae) from Thailand. ZooKeys. 2020;933:1-14.	12, 1	2020
	Ng TH, **Jeratthitikul E**, Sutcharit C, Chhuoy S, Pin K, Pholyotha A, Siriwut W, Srisonchai R, Hogan, ZS, Ngor PB Annotated checklist of freshwater molluscs from the largest freshwater lake in Southeast Asia. ZooKeys. 2020;958:107-141.	12, 1	2020

Current Teaching Load

1.	SCBI 504	Introduction to Malacology	3 (2-3-5)
2.	SCBI 506	Insect Taxonomy	3 (2-3-5)
3.	SCBI 509	Biology of Insects	3 (3-0-6)
4.	SCBI 514	Field Methods in Malacology	2 (0-6-3)
5.	SCBI 516	Comparative Anatomy of Mollusks	3 (2-3-5)
6.	SCBI 582	Current Topics in Biology	2(2-0-4)
7.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
8.	SCBI 699	Dissertation	36 (0-108-0)
9.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 506	Insect Taxonomy	3 (2-3-5)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
4.	SCBI 586	Systematic Biology	3 (3-0-6)
5.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
6.	SCBI 616	Integrated Biology for Frontier Research	2 (2-0-4)
7.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
8.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
9.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
10.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
11.	SCBI 637	Molecular Ecology	3 (3-0-6)
12.	SCBI 699	Dissertation	36 (0-108-0)
13.	SCBI 799	Dissertation	48 (0-144-0)
14.	SCBI 898	Dissertation	48 (0-144-0)
15.	SCBI 899	Dissertation	72 (0-216-0)

5. Name Assistant Professor Dr.Jenjit Khudamrongsawat

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	University of Alabama, U.S.A.	2007
M.Sc.	Botany and Plant Sciences	University of California-Riverside, U.S.A.	2002
B.Sc.	Biology	Rochester Institute of Technology, U.S.A.	2000

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Biodiversity and conservation
2. Ecology and genetics of vertebrate populations

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	**Khudamrongsawat J**, Kettratad J, Intasorn P, Pinyo N, Tapcheewin S, Wanusrut P. Pattern of genetic structure of the common stream fish, *Neolissochilus soroides* (Pisces: Cyprinidae), addresses the importance of protected areas in eastern Thailand. J Fish Biol. 2021; 99: 175-185.	12, 1	2021
	Promnun P, Tandavanitj N, Kongrit C, Kongsatree K, Kongpraphan P, Dongkumfu W, Kumsuan D, **Khudamrongsawat J**. Phylogeography and ecological niche modeling reveal evolutionary history of *Leiolepis ocellata* (Squamata, Leiolepidae). Ecol Evol. 2021;11: 2221-2233.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Krajangdara T, Fahmi, Ebert DA, Chaorattana C, **Khudamrongsawat J**. Morphological and genetic evidence confirmed three new records of ghost shark species from the Andaman Sea of Thailand. Trop Nat Hist. 2021;21: 218-233.	12, 1	2021
	Khudamrongsawat J, Meetan D, Chansue N. Turtles in temple ponds in Thailand: Species, abundance, and health issues. Soc Anim. 2020;28(3): 215-232.	12, 1	2020
	Promnun P, Kongrit C, Tandavanitj N, Techachoochert S, **Khudamrongsawat J**. Predicting potential distribution of an endemic butterfly lizard, *Leiolepis ocellate* (Squamata: Agamidae). Trop Nat Hist. 2020;20(1):60-71.	12, 1	2020
	Kongrit C, Markviriya D, Laithong P, **Khudamrongsawat J**. Species identification and unlocking hidden genetic diversity of confiscated slow lorises (*Nycticebus* spp.) based on mitochondrial DNA markers. Folia Primatol. 2020;91:1-14.	12, 1	2020

Current Teaching Load

1.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
2.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
3.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
4.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
5.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
6.	SCBI 699	Dissertation	36 (0-108-0)
7.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 546	Population and Ecological Genetics	3 (3-0-6)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
4.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
5.	SCBI 617	Biological Laboratory Design and Demonstration	1 (0-2-4)
6.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
7.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
8.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
9.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
10.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
11.	SCBI 699	Dissertation	36 (0-108-0)
12.	SCBI 799	Dissertation	48 (0-144-0)
13.	SCBI 898	Dissertation	48 (0-144-0)
14.	SCBI 899	Dissertation	72 (0-216-0)

6. Name Assistant Professor Dr.Metha Meetam

Education

Degree	Degree Name	Institute	Year
Ph.D.	Horticulture	Purdue University, U.S.A.	2006
B.A.	Biology	Washington University, U.S.A.	1999

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Response of plants to environment
2. Heavy metal toxicity
3. Bioremediation
4. Biomass energy

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	Promsing S, Pokethitiyook P, Kruatrachue M, Ounjai P, **Meetam M**, Onparn N, Kumsopa A. Rhizoremediation of fuel oil by *Vetiveria zizanioides* in association with *Kocuria* sp. no MU1 and *Micrococcus luteus* WN01. ScienceAsia, 2021;47(1):96-105.	12, 1	2021
	Meetam M, Sripintusorn N, Songnuan W, Siriwattanakul U, Pichakum A. Assessment of physiological parameters to determine drought tolerance of plants for extensive green roof architecture in tropical areas. Urban For Urban Gree. 2020;56:1618-8667.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Pakdee O, Songnuan W, Panvisavas N, Pokethitiyook P, Yokthongwattana K, **Meetam M**. Functional characterization of metallothionein-like genes from *Physcomitrella patens*: expression profiling, yeast heterologous expression, and disruption of PpMT1.2a gene. Planta. 2019;250(2):427-443.	12, 1	2019
	Charoonnart P, Worakajit N, Zedler JAZ, **Meetam M**, Robinson C, Saksmerprome V. Generation of microalga *Chlamydomonas reinhardtii* expressing shrimp antiviral dsRNA without supplementation of antibiotics. Sci Rep. 2019;9:3164.	12, 1	2019
	Pugkaew W, **Meetam M**, Yokthongwattana K, Leeratsuwan N, Pokethitiyook P. Effects of salinity changes on growth, photosynthetic activity, biochemical composition, and lipid productivity of marine microalga *Tetraselmis suecica*. J Appl Phycol. 2019;31:969-979.	12, 1	2019

Current Teaching Load

1.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 582	Current Topics in Biology	3 (3-0-6)
4.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
5.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
6.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
7.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

7. Name Assistant Professor Dr.Parinda Thayanukul

Education

Degree	Degree Name	Institute	Year
Ph.D.	Urban Engineering	The University of Tokyo, Japan	2012
M.E.	Urban Engineering	The University of Tokyo, Japan	2009
B.Sc.	Biotechnology	Mahidol University	2006

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Environmental impacts on mosquitoes, *Wolbachia* bacteria, and mosquito borne diseases
2. Antibiotic resistance gene and antibiotic residual in environment
3. Endocrine disrupting chemical in wastewater and biological treatment
4. Microbial regrowth in water distribution system

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	Srikwan P, Niamhom B, Yagi T, **Thayanukul P.** Characterization of methyltestosterone degrading bacteria isolated from tilapia masculinizing ponds: metabolic intermediate, glucose amendments effects, and other hormones transformation. Water Air Soil Pollut. 2020; 231(10):498.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Krainara S, Suraraksa B, Prommeenate P, **Thayanukul P**, Luepromchai E. Enrichment and characterization of bacterial consortia for degrading 2-mercaptobenzothiazole in rubber industrial wastewater. J Hazard Mater. 2020;400:123291.	12, 1	2020
	Sruamsiri D, **Thayanukul P**, Boonchayaanant BS. In situ identification of polyhydroxyalkanoate (PHA)-accumulating microorganisms in mixed microbial cultures under feast/famine conditions. Sci Rep. 2020:10(1):3752.	12, 1	2020
	Nguyen TKX, Pinyakong O, **Thayanukul P.** Bacterial community structures and biodegradation kinetic of Tiamulin antibiotic degrading enriched consortia from swine wastewater. J Environ Health Sci Eng. 2019;17:1131-1160.	12, 1	2019
	Suttakun S, Rattanakul S, **Thayanukul P.** Hydrogen peroxide production in *Anubias barteri*, *Echinodorus ozelot* and *Cabomba caroliniana* by induction of 17α-Ethinylestradiol. Thai Environ Eng J 2019;33(2):41-49.	9, 0.6	2019
	Mrozik W, Vinitnantharat S, Thongsamer T, Pansuk N, Pattanachan P, **Thayanukul P**, Acharya K, Baluja MQ, Hazlerigg C, Robson AF, Davenport RJ, Werner D. The food-water quality nexus in periurban aquacultures downstream of Bangkok, Thailand. Sci Total Environ. 2019;695:133923.	12, 1	2019

Current Teaching Load

1. SCBI 640 Research Seminar in Biology 1 (1-0-2)
2. SCBI 641 Advanced Research Seminar in Biology 1 (1-0-2)

3.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
4.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
5.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
6.	SCBI 699	Dissertation	36 (0-108-0)
7.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 501	Molecular Entomology	3 (3-0-6)
2.	SCBI 502	Medical Entomology	3 (2-3-5)
3.	SCBI 581	Special Problems in Biology	2 (0-6-3)
4.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
5.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
6.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
7.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
8.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
9.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
10.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
11.	SCBI 699	Dissertation	36 (0-108-0)
12.	SCBI 799	Dissertation	48 (0-144-0)
13.	SCBI 898	Dissertation	48 (0-144-0)
14.	SCBI 899	Dissertation	72 (0-216-0)

8. Name Assistant Professor Dr.Patompong Saengwilai

Education

Degree	Degree Name	Institute	Year
Ph.D.	Plant Biology	Pennsylvania State University, U.S.A.	2013
B.Sc.	Biology	Mahidol University	2007

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Plant physiology and genetics
2. Root biology
3. Bio-phytoremediation of heavy metals and metalloids

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	Busener N, Kengkanna J, **Saengwilai PJ**, Bucksch A. Image-based root phenotyping links root architecture to micronutrient concentration in cassava. Plants People Planet. 2020;2(6):678-87.	12, 1	2020
	Salungyu J, Thaitad S, Bucksch A, Kengkanna J, **Saengwilai PJ**. From lab to field: Open tools facilitating the translation of maize root traits. Field Crops Res. 2020;255:107872.	12, 1	2020
	Saengwilai P, Meeinkuirt W, Phusantisampan T, Pichtel J. Immobilization of Cadmium in contaminated soil using organic amendments and its effects on rice growth performance. Expos Health. 2020;12(2):295-306.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Meeinkuirt W, Phusantisampan T, **Saengwilai P**. Root system architecture influencing cadmium accumulation in rice (*Oryza sativa* L.). Int J Phytoremediation. 2019;21(1):19-26.	12, 1	2019
	Kengkanna J, Jakaew P, Amawan S, Busener N, Bucksch A, **Saengwilai P**. Phenotypic variation of cassava root traits and their responses to drought. Appl Plant Sci. 2019;7(4):e01238.	12, 1	2019

Current Teaching Load

1.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
4.	SCBI 699	Dissertation	36 (0-108-0)
5.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

9. Name Assistant Professor Dr.Phurt Harnvoravongchai

Education

Degree	Degree Name	Institute	Year
D.Eng.	Bioengineering	Tokyo Institute of Technology, Japan	2015
M.Eng.	Bioengineering	Tokyo Institute of Technology, Japan	2012
B.Sc.	Biotechnology	Mahidol University	2010

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Antibiotic resistance
2. Extremophile
3. Molecular biology

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	Pipatthana M, **Harnvoravongchai P,** Pongchaikul P, Likhitrattanapisal S, Phanchana M, Chankhamhaengdecha S, Janvilisri T. The repertoire of ABC proteins in *Clostridioides difficile*. Comput. Struct. Biotechnol J. 2021;19:2905-2920.	12, 1	2021
	Ojha SC, Phanchana M, **Harnvoravongchai P**, Chankhamhaengdecha S, Singhakaew S, Ounjai P, Janvilisri T. Teicoplanin suppresses vegetative *Clostridioides difficile* and spore outgrowth. Antibiotics. 2021;10:984.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Harnvoravongchai P, Singwisut R, Ounjai P, Aroonnual A, Kosiyachinda P, Janvilisri T, Chankhamhaengdecha S. Isolation and characterization of thermophilic cellulose and hemicellulose degrading bacterium, *Thermoanaerobacterium* sp. R63 from tropical dry deciduous forest soil. PLoS One. 2020;15(7):e0236518.	12, 1	2020

Current Teaching Load

1.	SCBI 582	Current Topics in Biology	3 (3-0-6)
2.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
3.	SCBI 699	Dissertation	36 (0-108-0)
4.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

10. Name Assistant Professor Dr.Prinpida Sonthiphand

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	University of Waterloo, Canada	2014
M.Sc.	Environment Management	Chulalongkorn University	2009
B.Sc.	Biochemistry	Chulalongkorn University	2005

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Environmental biology
2. Heavy metal transformation and bioremediation

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	Pipattanajaroenkul P, Chotpantarat S, Termsaithong T, **Sonthiphand P**. Effects of arsenic and iron on the community and abundance of arsenite-oxidizing bacteria in an arsenic-affected groundwater aquifer. Curr Microbiol. 2021;78(4):1324-1334.	12, 1	2021
	Sonthiphand P, Rattanaroongrot P, Mek-yong K, Kusonmano K, Rangsiwutisak C, Uthaipaisanwong P, Chotpantarat S, Termsaithong T. Microbial community structure in aquifers associated with arsenic: analysis of 16S rRNA and arsenite oxidase genes. PeerJ. 2021;9: e10653.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Boonkaewwan S, **Sonthiphand P**, Chotpantarat S. Mechanisms of arsenic contamination associated with hydrochemical characteristics in coastal alluvial aquifers using multivariate statistical technique and hydrogeochemical modeling: a case study in Rayong province, eastern Thailand. Environ Geochem Health. 2021;43:537-566.	12, 1	2021
	Martin MA, Sivaguru J, McEvoy J, **Sonthiphand P**, Delorme A, Khan E. Photodegradation of (E)-and (Z) endoxifen in water by ultraviolet light: efficiency, kinetics, by-products, and toxicity assessment. Water Res. 2020;171:115451.	12, 1	2020
	Sonthiphand P, Ruangroengkulrith S, Mhuantong W, Charoensawan V, Chotpantarat S, Boonkaewwan S. Metagenomic insights into microbial diversity in a groundwater basin impacted by a variety of anthropogenic activities. Environ Sci Pollut Res. 2019;26:26765–26781.	12, 1	2019
	Kunapongkiti P, Limpiyakorn T, **Sonthiphand P**, Rongsayamanont C. Partial nitrification in entrapped-cell-based reactors with two different cell-to-matrix ratios: performance, microenvironment, and microbial community. J Environ Sci Health A. 2019;54(9):874-883.	12, 1	2019

Current Teaching Load

1.	SCBI 582	Current Topics in Biology	3 (3-0-6)
2.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
3.	SCBI 699	Dissertation	36 (0-108-0)
4.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

11. Name Assistant Professor Dr.Puey Ounjai

Education

Degree	Degree Name	Institute	Year
Ph.D.	Molecular Genetics and Genetic Engineering	Mahidol University	2007
B.Sc.	Biotechnology	King Mongkut's Institute of Technology Ladkrabang	2001

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Structural biology and biophysics of viruses and molecular machines
2. Molecular cell biology and biochemistry
3. Microbiology and biotechnological application
4. Biology of virus and bacteriophage, biomaterial, biofilm, diagnostic technology

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	Asawasriworanan T, Harnvoravongchai P, Somana J, Chankhamhaengdecha S, **Ounjai P**. Draft genome sequence of *Neobacillus cucumis* strain T4S4, a stevioside and rebaudioside A hydrolytic strain isolated from tropical forest soil. Microbiol Resour Announc. 2021;10(21):e0149120.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Wannigama DL, Amarasiri M, Hurst C, Phattharapornjaroen P, Abe S, Hongsing P, Hosseini Rad SMA, Pearson L, Saethang T, Luk-in S, Kueakulpattana N, Storer RJ, **Ounjai P**, Kavquet A, Leelahavanichkul A, Chatsuwan T. Tracking COVID-19 with wastewater to understand asymptomatic transmission. Int J Infect Dis. 2021;108:296-299.	12, 1	2021
	Promsing S, Pokethitiyook P, Kruatrachue M, **Ounjai P**, Meetam M, Onparn N, Kumsopa A. Rhizoremediation of fuel oil by *Vetiveria zizanioides* in association with *Kocuria* sp. no MU1 and *Micrococcus luteus* WN01. ScienceAsia, 2021;47(1):96-105.	12, 1	2021
	Sridapan T, Tangkawsakul W, Janvilisri T, Kiatpathomchai W, Dangtip S, Ngamwongsatit N, Nacapricha D, **Ounjai P**, Chankhamhaengdecha S. Rapid detection of *Clostridium perfringens* in food by loop-mediated isothermal amplification combined with a lateral flow biosensor. PLoS One. 2021;16(1):e0245144.	12, 1	2021
	Sonpho E, Wootthichairangsan C, Ishida M, Inoue T, Agata K, Maleehuan A, Charngkaew K, Chomanee N, Moonsom S, Wongtrakoongate P, Chairoungdua A, **Ounjai P**. ECM-body: A cell-free 3D biomimetic scaffold derived from intact planarian body. Zool Sci. 2020;37(4): 307-313.	12, 1	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Harnvoravongchai P, Singwisut R, **Ounjai P**, Aroonnual A, Kosiyachinda P, Janvilisri T, Chankham haengdecha S. Isolation and characterization of thermophilic cellulose and hemicellulose degrading bacterium, *Thermoanaero-bacterium* sp. R63 from tropical dry deciduous forest soil. PLoS One. 2020;15(7):e0236518.	12, 1	2020
	Kitdumrongthum S, Reabroi S, Suksen K, Tuchinda P, Munyoo B, Mahalapbutr P, Rungrotmongkol T, **Ounjai P**, Chairoungdua A. Inhibition of topoisomerase IIα and induction of DNA damage in cholangiocarcinoma cells by altholactone and its halogenated benzoate derivatives. Biomed Pharmacother. 2020;127: 110149.	12, 1	2020
	Phanchana M, Phetruen T, Harnvoravongchai P, Raksat P, **Ounjai P**, Chankhamhaengdecha S, Janvilisri T. Repurposing a platelet aggregation inhibitor ticagrelor as an antimicrobial against *Clostridioides difficile*. Sci Rep. 2020;10:6497.	12, 1	2020
	Jampasri K, Pokethitiyook P, Poolpak T, Kruatrachue M, **Ounjai P**, Kumsopa A. Bacteria-assisted phytoremediation of fuel oil and lead co-contaminated soil in the salt-stressed condition by *Chromolaena odorata* and *Micrococcus luteus*. Int J Phytoremediation. 2020;22(3):322-333.	12, 1	2020
	Samranwanich T, Boonthaworn K, Singhakaew S, **Ounjai P**. Time-restricted inquiry-based learning promotes student active engagement in undergraduate zoology laboratory. J Microbiol Biol Educ. 2019;20(1): 20.1.2	12, 1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Kampeera J, Pasakon P, Karuwan C, Arunrut N, Sappat A, Sirithammajak S, Nipaphorn Dechokiattawan, Sumranwanich T, Chaivisuthangkura P, **Ounjai P**, Chankhamhaengdecha S, Wisitsoraat A, Tuantranont A, Wansika K. Point-of-care rapid detection of Vibrio parahaemolyticus in seafood using loop-mediated isothermal amplification and graphene-based screen-printed electrochemical sensor. Biosens Bioelectron. 2019;132:271-278.	12, 1	2019
	Taweewattanapaisan P, Jantarat J, **Ounjai P**, Janebodin K. The effects of EDTA on blood clot in regenerative endodontic procedures. J Endod. 2019;45(3):281-286.	12, 1	2019

Current Teaching Load

1.	SCID 500	Cell and Molecular Biology	3 (3-0-6)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 582	Current Topics in Biology	3 (3-0-6)
4.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
5.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
6.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
7.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)

3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)
13.	SCID 500	Cell and Molecular Biology	3 (3-0-6)

12. Name Assistant Professor Dr.Supeecha Kumkate

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	University of York, U.K.	2004
M.Sc.	Environmental Biology	Mahidol University	1999
B.Sc.	Microbiology	Chulalongkorn University	1995

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Immunological characterization of pit viper venom proteins
2. Anti-cancerous properties of herbal extracts

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	Balasubramanian B, Venkatraman S, Myint KZ, Janvilisri T, Wongprasert K, **Kumkate S**, Bates DO, Tohtong R. Co-clinical trials: An innovative drug development platform for cholangiocarcinoma. Pharmaceuticals (Basel). 2021;14(1):51.	12,1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Boonsri B, Yacqub-Usman K, Thintharua P, Myint KZ, Sae-Lao T, Collier P, Suriyonplengsaeng C, Larbcharoensub N, Balasubramanian B, Venkatraman S, Egbuniwe IU, Gomez D, Mukherjee A, **Kumkate S**, Janvilisri T, Zaitoun AM, Kuakpaetoon T, Tohtong R, Grabowska AM, Bates DO, Wongprasert K. Effect of combining EGFR tyrosine kinase inhibitors and cytotoxic agents on cholangiocarcinoma cells. Cancer Res Treat. 2021;53(2):457-470.	12,1	2021
	Likhitrattanapisal S, **Kumkate S**, Ajawatanawong P, Wongprasert K, Tohtong R, Janvilisri T. Dysregulation of microRNA in cholangiocarcinoma identified through a meta-analysis of microRNA profiling. World J Gastroenterol. 2020;26(29):4356-4371.	12,1	2020
	Kumkate S, Chanhome L, Thiangtrongjit T, Noiphrom J, Laoungboa P, Khow O, Vasaruchapong T, Sitprija S, Chaiyabutr N, Reamtong O. Venomics and cellular toxicity of Thai pit vipers (*Trimeresurus macrops* and *T. hageni*). Toxins. 2020;12(1):54.	12,1	2020
	Seeree P, Janvilisri T, Kangsamaksin T, Tohtong R, **Kumkate S**. Downregulation of ABCA1 and ABCG1 transporters by simvastatin in cholangiocarcinoma cells. Oncol Lett. 2019;18:5173-5184.	12,1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Pearngam P, **Kumkate S**, Okada S, Janvilisri T. Andrographolide inhibits cholangiocarcinoma cell migration by down-regulation of claudin-1 *via* the p-38 signaling pathway. Front Pharmacol. 2019;10:827.	12,1	2019

Current Teaching Load

1.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 582	Current Topics in Biology	3 (3-0-6)
4.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
5.	SCBI 699	Dissertation	36 (0-108-0)
6.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

13. Name Assistant Professor Dr.Wachareeporn Trinachartvanit

Education

Degree	Degree Name	Institute	Year
Ph.D.	Ecology, Ethology, and Evolution	University of Illinois at Urbana-Champaign, U.S.A.	2004
M.Sc.	Environmental Biology	Mahidol University	1995
B.Sc.	Biology	Mahidol University	1992

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Biology and biodiversity of tick and tick-born microorganisms
2. Cytogenetics, cyto-molecular genetics and genetics toxicology

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	Apanaskevich DA, Apanaskevich MA, Nooma W, Ahantarig A, **Trinachartvanit W**. Reinstatement of *Dermacentor tricuspis* (Schulze, 1933) n. comb., n. stat. (Acari: Ixodidae) as a valid species, synonymization of *D. atrosignatus* Neumann, 1906 and description of a new species from Indonesia, Malaysia and Thailand. Syst Parasitol. 2021;98(3):207-230.	12,1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Olanratmanee P, Baimai V, Ahantarig A, **Trinachartvanit W**. Novel Supergroup U *Wolbachia* in bat mites of Thailand. Southeast Asian J Trop Med Public Health. 2021;51(2):48-55.	12,1	2021
	Apanaskevich DA, Vongphayloth K, Jeangkhwoa P, Chaloemthanetphong A, Ahantarig A, Apanaskevich MA, Brey PT, Lakeomany K, **Trinachartvanit W.** Description of a new species of *Dermacentor* Koch, 1844 (Acari: Ixodidae) from the mountains of Laos and Thailand. Syst Parasitol. 2020;97(4):347-355.	12,1	2020
	Nontaleerak B, Duang-Nkern J, Wongsaroj L, **Trinachartvanit W,** Romsang A, Mongkolsuk S. Roles of RcsA, an AhpD family protein, in reactive chlorine stress resistance and virulence in *Pseudomonas aeruginosa*. Appl Environ Microbiol. 2020;86(20):e01480-20.	12,1	2020
	Kaenkan W, Nooma W, Chelong IA, Baimai V, **Trinachartvanit W**, Ahantarig A. Reptile-associated *Borrelia* spp. in *Amblyomma* ticks, Thailand. Ticks Tick-Borne Dis. 2020;11(1): 101315.	12,1	2020
	Apanaskevich DA, Chaloemthanetphong A, Vongphayloth K, Ahantarig A, Apanaskevich MA, Brey PT, Hertz JC, Lakeomany K, Sutherland IW, **Trinachartvanit W**. Description of a new species of *Dermacentor* Koch, 1844 (Acari: Ixodidae) from Laos and Thailand. Syst Parasitol. 2019;96(6):475-484.	12,1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Ahantarig A, Hirunkanokpun S, Naksatit A, Ongin T, Baimai V, **Trinachartvanit W**. Etiological agents of tortoise tick in Thailand. Southeast Asian J Trop Med Public Health. 2019;50(1): 79-85.	12,1	2019
	Trinachartvanit W, Wutha W, Kaenkan W, Chelong I, Bahakheeree M, Baimai V, Ahantarig A. Co-infection with *Coxiella*-like bacteria and *Babesia* in goat ticks from southern Thailand. Southeast Asian J Trop Med Public Health. 2019;50(4):643-650.	12,1	2019

Current Teaching Load

1.	SCBi 545	Cytogenetics	3 (2-3-5)
2.	SCBI 579	Research Techniques in Biological Science	1 (1-0-2)
3.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
4.	SCBI 699	Dissertation	36 (0-108-0)
5.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBi 545	Cytogenetics	3 (2-3-5)
2.	SCBI 581	Special Problems in Biology	2 (0-6-3)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
5.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
6.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
7.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 699	Dissertation	36 (0-108-0)
9.	SCBI 799	Dissertation	48 (0-144-0)
10.	SCBI 898	Dissertation	48 (0-144-0)
11.	SCBI 899	Dissertation	72 (0-216-0)

14. Name Lecturer Dr.Alisa Damnernsawad

Education

Degree	Degree Name	Institute	Year
Ph.D.	Cancer Biology	University of Wisconsin-Madison, U.S.A.	2015
B.Sc.	Biology	Mahidol University	2007

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Cancer biology
2. Cell biology

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	You X, Ryu MJ, Cho E, Sang Y, **Damnernsawad A**, Zhou Y, Liu Y, Zhang J, Lee Y. Embryonic expression of NrasG12D leads to embryonic lethality and cardiac defects. Front Cell Dev Biol. 2021;9:633661.	12, 1	2021
	Wen Z, Yun G, Hebert A, Kong G, Ranheim EA, Finn R, Rajagoplan A, Li S, Zhou Y, Yu M, **Damnernsawad A**, Roose J, Coon J, Wen R, Wang D, Zhang J. *Nras*$^{Q61R/+}$ and *Kras*$^{-/-}$ cooperate to downregulate Rasgrp1 and promote lympho-myeloid leukemia in early T-cell precursors. Blood 2021;137(23):3259-3271.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Lim SL, **Damnernsawad A**, Shyamsunder P, Chng WJ, Han BC, Xu L, Pan J, Pravin DP, Alkan S, Tyner JW, Koeffler HP. Proteolysis targeting chimeric molecules as therapy for multiple myeloma: efficacy, biomarker and drug combinations. Haematologica. 2019;104(6):1209-1220.	12, 1	2019
	Edwards DK, Watanabe-Smith K, Rofelty A, **Damnernsawad A**, Laderas T, Lamble A, Lind EF, Kaempf A, Mori M, Rosenberg M, d'Almeida A, Loriaux M, McWeeney SK, Tyner JW. CSF1R inhibitors exhibit antitumor activity in acute myeloid leukemia by blocking paracrine signals from support cells. Blood. 133(6): 588-599.	12, 1	2019

Current Teaching Load

1.	SCBI 582	Current Topics in Biology	2 (2-0-4)
2.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
3.	SCBI 699	Dissertation	36 (0-108-0)
4.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
2.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
3.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
4.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
5.	SCBI 699	Dissertation	36 (0-108-0)
6.	SCBI 799	Dissertation	48 (0-144-0)
7.	SCBI 898	Dissertation	48 (0-144-0)
8.	SCBI 899	Dissertation	72 (0-216-0)

15. Name Lecturer Dr.Pahol Kosiyachinda

Education

Degree	Degree Name	Institute	Year
Ph.D.	Plant Pathology	Cornell University, U.S.A.	2002
B.Sc.	Biology	Mahidol University	1996

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Environmental biology and toxicology
2. Host-microbe interactions
3. Natural products

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	Harnvoravongchai P, Singwisut R, Ounjai P, Aroonnual A, **Kosiyachinda P**, Janvilisri T, Chankham haengdecha S. Isolation and characterization of thermophilic cellulose and hemicellulose degrading bacterium, *Thermoanaero-bacterium* sp. R63 from tropical dry deciduous forest soil. PLoS One. 2020;15(7):e0236518.	12, 1	2020
	Palasai A, Senarat S, Kettratad J, Jiraungkoorskul W, **Kosiyachinda P**, Poolprasert P. Ovarian structure and oogenesis with emphasis on nuclear characteristics in the shortfin neoscopelid, *Neoscopelus microchir* Matsubara, 1943. Adv. Sci J. 2020;20(1):105-123.	13, 0.8	2020

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Senarat S, Poolprasert P, Kettratad J, Boonyoung P, Jiraungkoorskul W, Huang S, Pengsakul T, **Kosiyachinda P**, Sudtongkong C. Histological observation of digestive system of malayan halfbeak, *Dermogenys pusilla* (Kuhl & van Hasselt, 1823) during juvenile stage from Thailand. Vet. Integr. Sci. 2020;18(1):33-41.	13, 0.8	2020
Other types of academic work	Wiwatanaratanabutr I, **Kosiyachinda P**, Boonplueang R, Onparn N. (2019) Essential Biology 1. (Mader S. and Windelspecht M., Trans.) Bangkok, Thailand. McGrawHill. (Original work published in 2014).	8, 1	2019
	Wiwatanaratanabutr I, **Kosiyachinda P**, Boonplueang R, Onparn N. (2019) Essential Biology 2. (Mader S. and Windelspecht M., Trans.) Bangkok, Thailand. McGrawHill. (Original work published in 2014).	8, 1	2019

Current Teaching Load

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Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 589	Research Techniques in Biological Science	1 (1-0-2)
3.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
4.	SCBI 699	Dissertation	36 (0-108-0)
5.	SCBI 799	Dissertation	48 (0-144-0)
6.	SCBI 898	Dissertation	48 (0-144-0)
7.	SCBI 899	Dissertation	72 (0-216-0)

16. Name Lecturer Dr.Siravit Sitprija

Education

Degree	Degree Name	Institute	Year
Ph.D.	Physiology	Chulalongkorn University	2003
M.Sc.	Industrial Microbiology	Chulalongkorn University	1999
B.Sc.	Biology	Kasetsart University	1996

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Animal physiology

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	Chaiyabutr N, **Sitprija S**, Chanpongsang S, Thammacharoen S. Exogenous bovine somatotropin and mist-fan cooling synergistically promote the intramammary glucose transport for lactose synthesis in crossbred Holstein cows in the tropics. Vet World, 2021;14(5):1247-1257.	12, 1	2021
	Kumkate S, Chanhome L, Thiangtrongjit T, Noiphrom J, Laoungboa P, Khow O, Vasaruchapong T, **Sitprija S**, Chaiyabutr N, Reamtong O. Venomics and cellular toxicity of Thai pit vipers (*Trimeresurus macrops* and *T. hageni*). Toxins. 2020;12(1):54.	12, 1	2020
	Sitprija V, **Sitprija S**. Marine toxins and nephrotoxicity: Mechanism of injury. Toxicon. 2019;161:44-49.	12, 1	2019

Current Teaching Load

1.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
2.	SCBI 699	Dissertation	36 (0-108-0)
3.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

17. Name Lecturer Dr.Thitinun Sumranwanich

Education

Degree	Degree Name	Institute	Year
Ph.D.	Horticulture	Pennsylvania State University, U.S.A.	2003
B.Sc.	Biology	Chiang Mai University	1996

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Metal toxicity on plants and microorganisms
2. Phytoremediation
3. Renewable energy from plant biomass and agricultural wastes

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	Kampeera J, Pasakon P, Karuwan C, Arunrut N, Sappat A, Sirithammajak S, Dechokiattawan N, **Sumranwanich T**, Chaivisuthangkura P, Ounjai P, Chankhamhaengdecha S, Wisitsoraat A, Tuantranont A, Kiatpathomchai W. Point-of-care rapid detection of *Vibrio parahaemolyticus* in seafood using loop-mediated isothermal amplification and graphene-based screen-printed electrochemical sensor. Biosens Bioelectron, 2019;132:271-278.	12, 1	2019

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Samranwanich T, Boonthaworn K, Singhakaew S, Ounjai P. Time-restricted inquiry-based learning promotes student active engagement in undergraduate zoology laboratory. J Microbiol Biol Educ. 2019;20(1): 20.1.2	12, 1	2019
	Amosu E, Ounjai P, **Sumranwanich T**, Harnvoravongchai P, Chankhamhaengdecha S. Isolation of potential lignin-degrading bacteria from tropical forest soils in Thailand. In The 31st Annual Meeting of the Thai Society for Biotechnology and International Conference (TSB2019); 2019 November 10-12; Duangjitt Resort & Spa, Patong Beach, Phuket, Thailand. p.371-387.	11, 0.4	2019

Current Teaching Load

1.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
2.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
3.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
4.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
5.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
6.	SCBI 699	Dissertation	36 (0-108-0)
7.	SCBI 799	Dissertation	48 (0-144-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)

6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

18. Name Lecturer Dr.Toemthip Poolpak

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	Mahidol University	2008
M.Sc.	Environmental Biology	Mahidol University	2002
B.Sc.	Biology	Mahidol University	1998

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Bacterial biodegradation of organic chemicals contamination
2. Plant-bacteria partnership for organic and inorganic pollutants bioremediation

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	Choden D, Pokethitiyook P, **Poolpak T**, Kruatrachue M. Phytoremediation of soil co-contaminated with zinc and crude oil using *Ocimum gratissimum* (L.) in association with *Pseudomonas putida* MU02. Int J Phytoremediation. 2021;23:181-189.	12, 1	2021
	Yang KM, **Poolpak T**, Pokethitiyook P, Kruatrachue M, Saengwilai P. Responses of oil degrader enzyme activities, metabolism and degradation kinetics to bean root exudates during rhizoremediation of crude oil contaminated soil. Int. J. Phytoremediation. 2021:1-9.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Jampasri K, Pokethitiyook P, **Poolpak T**, Kruatrachue M, Ounjai P, Kumsopa A. Bacteria-assisted phytoremediation of fuel oil and lead co-contaminated soil in the salt-stressed condition by *Chromolaena odorata* and *Micrococcus luteus*. Int J Phytoremediation. 2020;22(3):322-333.	12, 1	2020

Current Teaching Load

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Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

19. Name Lecturer Dr. Warut Siriwut

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biological Science	Chulalongkorn University	2016
B.Sc.	Biology	Khon Kaen University	2010

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Molecular phylogeny and evolutionary systematics
2. Invertebrate zoology and biogeography

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	Macharoenboon K, **Siriwut W**, Jeratthitikul E. A review of the taxonomy of spiny-backed orb-weaving spiders of the subfamily Gasteracanthinae (Araneae, Araneidae) in Thailand. ZooKeys. 2021;1032:17-62.	12, 1	2021
	Siriwut W, Jeratthitikul E, Panha S, Chanabun R, Ngor PB, Sutcharit C. Evidence of cryptic diversity in freshwater *Macrobrachium* prawns from Indochinese riverine systems revealed by DNA barcode, species delimitation and phylogenetic approaches. PLoS ONE. 2021;16(6):e0252546.	12, 1	2021

Types of Academic Work	Title	Standard Criteria and Weights	Year of Publication
	Sutcharit C, Thach P, Chhuoy S, Ngor PB, Jeratthitikul E, **Siriwut W**, Srisonchai R, Ng TH, Pholyotha A, Jirapatrasilp P, Panha S. Annotated checklist of the land snail fauna from southern Cambodia (Mollusca, Gastropoda). ZooKeys. 2020;948:1-46.	12, 1	2020
	Siriwut W, Jeratthitikul E, Panha S, Chanabun R, Sutcharit C. Molecular phylogeny and species delimitation of the freshwater prawn *Macrobrachium pilimanus* species group, with descriptions of three new species from Thailand. PeerJ. 1010;8:e10137.	12, 1	2020
	Srisonchai R, Likhitrakarn N, Sutcharit C, Jeratthitikul E, **Siriwut W**, Thrach P, Chhuoy S, Ngor PB, Panha S. A new micropolydesmoid millipede of the genus *Eutrichodesmus* silvestri, 1910 from Cambodia, with a key to species in mainland southeast Asia (Diplopoda, Polydesmida, Haplodesmidae). ZooKeys. 2020;996:59-91.	12, 1	2020
	Ng TH, Jeratthitikul E, Sutcharit C, Chhuoy S, Pin K, Pholyotha A, **Siriwut W**, Srisonchai R, Hogan, ZS, Ngor PB Annotated checklist of freshwater molluscs from the largest freshwater lake in Southeast Asia. ZooKeys. 2020;958:107-141.	12, 1	2020
	Inkhavilay K, Sutcharit C, Bantaowong U, Chanabun R, **Siriwut W**, Srisonchai R, Polyotha A, Jirapatrasilp P, Panha S. Annotated checklist of the terrestrial molluscs from Laos (Gastropoda: Neritimorpha, Caenogastropoda and Heterobranchia). ZooKeys. 2019;834: 1-166.	12, 1	2019

Current Teaching Load

1.	SCBI 582	Current Topics in Biology	3 (3-0-6)
2.	SCBI 586	Systematic Biology	3 (2-3-5)
3.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
4.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
5.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
6.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
7.	SCBI 636	Advanced Independent Research in Biology	2 (0-6-3)
8.	SCBI 699	Dissertation	36 (0-108-0)

Assigned Teaching Load for the Proposed Program

1.	SCBI 581	Special Problems in Biology	2 (0-6-3)
2.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
3.	SCBI 589	Advanced Research Techniques in Biological Science	1 (1-0-2)
4.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
5.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
6.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
7.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
8.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 699	Dissertation	36 (0-108-0)
10.	SCBI 799	Dissertation	48 (0-144-0)
11.	SCBI 898	Dissertation	48 (0-144-0)
12.	SCBI 899	Dissertation	72 (0-216-0)

Full time instructors

1. Name Lecturer Dr.Intanon Kolasartsanee

Education

Degree	Degree Name	Institute	Year
Ph.D.	Biology	Mahidol University	2014
B.Sc.	Biology	Mahidol University	2006

Faculty/Institute/College

Department of Biology, Faculty of Science, Mahidol University

Interesting Research Topics or Specialties

1. Ecology
2. Wildlife conservation

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	**Kolasartsanee I**. Diversity and habitat use of terrestrial mammals in the area proposed for water resource development in Khao Soi Dao Wildlife Sanctuary, Thailand. Environ Nat Resour J. 2021;19(3):186-194.	12, 1	2021
	Kolasartsanee I, Srikosamatara S. Evidence of pileated gibbons *Hylobates pileatus* recolonization in an area proposed for water resource development in Khao Soi Dao Wildlife Sanctuary, Thailand. Asian Primates J. 2019;8(1):41-44.	12, 1	2019

Current Teaching Load

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Assigned Teaching Load for the Proposed Program

1.	SCBI 530	Conservation Biology	3 (3-0-6)
2.	SCBI 532	Basic Principles of Sociobiology	3 (3-0-6)
3.	SCBI 539	Techniques in Ecology and Conservation	2 (0-6-3)
4.	SCBI 585	Trends and Advances in Biology	3 (3-0-6)
5.	SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)
6.	SCBI 640	Research Seminar in Biology	1 (1-0-2)
7.	SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)
8.	SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)
9.	SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)

Appendix C

Curriculum Mapping

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	3	1	2	3	4	1	2	3
1.Required courses														
SCBI 585 Trends and Advances in Biology	●	●	●	●	●	●	○	●	●	●	○	○	●	●
SCBI 586 Systematic Biology	○	●	●	○	●	●	○	○	●	●	○	●	●	●
SCBI 587 Ecology and Evolutionary Biology	○	●	●	○	●	●	○	○	●	●	○	●	●	●
SCBI 609 Molecular Genetics	○	●	●	○	●	●	○	○	●	●	○	●	●	●
SCBI 616 Integrated Biology for Frontier Research	●	●	●	●	●	●	○	○	●	●	●	○	●	●
SCBI 636 Advanced Research Methodology in Biology	●	●	○	●	●	●	●	●	●	●	●	●	●	●
SCBI 640 Research Seminar in Biology	●	●	○	●	●	○	○	●	●	●	●	○	●	●
SCBI 641 Advanced Research Seminar in Biology	●	●	○	●	●	●	○	●	●	●	●	○	●	●
SCBI 642 Doctoral Research Seminar in Biology	●	●	●	●	●	●	○	●	●	●	●	●	●	●
SCBI 643 Advanced Doctoral Research Seminar in Biology	●	●	●	●	●	●	○	●	●	●	●	●	●	●
SCID 500 Cell and Molecular Biology	●	●	●	○	●	●	○	○	●	●	○	○	●	●
SCID 518 Generic Skills in Science Research	●	●	○	●	○	○	●	●	●	●	○	●	●	●
2. Elective courses														
SCBI 501 Molecular Entomology	○	●	●	●	●	●	○	○	●	●	○	○	●	●
SCBI 502 Medical Entomology	○	●	●	●	●	●	○	○	●	●	○	○	●	●

Subjects	Morality and Ethics		Knowledge		Intellectual skills			Interpersonal relationship and Responsibility				Mathematical Analytical thinking		
	1	2	1	2	1	2	3	1	2	3	4	1	2	3
SCBI 506 Insect Taxonomy	○	●	●	●	●	●	○	○	●	●	○	○	●	●
SCBI 530 Conservation Biology	●	●	●	●	●	○	●	●	●	●	○	●	●	●
SCBI 532 Basic Principles of Sociobiology	●	●	●	○	●	○	●	●	●	●	○	○	●	●
SCBI 539 Techniques in Ecology and Conservation	●	●	○	●	○	○	●	●	●	●	○	●	●	●
SCBI 545 Cytogenetics	○	●	●	○	●	●	○	○	●	●	○	●	●	●
SCBI 546 Population and Ecological Genetics	●	●	●	●	●	●	○	○	●	●	○	●	●	●
SCBI 581 Special Problems in Biology	●	●	○	●	●	●	●	●	●	●	●	●	●	●
SCBI 589 Advanced Research Techniques in Biological Science	●	●	○	●	●	●	●	●	●	●	●	●	●	●
SCBI 607 Evolutionary Genetics	○	●	●	○	●	●	○	○	●	●	○	●	●	●
SCBI 617 Biological Laboratory Design and Demonstration	●	●	○	●	●	○	●	●	●	●	●	○	●	●
SCBI 637 Molecular Ecology	○	●	●	●	●	●	○	○	●	●	○	●	●	●
SCBI 644 Bioeconomy	●	●	●	●	●	●	○	○	●	●	○	●	●	●
SCID 502 Cell Science	●	●	●	○	●	○	○	○	●	●	○	●	●	●
SCID 503 Systematic Bioscience	○	●	●	○	●	○	○	○	●	●	○	○	●	●
SCID 506 Concept of Molecular Bioscience	○	●	●	●	●	○	●	○	●	●	○	○	●	●
SCID 508 Biomolecular and Spectroscopy Techniques	●	●	○	●	○	○	●	○	●	●	○	●	●	●
SCID 510 Immunological Methods	●	●	○	●	○	○	●	○	●	●	○	●	●	●
SCID 513 Animal Cell Culture Techniques	●	●	○	●	○	○	●	○	●	●	○	●	●	●
SCID 514 Animal Experimentation in Biomedical Research	●	●	○	●	○	○	●	○	●	●	○	●	●	●

Subjects	Morality and Ethics		Knowledge		Intellectual skills			Interpersonal relationship and Responsibility				Mathematical Analytical thinking		
	1	2	1	2	1	2	3	1	2	3	4	1	2	3
3. Dissertation														
SCBI 699 Dissertation	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SCBI 799 Dissertation	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SCBI 898 Dissertation	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SCBI 899 Dissertation	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table of Relationships 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 Express morals and ethical conduct in research and scientific profession	Integrity, Harmony
1.2 Follow regulations	Integrity, Harmony
2. Knowledge	
2.1 Critical understand biological principles and theories in depth	Mastery, Determination
2.2 Imprement biological knowledges for their own life-long learning attitudes	Mastery, Determination
3. Intellectual Skills	
3.1 Integrate biological principles and theories in modern biological research and current situations	Mastery, Determination
3.2 Synthesize biological principles and knowledge	Mastery, Originality
3.3 Design and conduct research for the development of new knowledge and/or innovation in biology	Mastery, Determination, Originality
4. International Relationship and responsibility	
4.1 Demonstrate interpersonal relationship, good leadership and cooperative skills	Harmony, Altruism, Leadership
4.2 Take responsibility for their work, themselves, and others	Altruism, Determination
4.3 Express self-development	Determination
4.4 Exchange academic knowledge and opinions effectively and appropriately	Harmony, Altruism
5. Mathematical Analytical Thinking, Communication Skills, and Information	
5.1 Appropriately select numerical analyses for statistical and data analyses	Mastery, Determination, Integrity
5.2 Utilize informative technology for literature search, analyses, and data processing correctly and systematically	Mastery, Originality, Mastery
5.3 Report and communicate academic knowledge correctly and appropriately	Mastery, Harmony, Determination

Appendix D

Program Learning Outcomes

Appendix D

Program Learning Outcomes

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

Objectives of the Program B.E. 2561	Revised Objectives of the Program 2023
By the end of the study, students should be able to 1. Demonstrate moral and ethical conduct for research and scientific professions	By the end of the study in Doctor of Philosophy Program in Biology, graduates will have attributes that meet the qualifications framework for graduate education, as following: 1. Students are able to demonstrate moral and ethical conduct in academic and the scientific profession.
2. Explain important concepts and theories of biology in depth	2. Students are able to explain important biological principles and theories in depth, and integrate them to current situations and for their own life-long learning attitudes.
3. Integrate and synthesize biological concepts and theories for application of modern biological research and creation of new knowledge	3. Students are able to synthesize biological principles and knowledge, and implement scientific research to develop new knowledge and/or innovation in biology.
4. Demonstrate team working skills and responsible for tasks and community	4. Students are able to demonstrate responsibility, good human relations, and effective team working skills.
5. Exhibit skills in searching and analyzing research information correctly and systematically by utilizing appropriate information technology	5. Students are able to perform numerical analyses, communicate effectively and appropriately, apply information technology to search for works and presentation.

Table 2: Relationships between objective of the program and program learning outcomes

Objective of the Program	Program Learning Outcome*					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
1. Students are able to demonstrate moral and ethical conduct in academic and the scientific profession.	✓					
2. Students are able to explain important biological principles and theories in depth, and integrate them to current situations and for their own life-long learning attitudes.		✓	✓			
3. Students are able to synthesize biological principles and knowledge, and implement scientific research to develop new knowledge and/or innovation in biology.				✓		
4. Students are able to demonstrate responsibility, good human relations, and effective team working skills.					✓	
5. Students are able to perform numerical analyses, communicate effectively and appropriately, apply information technology to search for works and presentation.						✓

*Program Learning Outcomes (PLOs)

PLO1 Students demonstrate moral and ethical conduct in academic and the scientific profession.

PLO2 Students explain important biological principles and theories in depth.

PLO3 Students integrate biological principles and theories in modern biological research, current situations, and for their own life-long learning attitudes.

PLO4 Students are able to synthesize biological principles and knowledge to conduct research for the development of new knowledge and/or innovation in biology.

PLO5 Students demonstrate good leadership and cooperative skills, good human relations, and responsibility for their work, themselves, and others.

PLO6 Students are able to select numerical analyses for statistical and data analyses appropriately; utilize information technology for literature search, analysis, data processing, and presentation correctly and systematically; and communicate and exchange academic knowledge and opinions effectively and appropriately.

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

Domains	Standard Learning Outcomes (TQF)	Program Learning Outcomes					
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
Morality and Ethics	1.1. Express morals and ethical conduct in research and scientific profession	✓					
	1.2. Follow regulations	✓					
Knowledge	2.1 Critical understand biological principles and theories in depth		✓				
	2.2 Implement biological knowledges for their own life-long learning attitudes			✓			
Intellectual Development	3.1 Integrate biological principles and theories in modern biological research and current situations			✓			
	3.2 Synthesize biological principles and knowledge				✓		
	3.3 Design and conduct research for the development of new knowledge and/or innovation in biology				✓		
Interpersonal Relationship and Responsibility	4.1 Demonstrate interpersonal relationship, good leadership and cooperative skills					✓	
	4.2 Take responsibility for their work, themselves, and others					✓	
	4.3 Express self- development					✓	
	4.4 Exchange academic knowledge and opinions effectively and appropriately						✓
Math, Communication, IT Skills	5.1 Appropriately select numerical analyses for statistical and data analyses						✓
	5.2 Utilize informative technology for literature search, analyses, data processing, and presentation correctly and systematically						✓
	5.3 Report and communicate academic knowledge correctly and appropriately						✓

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

PLOs	Learning Method	Assessment
1. Students demonstrate moral and ethical conduct in academic and the scientific profession.	1. Students are required to attend classes and turn-in assignments on time. 2. Evaluate students' assignments and theses based on their morality, honesty, professionalism towards research ethics that shows originality and no plagiarism, and following international standard, especially in SCBI 636 and special problems. 3. Students are encouraged to follow research ethical guidelines, such as the protocol for animal use, and regulations of the organization, such as in the central laboratory.	1. Assess the students' attendance and punctuality in classes. 2. Assess the punctuality for turning-in and check for plagiarism of students' assignments. 3. Students' theses are evaluated following international standard and scientific profession and are checked for plagiarism. 4. Students are evaluated based on their behaviors during the use of central laboratory and the conduct of research
2. Students explain important biological principles and theories in depth.	1. Lecture by faculty members and invited speakers, group discussions, mini-proposals, class assignments, laboratory practices	1. Assess students' achievement by examination, assignments reports, presentations, laboratory results.
3. Students integrate biological principles and theories in modern biological research, current situations, and for their own life-long learning attitudes.	1. Assign students to practice writing a mini research proposal (SCBI 636) based on their achieved knowledge, principles, and theories. 2. Assign students to do literature review on topic related to their research and their own interests from up-to-date sources, and prepare for a presentation. 3. Qualifying exams.	1. Assess students' proposals for their demonstration of integration and application of their achieved knowledge, principles, and theories. 2. Assess students' reports and presentations for its correction, properly review, and with up-to-date information. 3. Assess students' achievement by qualifying exams.

PLOs	Learning Method	Assessment
4. Students are able to synthesize biological principles and knowledge to conduct research for the development of new knowledge and/or innovation in biology.	1. Mini projects such as special problems in biology in order to develop their intellectual skills before conducting their dissertation. 2. Dissertation	1. Assess the completement of special problems according to the standard scientific research methods. 2. Proposal examination and dissertation defense. 3. Students' theses meet requirements of Graduate School regulations.
5. Students demonstrate good leadership and cooperative skills, good human relations, and responsibility for their work, themselves, and others.	1. Students are assigned to work in groups such as during laboratory practice or mini projects. 2. Group discussions. 3. Students serve as teaching assistants in SCBI 626 4. Student participations in extra curriculum activities such as Sports Day, Open House, and other cultural activities	1. Students are evaluated based on project outcomes and outputs as well as their behaviors during group working. 2. Students are evaluated based on comments during their service as teaching assistants 3. Student behaviors and roles in extra curriculum activities
6. Students are able to select numerical analyses for statistical and data analyses appropriately; utilize information technology for literature search, analysis, data processing, and presentation correctly and systematically; and communicate and exchange academic knowledge and opinions effectively and appropriately.	1. Students are assigned to evaluate, process, and discuss information published in international scientific journals. 2. Students use information technology to prepare their assignments. 3. Students present their findings related to their theses to gain experiences in public speaking and presentations. 4. Students are required to report their dissertation progress at the end of each semester.	1. Assess students' reports based on correction and suitability of information in their reports. 2. Assess students' outputs based on correction and suitability of using information technology as well as presentations. 3. Evaluated students during presentation and dissertation progress report based on their performance on presentation skills, with specified criteria. 4. Results or parts of students' theses are published in

PLOs	Learning Method	Assessment
	5. Preparing manuscripts for publication 6. Seminars 7. Group discussions.	international scientific journals. 5. Evaluated students based on their performance and participation in seminars and group discussions as well as during class presentations. 6. Observe student's behaviors during group discussions

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

Code	Name	Credits	PLOs					
			1	2	3	4	5	6
1. Core courses								
SCBI 585	Trends and Advances in Biology	3 (3-0-6)	R	R	M	R	P	R
SCBI 586	Systematic Biology	3 (2-3-5)	R	M	R	I	R	R
SCBI 587	Ecology and Evolutionary Biology	3 (3-0-6)	R	M	R	I	R	R
SCBI 609	Molecular Genetics	3 (3-0-6)	R	M	R	I	R	R
SCBI 616	Integrated Biology for Frontier Research	2 (2-0-4)	R	R	M	R	P	P
SCBI 618	Advanced Research Methodology in Biology	2 (0-6-3)	P	P	P	P	P	P
SCBI 640	Research Seminar in Biology	1 (1-0-2)	R	P	R	I	R	R
SCBI 641	Advanced Research Seminar in Biology	1 (1-0-2)	R	P	R	I	R	R
SCBI 642	Doctoral Research Seminar in Biology	1 (1-0-2)	R	R	R	R	R	R
SCBI 643	Advanced Doctoral Research Seminar in Biology	1 (1-0-2)	R	R	R	R	R	R
SCID 500	Cell and Molecular Biology	3 (3-0-6)	R	R	R	I	R	R
SCID 518	Generic skills in Science Research	1 (1-0-2)	R	R	R	I	R	R
2. Elective courses								
SCBI 501	Molecular Entomology	3 (3-0-6)	R	M	R	I	R	R
SCBI 502	Medical Entomology	3 (2-3-5)	R	M	R	I	R	R
SCBI 506	Insect Taxonomy	3 (2-3-5)	R	M	R	I	R	R
SCBI 530	Conservation Biology	3 (3-0-6)	R	M	R	I	R	R
SCBI 532	Basic Principles of Sociobiology	3 (3-0-6)	R	M	R	I	R	R
SCBI 539	Techniques in Ecology and Conservation	2 (0-6-3)	R	R	R	I	P	M
SCBI 545	Cytogenetics	3 (2-3-5)	R	M	R	I	R	P
SCBI 546	Population and Ecological Genetics	3 (3-0-6)	R	M	R	I	R	P
SCBI 581	Special Problems in Biology	2 (0-6-3)	P	P	P	P	P	M
SCBI 589	Advance Research Techniques in Biological Science	2 (0-6-3)	R	P	R	P	P	M
SCBI 607	Evolutionary Genetics	3 (3-0-6)	R	M	R	I	R	R
SCBI 617	Biological Laboratory Design and Demonstration	1 (0-2-4)	R	R	P	I	P	P
SCBI 637	Molecular Ecology	3 (3-0-6)	R	M	R	I	R	R
SCBI 644	Bioeconomy	1 (0-3-2)	R	R	M	I	R	R
SCID 502	Cell Science	2 (2-0-4)	R	M	R	I	R	R

Code	Name	Credits	PLOs					
			1	2	3	4	5	6
SCID 503	Systematic Bioscience	3 (3-0-6)	R	M	R	I	R	R
SCID 506	Concept of Molecular Bioscience	2 (2-0-4)	R	M	R	I	R	R
SCID 508	Biomolecular and Spectroscopy Techniques	1 (0-2-1)	R	R	R	R	P	P
SCID 510	Immunological Methods	1 (0-2-1)	R	R	R	R	P	P
SCID 513	Animal Cell Culture Techniques	1 (0-2-1)	R	R	R	R	P	P
SCID 514	Animal Experimentation in Biomedical Research	1 (0-2-1)	R	R	R	R	P	P
3. Dissertation								
SCBI 699	Dissertation	36 (0-108-0)	M	M	M	M	M	M
SCBI 799	Dissertation	48(0-144-0)	M	M	M	M	M	M
SCBI 898	Dissertation	48(0-144-0)	M	M	M	M	M	M
SCBI 899	Dissertation	72(0-216-0)	M	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

Plan 1.1 For students with Master's Degree

Year of study	Knowledge, skills, and any other expected learning outcomes
1st	Synthesize biological principles and knowledge to develop their own research proposal. They also able to utilize information technology for their works and presentation, and communicate and exchange academic knowledge and opinions effectively and appropriately.
2nd	Synthesize biological principles and knowledge to conduct research. They also had good interpersonal relationship and show how to work as a good leader or member of the team.
3rd	Continue their own research until be able to development of new knowledge and/or innovation in biology.

Plan 1.2 For students with Bachelor's Degree

Year of study	Knowledge, skills, and any other expected learning outcomes
1st	Synthesize biological principles and knowledge to develop their own research proposal. They also able to utilize information technology for their works and presentation, and communicate and exchange academic knowledge and opinions effectively and appropriately.
2nd	Synthesize biological principles and knowledge to conduct research. They also had good interpersonal relationship and show how to work as a good leader or member of the team.
3rd	Continue their own research.
4st	Continue their own research until be able to development of new knowledge and/or innovation in biology.

Plan 2.1 For students with Master's Degree

Year of study	Knowledge, skills, and any other expected learning outcomes
1st	Acquire knowledge in methodology for design and conducting research. Evaluating abilities to integrate biological principles and theories in modern biological research, current situations, and for their own life-long learning attitudes. They also able to utilize information technology for their works, presentation, communicate, and exchange academic knowledge and opinions effectively and appropriately.
2nd	Synthesize biological principles and knowledge to develop their own research proposal. They also had good interpersonal relationship and show how to work as a good leader or member of the team.
3rd	Synthesize biological principles and knowledge to conduct research for the development of new knowledge and/or innovation in biology.

Plan 2.2 For students with Bachelor's Degree

Year of study	Knowledge, skills, and any other expected learning outcomes
1st	Understand important biological principles and theory in dept. Acquire knowledge in methodology for design and conducting research.
2nd	Evaluating abilities to integrate biological principles and theories in modern biological research, current situations, and for their own life-long learning attitudes. They also able to utilize information technology for their works and presentation, and communicate and exchange academic knowledge and opinions effectively and appropriately.
3rd	Synthesize biological principles and knowledge to develop their own research proposal. They also had good interpersonal relationship and show how to work as a good leader or member of the team.
4st	Synthesize biological principles and knowledge to conduct research for the development of new knowledge and/or innovation in biology.

Appendix E

The Revised Curriculum

Appendix E

The Revision of Doctor of Philosophy Program in Biology (International Program)

Volume in 2023

Faculty of Science 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** August 1, 2018

2. **The Mahidol University Council has approved this revised curriculum in the meeting 586 on November 16, 2022**

3. **The revised curriculum will be effective with student class** 2023 from the first semester of the Academic Year 2023 onwards.

4. **Rationale of revision**

   4.1 Revise the curriculum according to Criteria on Graduate Studies B.E. 2558, the Ministry of Education

   4.2 The emphasis on communication skills to program learning outcomes is based on the suggestion from AUNQA committee in 2020 as these skills are beneficial for grant proposing and public visibility of research.

   4.3 Study plans 1.1 and 1.2 in which students may begin their dissertation in the first semester of enrollment in the program were added for those with prior experiences in research or who have successfully published other research findings before entering the program. These study plans will encourage high quality students to join the Ph.D. program in biology and spend less time in the program to produce quality research. The targeted prospective students include those currently working in government or private organizations who are interested in obtaining a Ph.D. degree and do not have time to take courses.

5. The details of the revision

5.1 Revise the faculty in charge of the program and full-time instructors of the curriculum as follows.

Current curriculum	Revised curriculum
Associate Professor Dr.Arunee Ahantarig*	Associate Professor Dr.Arunee Ahantarig*
Associate Professor Dr.Surang Chankhamhaengdecha*	Associate Professor Dr.Surang Chankhamhaengdecha*
Assistant Professor Dr.Ekgachai Jeratthitikul*	Assistant Professor Dr.Ekgachai Jeratthitikul*
Assistant Professor Dr.Jenjit Khudamrongsawat*	Assistant Professor Dr.Jenjit Khudamrongsawat*
Assistant Professor Dr.Phurt Harnvoravongchai*	Assistant Professor Dr.Phurt Harnvoravongchai*
Associate Professor Dr.Choowong Auesukaree	-
Associate Professor Dr.Pattamaporn Kittayapong	-
Associate Professor Dr.Prayat Pokethitiyook	-
Associate Professor Dr.Sompoad Srikosamatara	-
Assistant Professor Dr.Chalita Kongrit	Assistant Professor Dr.Chalita Kongrit
Assistant Professor Dr.Metha Meetam	Assistant Professor Dr.Metha Meetam
Assistant Professor Dr.Parinda Thayanukul	Assistant Professor Dr.Parinda Thayanukul
Assistant Professor Dr.Patompong Saengwilai	Assistant Professor Dr.Patompong Saengwilai
Assistant Professor Dr.Prinpida Sonthiphand	Assistant Professor Dr.Prinpida Sonthiphand
Assistant Professor Dr.Puey Ounjai	Assistant Professor Dr.Puey Ounjai
Assistant Professor Dr.Supeecha Kumkate	Assistant Professor Dr.Supeecha Kumkate
Assistant Professor Dr.Wachareeporn Trinachartvanit	Assistant Professor Dr.Wachareeporn Trinachartvanit
Lecturer Dr.Alisa Damnernsawad	Lecturer Dr. Alisa Damnernsawad
Lecturer Dr.Nuttapon Onparn	-
-	Lecturer Dr.Pahol Kosiyachinda
Lecturer Dr.Siravit Sitprija	Lecturer Dr.Siravit Sitprija
Lecturer Dr.Thitinun Sumranwanich	Lecturer Dr.Thitinun Sumranwanich

Current curriculum	Revised curriculum
-	Lecturer Dr.Toemthip Poolpak
Lecturer Dr.Warut Siriwut	Lecturer Dr.Warut Siriwut

* The faculty in charge of the program

5.2 Revise course details of the curriculum as follows.

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

Plan 1.1 For students with Master's Degree

Courses of the Current Program	Courses of the Revising Program	Remark
Required courses (- credits)	**Required courses** (- credits)	
Elective Courses (- credits)	**Elective Courses** (- credits)	
Dissertation (- credits) -	**Dissertation** (48 credits) *SCBI 898 Dissertation 48 (0-144-0) *วทชว ๘๙๘ วิทยานิพนธ์	added

Plan 1.2 For students with Bachelor's Degree

Courses of the Current Program	Courses of the Revising Program	Remark
Required courses (- credits)	**Required courses** (- credits)	
Elective Courses (- credits)	**Elective Courses** (- credits)	
Dissertation (- credits) -	**Dissertation** (72 credits) *SCBI 899 Dissertation 72 (0-216-6) *วทชว ๘๙๙ วิทยานิพนธ์	added

Plan 2.1 For students with Master's Degree

Courses of the Current Program	Courses of the Revising Program	Remark
Required courses (6 credits) -	**Required courses** (6 credits) *SCBI 616 Integrated Biology for Frontier Research 2 (2-0-4) *วทชว ๖๑๖ ชีววิทยาเชิงบูรณาการสำหรับงานวิจัยแนวหน้า	added
	*SCBI 618 Advanced Research Methodology in Biology 2 (0-6-3) *วทชว ๖๑๘ วิทยาระเบียบวิธีวิจัยขั้นสูงทางชีววิทยา	added
SCBI 626 Biology Laboratory Teaching Practice 1 (1-0-2) วทชว ๖๒๖ การสอนปฏิบัติการชีววิทยา	-	cancelled
SCBI 636 Advanced Independent Research in Biology 2 (0-6-3) วทชว ๖๓๖ การวิจัยอิสระทางชีววิทยาขั้นสูง	-	cancelled
SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๒ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยา	SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๒ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยา	revised course description

**New course*

Courses of the Current Program	Courses of the Revising Program	Remark
SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๓ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยาขั้นสูง	SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๓ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยาขั้นสูง	revised course description
SCID 507 Microscopic Technique 1 (0-2-1) วทชว ๕๐๗ เทคนิคการใช้กล้องจุลทรรศน์	-	cancelled
SCID 508 Biomolecular and Spectroscopy Techniques 1 (0-2-1) วทคร ๕๐๘ เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	-	moved to elective course
SCID 509 Separation Techniques 1 (0-2-1) วทคร ๕๐๙ เทคนิคการแยกสาร	-	cancelled
SCID 510 Immunological Methods 1 (0-2-1) วทคร ๕๑๐ ระเบียบวิธีวิทยาภูมิคุ้มกัน	-	moved to elective course
SCID 511 Gene Technology 1 (0-2-1) วทคร ๕๑๑ เทคโนโลยีด้านยีน	-	cancelled
SCID 512 Receptor binding and Enzyme Kinetic Assay 1 (0-2-1) วทคร ๕๑๒ การสอบปริมาณการจับตัวรับและเอนไซม์เชิงจลน์	-	cancelled
SCID 513 Animal Cell Culture Techniques 1 (0-2-1) วทคร ๕๑๓ เทคนิคการเพาะเลี้ยงเซลล์สัตว์	-	moved to elective course
SCID 514 Animal Experimentation in Biomedical Research 1 (0-2-1) วทคร ๕๑๔ การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	-	moved to elective course
Elective Courses (not less than 6 credits)	**Elective Courses** (not less than 6 credits)	
SCBI 501 Molecular Entomology 3 (3-0-6) วทชว ๕๐๑ กีฏวิทยาระดับโมเลกุล	SCBI 501 Molecular Entomology วทชว ๕๐๑ กีฏวิทยาระดับโมเลกุล	unchanged
SCBI 502 Medical Entomology 3 (2-3-5) วทชว ๕๐๒ กีฏวิทยาทางการแพทย์	SCBI 502 Medical Entomology 3 (2-3-5) วทชว ๕๐๒ กีฏวิทยาทางการแพทย์	unchanged
SCBI 504 Introduction to Malacology 3 (2-3-5) วทชว ๕๐๔ ศังขวิทยาขั้นแนะนำ	-	cancelled
SCBI 506 Insect Taxonomy 3 (2-3-5) วทชว ๕๐๖ อนุกรมวิธานของแมลง	SCBI 506 Insect Taxonomy 3 (2-3-5) วทชว ๕๐๖ อนุกรมวิธานของแมลง	unchanged
SCBI 508 Cell and Developmental Biology 3 (2-3-5) วทชว ๕๐๘ เซลล์และชีววิทยาการเจริญ	-	cancelled
SCBI 509 Biology of Insects 3 (3-0-6) วทชว ๕๐๙ ชีววิทยาของแมลง	-	cancelled

Courses of the Current Program	Courses of the Revising Program	Remark
SCBI 514 Field Methods in Malacology 2 (0-6-3) วทชว ๕๑๔ การศึกษาศังขวิทยาภาคสนาม	-	cancelled
SCBI 516 Comparative Anatomy of Mollusks 3 (2-3-5) วทชว ๕๑๖ กายวิภาคศาสตร์เปรียบเทียบของสัตว์พวกหอย	-	cancelled
SCBI 530 Conservation Biology 3 (3-0-6) วทชว ๕๓๐ ชีววิทยาเชิงอนุรักษ์	-	cancelled
SCBI 532 Basic Principles of Sociobiology 3 (3-0-6) วทชว ๕๓๒ หลักชีววิทยาเชิงสังคม	SCBI 532 Basic Principles of Sociobiology 3 (3-0-6) วทชว ๕๓๒ หลักชีววิทยาเชิงสังคม	unchanged
SCBI 539 Techniques in Ecology and Conservation 2 (0-6-3) วทชว ๕๓๙ เทคนิคการวิจัยทางนิเวศวิทยาและการอนุรักษ์	-	cancelled
SCBI 540 Behavioral Ecology 3 (2-3-5) วทชว ๕๔๐ นิเวศวิทยาเชิงพฤติกรรม	-	cancelled
SCBI 545 Cytogenetics 3 (2-3-5) วทชว ๕๔๕ เซลล์พันธุศาสตร์	SCBI 545 Cytogenetics 3 (2-3-5) วทชว ๕๔๕ เซลล์พันธุศาสตร์	unchanged
SCBI 546 Population and Ecological Genetics 3 (3-0-6) วทชว ๕๔๖ พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	SCBI 546 Population and Ecological Genetics 3 (3-0-6) วทชว ๕๔๖ พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	unchanged
SCBI 572 Molecular Parasitology 3 (2-3-5) วทชว ๕๗๒ ปรสิตวิทยาระดับโมเลกุล	-	cancelled
SCBI 574 Immunological Parasitology 3 (3-0-6) วทชว ๕๗๔ วิทยาภูมิคุ้มกันทางปรสิตวิทยา	-	cancelled
SCBI 578 Techniques in Cell and Tissue Culture 2 (0-6-3) วทชว ๕๗๘ เทคนิคการเลี้ยงเซลล์และเนื้อเยื่อ	-	cancelled
SCBI 579 Research Techniques in Biological Science 2 (0-6-3) วทชว ๕๗๙ เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพ	-	cancelled
SCBI 581 Special Problems in Biology 2 (0-6-3) วทชว ๕๘๑ ปัญหาพิเศษทางชีววิทยา	SCBI 581 Special Problems in Biology 2 (0-6-3) วทชว ๕๘๑ ปัญหาพิเศษทางชีววิทยา	unchanged

Courses of the Current Program	Courses of the Revising Program	Remark
-	*SCBI 589 Advance Research Techniques in Biological Science 2 (0-6-3) *วทชว ๕๘๙ เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพขั้นสูง	added
SCBI 607 Evolutionary Genetics 3 (3-0-6) วทชว ๖๐๗ พันธุศาสตร์เชิงวิวัฒนาการ	SCBI 607 Evolutionary Genetics 3 (3-0-6) วทชว ๖๐๗ พันธุศาสตร์เชิงวิวัฒนาการ	Unchanged
-	*SCBI 617 Biological Laboratory Design and Demonstration 1 (0-2-4) *วทชว ๖๑๗ การสอนปฏิบัติการชีววิทยา	added
SCBI 637 Molecular Ecology 3 (3-0-6) วทชว ๖๓๗ นิเวศวิทยาระดับโมเลกุล	SCBI 637 Molecular Ecology 3 (3-0-6) วทชว ๖๓๗ นิเวศวิทยาระดับโมเลกุล	unchanged
-	*SCBI 644 Bioeconomy 1 (0-3-2) *วทชว ๖๔๔ เศรษฐกิจชีวภาพ	added
SCID 502 Cell Science 2 (2-0-4) วทคร ๕๐๒ วิทยาศาสตร์เรื่องเซลล์	SCID 502 Cell Science 2 (2-0-4) วทคร ๕๐๒ วิทยาศาสตร์เรื่องเซลล์	unchanged
SCID 503 Systematic Bioscience 3 (3-0-6) วทคร ๕๐๓ วิทยาศาสตร์ชีวภาพเชิงระบบ	SCID 503 Systematic Bioscience 3 (3-0-6) วทคร ๕๐๓ วิทยาศาสตร์ชีวภาพเชิงระบบ	unchanged
SCID 506 Concept of Molecular Bioscience 2 (2-0-4) วทคร ๕๐๖ หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	SCID 506 Concept of Molecular Bioscience 2 (2-0-4) วทคร ๕๐๖ หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	unchanged
-	SCID 508 Biomolecular and Spectroscopy Techniques 1 (0-2-1) วทคร ๕๐๘ เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	moved from required course
-	SCID 510 Immunological Methods 1 (0-2-1) วทคร ๕๑๐ ระเบียบวิธีวิทยาภูมิคุ้มกัน	moved from required course
-	SCID 513 Animal Cell Culture Techniques 1 (0-2-1) วทคร ๕๑๓ เทคนิคการเพาะเลี้ยงเซลล์สัตว์	moved from required course
-	SCID 514 Animal Experimentation in Biomedical Research 1 (0-2-1) วทคร ๕๑๔ การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	moved from required course
SCID 516 Biostatistics 3 (3-0-6) วทคร ๕๑๖ ชีวสถิติ	-	cancelled
Dissertation (36 credits) SCBI 699 Dissertation 36 (0-108-6) วทชว ๖๙๙ วิทยานิพนธ์	**Dissertation** (36 credits) SCBI 699 Dissertation 36 (0-108-6) วทชว ๖๙๙ วิทยานิพนธ์	unchanged

**New course*

Plan 2.2 For students with Bachelor's Degree

Courses of the Current Program	Courses of the Revising Program	Remark
Required courses (17 credits) SCBI 582 Current Topics in Biology 2 (2-0-4) วทชว ๕๘๒ ปัญหาพิเศษทางชีววิทยา	**Required courses** (18 credits) -	cancelled
-	*SCBI 585 Trends and Advances in Biology 3 (3-0-6) *วทชว ๕๘๕ แนวโน้มและความก้าวหน้าทางชีววิทยา	added
SCBI 586 Systematic Biology 3 (3-0-6) วทชว ๕๘๖ การจัดระบบทางชีววิทยา	SCBI 586 Systematic Biology 3 (3-0-6) วทชว ๕๘๖ การจัดระบบทางชีววิทยา	changed study plan
SCBI 587 Ecology and Evolutionary Biology 3 (3-0-6) วทชว ๕๘๗ นิเวศวิทยาและชีววิทยาเชิงวิวัฒนาการ	SCBI 587 Ecology and Evolutionary Biology 3 (3-0-6) วทชว ๕๘๗ นิเวศวิทยาและชีววิทยาเชิงวิวัฒนาการ	unchanged
SCBI 609 Molecular Genetics 3 (3-0-6) วทชว ๖๐๙ พันธุศาสตร์ระดับโมเลกุล	SCBI 609 Molecular Genetics 3 (3-0-6) วทชว ๖๐๙ พันธุศาสตร์ระดับโมเลกุล	unchanged
-	*SCBI 616 Integrated Biology for Frontier Research 2 (2-0-4) *วทชว ๖๑๖ ชีววิทยาเชิงบูรณาการสำหรับงานวิจัยแนวหน้า	added
	*SCBI 618 Advanced Research Methodology in Biology 2 (0-6-3) *วทชว ๖๑๘ วิทยาระเบียบวิธีวิจัยขั้นสูงทางชีววิทยา	added
SCBI 626 Biology Laboratory Teaching Practice 1 (1-0-2) วทชว ๖๒๖ การสอนปฏิบัติการชีววิทยา	-	cancelled
SCBI 636 Advanced Independent Research in Biology 2 (0-6-3) วทชว ๖๓๖ การวิจัยอิสระทางชีววิทยาขั้นสูง	-	cancelled
SCBI 640 Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๐ สัมมนาการวิจัยทางชีววิทยา	SCBI 640 Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๐ สัมมนาการวิจัยทางชีววิทยา	revised course description
SCBI 641 Advanced Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๑ สัมมนาการวิจัยทางชีววิทยาขั้นสูง	SCBI 641 Advanced Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๑ สัมมนาการวิจัยทางชีววิทยาขั้นสูง	revised course description
SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๒ สัมมนาการวิจัยฯดุษฎีบัณฑิตทางชีววิทยา	SCBI 642 Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๒ สัมมนาการวิจัยฯดุษฎีบัณฑิตทางชีววิทยา	revised course description

Courses of the Current Program	Courses of the Revising Program	Remark
SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๓ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยาขั้นสูง	SCBI 643 Advanced Doctoral Research Seminar in Biology 1 (1-0-2) วทชว ๖๔๓ สัมมนาการวิจัยฦดุษฎีบัณฑิตทางชีววิทยาขั้นสูง	revised course description
SCID 500 Cell and Molecular Biology 3 (3-0-6) วทคร ๕๐๐ ชีววิทยาระดับเซลล์และโมเลกุล	SCID 500 Cell and Molecular Biology 3 (3-0-6) วทคร ๕๐๐ ชีววิทยาระดับเซลล์และโมเลกุล	unchanged
SCID 507 Microscopic Technique 1 (0-2-1) วทชว ๕๐๗ เทคนิคการใช้กล้องจุลทรรศน์	-	cancelled
SCID 508 Biomolecular and Spectroscopy Techniques 1 (0-2-1) วทคร ๕๐๘ เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	-	moved to elective course
SCID 509 Separation Techniques 1 (0-2-1) วทคร ๕๐๙ เทคนิคการแยกสาร	-	cancelled
SCID 510 Immunological Methods 1 (0-2-1) วทคร ๕๑๐ ระเบียบวิธีวิทยาภูมิคุ้มกัน	-	moved to elective course
SCID 511 Gene Technology 1 (0-2-1) วทคร ๕๑๑ เทคโนโลยีด้านยีน	-	cancelled
SCID 512 Receptor binding and Enzyme Kinetic Assay 1 (0-2-1) วทคร ๕๑๒ การสอบปริมาณการจับตัวรับและเอนไซม์เชิงจลน์	-	cancelled
SCID 513 Animal Cell Culture Techniques 1 (0-2-1) วทคร ๕๑๓ เทคนิคการเพาะเลี้ยงเซลล์สัตว์	-	moved to elective course
SCID 514 Animal Experimentation in Biomedical Research 1 (0-2-1) วทคร ๕๑๔ การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	-	moved to elective course
SCID 518 Generic Skill in Science Research 1 (1-0-2) วทคร ๕๑๘ ทักษะทั่วไปในการวิจัยทางวิทยาศาสตร์	SCID 518 Generic Skill in Science Research 1 (1-0-2) วทคร ๕๑๘ ทักษะทั่วไปในการวิจัยทางวิทยาศาสตร์	unchanged
Elective Courses (not less than 7 credits) SCBI 501 Molecular Entomology 3 (3-0-6) วทชว ๕๐๑ กีฏวิทยาระดับโมเลกุล	**Elective Courses** (not less than 7 credits) SCBI 501 Molecular Entomology วทชว ๕๐๑ กีฏวิทยาระดับโมเลกุล	unchanged
SCBI 502 Medical Entomology 3 (2-3-5)	SCBI 502 Medical Entomology 3 (2-3-5)	unchanged

Courses of the Current Program	Courses of the Revising Program	Remark
วทชว ๕๐๒ กีฏวิทยาทางการแพทย์	วทชว ๕๐๒ กีฏวิทยาทางการแพทย์	
SCBI 504 Introduction to Malacology 3 (2-3-5) วทชว ๕๐๔ ศังขวิทยาขั้นแนะนำ	-	cancelled
SCBI 506 Insect Taxonomy 3 (2-3-5) วทชว ๕๐๖ อนุกรมวิธานของแมลง	SCBI 506 Insect Taxonomy 3 (2-3-5) วทชว ๕๐๖ อนุกรมวิธานของแมลง	unchanged
SCBI 508 Cell and Developmental Biology 3 (2-3-5) วทชว ๕๐๘ เซลล์และชีววิทยาการเจริญ	-	cancelled
SCBI 509 Biology of Insects 3 (3-0-6) วทชว ๕๐๙ ชีววิทยาของแมลง	-	cancelled
SCBI 514 Field Methods in Malacology 2 (0-6-3) วทชว ๕๑๔การศึกษาศังขวิทยา ภาคสนาม	-	cancelled
SCBI 516 Comparative Anatomy of Mollusks 3 (2-3-5) วทชว ๕๑๖ กายวิภาคศาสตร์เปรียบเทียบของสัตว์พวกหอย	-	cancelled
SCBI 530 Conservation Biology 3 (3-0-6) วทชว ๕๓๐ ชีววิทยาเชิงอนุรักษ์	SCBI 530 Conservation Biology 3 (3-0-6) วทชว ๕๓๐ ชีววิทยาเชิงอนุรักษ์	unchanged
SCBI 532 Basic Principles of Sociobiology 3 (3-0-6) วทชว ๕๓๒ หลักชีววิทยาเชิงสังคม	SCBI 532 Basic Principles of Sociobiology 3 (3-0-6) วทชว ๕๓๒ หลักชีววิทยาเชิงสังคม	unchanged
SCBI 539 Techniques in Ecology and Conservation 2 (0-6-3) วทชว ๕๓๙ เทคนิคการวิจัยทางนิเวศวิทยาและการอนุรักษ์	SCBI 539 Techniques in Ecology and Conservation 2 (0-6-3) วทชว ๕๓๙ เทคนิคการวิจัยทางนิเวศวิทยาและการอนุรักษ์	unchanged
SCBI 540 Behavioral Ecology 3 (2-3-5) วทชว ๕๔๐ นิเวศวิทยาเชิงพฤติกรรม	-	cancelled
SCBI 545 Cytogenetics 3 (2-3-5) วทชว ๕๔๕ เซลล์พันธุศาสตร์	SCBI 545 Cytogenetics 3 (2-3-5) วทชว ๕๔๕ เซลล์พันธุศาสตร์	unchanged
SCBI 546 Population and Ecological Genetics 3 (3-0-6) วทชว ๕๔๖ พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	SCBI 546 Population and Ecological Genetics 3 (3-0-6) วทชว ๕๔๖ พันธุศาสตร์เชิงประชากรและเชิงนิเวศ	unchanged
SCBI 572 Molecular Parasitology 3 (2-3-5) วทชว ๕๗๒ ปรสิตวิทยาระดับโมเลกุล	-	cancelled
SCBI 574 Immunological Parasitology 3 (3-0-6) วทชว ๕๗๔ วิทยาภูมิคุ้มกันทางปรสิตวิทยา	-	cancelled

Courses of the Current Program	Courses of the Revising Program	Remark
SCBI 578 Techniques in Cell and Tissue Culture 2 (0-6-3) วทชว ๕๗๘ เทคนิคการเลี้ยงเซลล์และเนื้อเยื่อ	-	cancelled
SCBI 579 Research Techniques in Biological Science 2 (0-6-3) วทชว ๕๗๙ เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพ	-	cancelled
SCBI 581 Special Problems in Biology 2 (0-6-3) วทชว ๕๘๑ ปัญหาพิเศษทางชีววิทยา	SCBI 581 Special Problems in Biology 2 (0-6-3) วทชว ๕๘๑ ปัญหาพิเศษทางชีววิทยา	unchanged
-	*SCBI 589 Advance Research Techniques in Biological Science 2 (0-6-3) *วทชว ๕๘๙ เทคนิคการวิจัยทางวิทยาศาสตร์ชีวภาพขั้นสูง	added
SCBI 607 Evolutionary Genetics 3 (3-0-6) วทชว ๖๐๗ พันธุศาสตร์เชิงวิวัฒนาการ	SCBI 607 Evolutionary Genetics 3 (3-0-6) วทชว ๖๐๗ พันธุศาสตร์เชิงวิวัฒนาการ	unchanged
-	*SCBI 617 Biological Laboratory Design and Demonstration 1 (0-2-4) *วทชว ๖๑๗ การสอนปฏิบัติการชีววิทยา	added
SCBI 637 Molecular Ecology 3 (3-0-6) วทชว ๖๓๗ นิเวศวิทยาระดับโมเลกุล	SCBI 637 Molecular Ecology 3 (3-0-6) วทชว ๖๓๗ นิเวศวิทยาระดับโมเลกุล	unchanged
-	*SCBI 644 Bioeconomy 1 (0-3-2) *วทชว ๖๔๔ เศรษฐกิจชีวภาพ	added
SCID 502 Cell Science 2 (2-0-4) วทคร ๕๐๒ วิทยาศาสตร์เรื่องเซลล์	SCID 502 Cell Science 2 (2-0-4) วทคร ๕๐๒ วิทยาศาสตร์เรื่องเซลล์	unchanged
SCID 503 Systematic Bioscience 3 (3-0-6) วทคร ๕๐๓ วิทยาศาสตร์ชีวภาพเชิงระบบ	SCID 503 Systematic Bioscience 3 (3-0-6) วทคร ๕๐๓ วิทยาศาสตร์ชีวภาพเชิงระบบ	unchanged
SCID 506 Concept of Molecular Bioscience 2 (2-0-4) วทคร ๕๐๖ หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	SCID 506 Concept of Molecular Bioscience 2 (2-0-4) วทคร ๕๐๖ หลักการทางวิทยาศาสตร์ชีวภาพระดับโมเลกุล	unchanged
-	SCID 508 Biomolecular and Spectroscopy Techniques 1 (0-2-1) วทคร ๕๐๘ เทคนิคด้านชีวโมเลกุลและด้านสเปกโทรสโกปี	moved from required course
-	SCID 510 Immunological Methods 1 (0-2-1) วทคร ๕๑๐ ระเบียบวิธีวิทยาภูมิคุ้มกัน	moved from required course
-	SCID 513 Animal Cell Culture Techniques 1 (0-2-1)	moved from required course

Courses of the Current Program	Courses of the Revising Program	Remark
	วทคร ๕๑๓ เทคนิคการเพาะเลี้ยงเซลล์สัตว์	
-	SCID 514 Animal Experimentation in Biomedical Research 1 (0-2-1) วทคร ๕๑๔ การใช้สัตว์ทดลองในงานวิจัยทางชีวการแพทย์	moved from required course
SCID 516 Biostatistics 3 (3-0-6) วทคร ๕๑๖ ชีวสถิติ	-	cancelled
Dissertation (48 credits) SCBI 799 Dissertation 48 (0-114-6) วทชว ๗๙๙ วิทยานิพนธ์	**Dissertation** (48 credits) SCBI 799 Dissertation 48 (0-144-6) วทชว ๗๙๙ วิทยานิพนธ์	unchanged

New course

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)

6.1 Plan 1 (Research only)

6.1.1 Plan 1.1 For students with Master's Degree

Course Category	Credits		
	Criteria on Graduate Studies B.E. 2558	Curriculum Structure of the Current Program	Curriculum Structure of the Revised Program
1. Required courses	-	-	-
2. Elective courses	-	-	-
3. Dissertation	48 credits	-	48 credits
Total credits (not less than)	**48 credits**	-	**48 credits**

6.1.2 Plan 1.2 For students with Bachelor's Degree

Course Category	Credits		
	Criteria on Graduate Studies B.E. 2558	Curriculum Structure of the Current Program	Curriculum Structure of the Revised Program
1. Required courses	-	-	-
2. Elective courses	-	-	-
3. Dissertation	72 credits	-	72 credits
Total credits (not less than)	**72 credits**	-	**72 credits**

6.2 Plan 2 (Coursework and research)

6.2.1 Plan 2.1 For students with Master's Degree

Course Category	Credits		
	Criteria on Graduate Studies B.E. 2558	**Curriculum Structure of the Current Program**	**Curriculum Structure of the Revised Program**
1. Required courses 2. Elective courses	Not less than 12 Credits	6 Not less than 6	6 Not less than 6
3. Dissertation	36	36	36
Total credits (not less than)	**48**	**48**	**48**

6.2.2 Plan 2.2 For students with Bachelor's Degree

Course Category	Credits		
	Criteria on Graduate Studies B.E. 2558	**Curriculum Structure of the Current Program**	**Curriculum Structure of the Revised Program**
1. Required courses 2. Elective courses	Not less than 24 Credits	17 Not less than 7	18 Not less than 6
3. Dissertation	48	48	48
Total credits (not less than)	**72**	**72**	**72**