List of Annexes

Annex A

Mae Fah Luang Univerity
Thailand Scholarships 2020
Scholarship's terms and conditions

I. Qualifications/Criteria:

Master's degree programmes

a) Having a bachelor's degree or equivalent from an accredited university with a GPA of 2.5, or a Matriculation Examination Certification with an average of 63% with passing results. Both certificates must be certified by the Ministry of Education.

b) Having one of the following English Language Requirements:
- TOEFL Paper-based 500
- TOEFL Internet-based 70
- IELTS 5.5
- Other related documents or English proficiency requirements as specified by the programme

Doctoral degree programmes

a) Having a master's degree or equivalent from an accredited university with a GPA of 3.25, or a Matriculation Examination Certification with an average of 81% with passing results. Both certificates must be certified by the Ministry of Education.

b) Having one of the following English Language Requirements:
- TOEFL Paper-based 500
- TOEFL Internet-based 70
- IELTS 5.5
- Other related documents or English proficiency requirements as specified by the programme

II. Condition of Scholarship:

1. The scholarship shall be awarded according to the duration of study programme.
2. The Awardee shall not be allowed to change the study program.
3. Resignation from MFU shall be permitted by the scholarship committee. If not, the Awardee shall repay the full amount of the scholarship to MFU within three (3) months. Failure to comply shall lead to prosecution.

III. Grade Requirement

A minimum cumulative grade point average (GPAX) of 3.25 for Post Graduate Programme.

IV. Extension of Period of Study

Extension of period of study may be allowed on a case-to-case basis for a maximum of six (6) months, subject to the committee's decision.

V. Awardee's Responsibilities

During the period of the scholarship, the Awardee shall
1. work for MFU for not less than 60 hours per academic year,
2. report working hours at least 5 hours per month to the Global Relations Division before the 8th of every month, otherwise he/she shall not be given his/her monthly stipend,
3. pursue his/her study diligently and in good conduct,
4. comply with the rules and regulations of MFU,
5. participate regularly in MFU's extra-curricular activities,
6. update with MFU's news and announcements, and
7. submit his/her academic record of each semester to the Global Relations Division within one week after academic record announcement.

VI. Termination of Scholarship

The Awardee shall be monitored at the end of each semester. MFU reserves the right to terminate the scholarship of the Awardee based on any of the following reasons:

1. The Awardee fails to meet the grade requirements for two (2) consecutive semesters. However, the Awardee shall only once ask for the scholarship committee's approval to remain eligible for the scholarship.
2. The Awardee fails to comply with the terms and conditions of this scholarship or the rules and regulations of MFU and in response to a disciplinary reprimand.
3. The Awardee applies for other scholarships without permission from the MFU scholarship committee.

VII. Supervision

The Awardee shall be under the academic supervision and the guidance of MFU Global Relations Division, and shall comply with all the MFU scholarship policies including those not contained in this Agreement.

VIII. Required documents:

1. A completed scholarship application form (download from http://web2.mfu.ac.th/division/global/?page_id=265)
2. A single 1-inch photograph
3. A certified copy of degree certificate and an English translation of the degree certificate if the official degree was not issued in English
4. A certified copy of academic transcript and an English translation of the academic transcript if the official academic transcript for qualification was not issued in English
5. A copy of passport
6. 2 recommendation letters
7. English proficiency score report
8. Working experience letter
9. Publications if any

Annex B

Program Specification (TQF 2)
Doctor of Philosophy Program in Mathematics
(International Program/ Revised Program 2020)

Department of Mathematics
Graduate School
Silpakorn University

Contents

Program Specification
Doctor of Philosophy Program in Mathematics
(International Program/ Revised Program 2020)

Institute Silpakorn University

Campus/Faculty/Department Sanamchandra Palace/ Graduate School/ Department of Mathematics

Section 1 General Information

1. **Program Code and Program Title**

   1.1 Program Code 25500081107597

   1.2 Program Title

   Thai หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาคณิตศาสตร์ (หลักสูตรนานาชาติ)

   English Doctor of Philosophy Program in Mathematics (International Program)

2. **Degree Title and Academic Discipline**

   Full title in Thai ปรัชญาดุษฎีบัณฑิต (คณิตศาสตร์)

   Full title in English Doctor of Philosophy (Mathematics)

   Abbreviated title in Thai ปร.ด. (คณิตศาสตร์)

   Abbreviated title in English Ph.D. (Mathematics)

3. **Major field**

   None

4. **Program total credits**

Type 1.1 (student with a master' degree)	equivalent to	48 credits
Type 1.2 (student with a bachelor's degree)	equivalent to	72 credits
Type 2.1 (student with a master' degree)	not less than	51 credits
Type 2.2 (student with a bachelor's degree)	not less than	75 credits

5. **Program format**

   5.1 Format Doctor of Philosophy Program
   3 years for Type 1.1 and Type 2.1
   5 years for Type 1.2 and Type 2.2

   5.2 Language English

   5.3 Admission Thai and foreign students

   5.4 Collaboration with other institutes The program is administered solely by Silpakorn University.

   5.5 Degree offered One degree of one major

6. **Program status and program permission/approval**

Revised 2020 program Instruction begins during the first semester of the academic year 2020.

The University Academic Committee granted program approval at the meeting number...../.....

Day.....Month.....Year.....

The University Council granted program permission at Meeting Number...../.....

Day.....Month.....Year.....

7. **Expected Date for the Implementation of Program under the Thai Qualifications Register**

The curriculum will be ready to demonstrate its quality and standard complying with Qualifications Framework for Higher Education B.E. 2552 in Academic Year 2022.

8. **Post-graduate occupations**

8.1 Instructors in institutes of higher education.

8.2 Mathematics instructors in international schools both in Thailand and abroad.

8.3 Researchers in research and development institutes.

8.4 Academic positions in government and in private sector.

9. **Full names, national identification numbers, positions and academic qualifications of instructors in charge of the program**

9.1 Mr. Somjate Chaiya

National identification number: x-xxxx-xxxxx-xx-x

Position: Assistant Professor

Qualification: Ph.D. (Mathematics) University of Illinois at Urbana-Champaign, USA (2008)
M.S. (Mathematics) Oregon State University, USA (2002)
B.Sc. (Mathematics) Kasetsart University (2000)

9.2 Mr. Chalermpong Worawannotai

National identification number: x-xxxx-xxxxx-xx-x

Position: Assistant Professor

Qualification: Ph.D. (Mathematics) University of Wisconsin-Madison, USA (2012)
B.A. (Mathematics) University of Virginia, USA (2006)

9.3 Mr. Supap Kirtsaeng

National identification number: x-xxxx-xxxxx-xx-x

Position: Instructor

Qualification: Ph.D. (Mathematics) University of Southern California, USA (2010)
M.A. (Mathematics) University of Southern California, USA (2005)
B.A. (Mathematics) Cornell University, USA (2002)

10. Place of Instruction

Faculty of science, Silpakorn University, Sanamchandra Palace
Address : 6, Rajamankha Nai Rd., Amphoe Muang, Nakhon Pathom 73000

11. External Factors and/or Development Considered in Program Planning

11.1 Economic Circumstances/Development

In planning the present program, the economic situations and development included in the 12th National Social and Economic Development Plan (2017-2022) were taken into consideration. In particular, "Section 4, Strategy 8, Strategy for the Development of Science, Technology, Research, and Innovation" provides the following objectives: (i) to strengthen and enhance the capability of advanced science and technology; and (ii) to integrate the management systems of science, technology, research, and innovation to drive forward in the same direction. In addition, the National Strategy (2018-2037), "The Strategy for Human Capital Development and Strengthening" was also part of the consideration. The strategy aims to improve learning processes to accommodate changes in the 21st century by encouraging lifelong learning and development of learning skills, which can be achieved by adjusting learning systems, modernizing teacher education, improving the efficiency of educational management systems, and developing lifelong learning systems. In conclusion, the goal of both strategies is to improve the human resource in all subject areas especially in science and technology.

11.2 Social and Cultural Circumstances/Development

In modern world, integrating knowledge across disciplines is essential to drive the society forward. The integrated knowledge is used toward the socio-cultural development of the country to keep up with the pace in the international community. The planning of mathematics programs has to match this demand because mathematical thinking is essential for all developments that require logical thinking. Application of mathematical process for developments that match socio-cultural situations together with the promotion of good morality and work ethics will prepare the graduates for changes in both local and global levels.

12. Impact of 11.1 and 11.2 on the program development and their relevance to the university missions

12.1 Program development

To prepare for the impact of external situations, the development of the program has to be proactive and efficient. The program should be flexible enough to adjust to the changes and advancements in mathematics, science, and technology. In order for the country to advance along with the world, the doctoral program in mathematics has to produce graduates who are knowledgeable and capable of conducting research, along with constant self-improvement.

12.2 Relevance to the university missions

Due to the missions of Silpakorn University, "1. To develop and pass on knowledge in order to produce graduates who have desirable personality characteristics, good qualities, and potential to become valuable citizens of the country and the world; 2. To study, do research, and create academic and professional works in order to generate knowledge and develop the nation", and the missions of the Faculty of Science, "1. To develop and pass on knowledge in sciences and technology in order to build professional knowledge, intelligence, and social responsibility; 2. To study, do research, and create scientific works for academic advancement", the goals for the development of this program are to produce graduates who have good qualities, knowledge, understanding, and ability to effectively transfer the knowledge to others, and to produce skillful researchers with high moral and ethical standrads.

13. Relationship with other programs in the faculties/departments in the university

None

Section 2 Program's specific information

1. Program's philosophy, significance, and objectives

1.1 Philosophy

The program aims to produce high quality graduates who are both knowledgeable in mathematics and have high potential in conducting research in mathematics at an international level. Graduates should also possess ability to effectively transfer mathematical knowledge to others. In addition, the graduates should have good moral and ethical standards and place the first priority on the interest of the community and the country.

1.2 Significance

In developing the country to match the global advances in science and technology, the work force in mathematics which is highly capable of conducting research is of essential importance. To match the demand a doctoral program in mathematics with capacity in producing graduates with high research potential is required.

1.3 Program objectives and program learning outcomes

1.3.1 Program objectives

1) To produce mathematicians who have good qualities, knowledge and understanding, and are able to effectively transfer mathematical knowledge to others.

2) To produce researchers in pure mathematics or applied mathematics who are capable of conducting research at an international standard.

3) To produce mathematicians who have morality and ethics in research and publication.

4) To produce graduates who have responsibilities, honesty and discipline, and are able to work effectively with others.

1.3.2 Program Learning Outcomes (PLOs)

Order	Program Learning Outcomes (PLOs)	Cognitive Domain (Knowledge) (Bloom's Taxonomy(revised))						Psychomotor Domain (Skills)	Affective Domain (Attitude)
		R	U	Ap	An	E	C	S	At
PLO1	Be able to correctly explain important mathematical theories.		✓						
PLO2	Be able to teach in higher education.			✓					
PLO3	Be able to present mathematical research at an international level.			✓					
PLO4	Be able to use mathematical knowledge to think critically.				✓				
PLO5	Be able to properly use information technology and mathematical research instruments.					✓			
PLO6	Be able to design and conduct research to generate new and advanced mathematical knowledge.						✓		
PLO7	Be able to search and acquaint oneself with mathematical advances.							✓	
PLO8	Be able to work with others.							✓	
PLO9	Be honest, disciplined, responsible, and able to follow social norms and research ethics.								✓

Key : The check marks ✓ indicate the level of learning outcome for "Cognitive Domain" or the achievement goal for "Psychomotor Domain" and "Affective Domain".

1.3.3 The relation between the program objectives and the program learning outcomes

Program Objectives	Program Learning Outcomes (PLOs)								
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
1. To produce mathematicians who have good qualities, knowledge and understanding, and are able to effectively transfer mathematical knowledge to others.	✓	✓	✓	✓	✓				
2. To produce researchers in pure mathematics or applied mathematics who are capable of conducting research at an international standard.				✓	✓	✓	✓		
3. To produce mathematicians who have morality and ethics in research and publication.									✓
4. To produce graduates who have responsibilities, honesty and discipline, and are able to work effectively with others.								✓	✓

2. Revision plan

Improvement/Development plans	Strategies	Evidence/Indicators
Revise the program to maintain the standard specified by OHEC, at least once every 5 years.	1. Prepare course details according to TQF 3. 2. Prepare a report of the course operation outcome according to TQF 5. 3. Prepare a report of the program operation outcome according to TQF 7	1. TQF 3 of all courses 2. TQF 5 of all courses 3. Annual TQF 7 Form
Revise the program to keep it updated and consistent with the advances in science and technology, at least every 5 years.	Evaluate the program from its operation, instruction management, organization and operator demand, and graduate employment.	Program's evaluation report
Disseminate research results in international academic communities within 5 years.	Encourage and support the dissemination of students' research results to be published in international journals.	Disseminated articles or presentation of research results

Section 3 Program's academic administration, implementation and structure

1. Academic administration

1.1 System: Bi-semester instructional system. One academic year is divided into two regular semesters. Each regular semester includes at least 15 weeks of instruction. All regulations are in accordance with Ministry of Education's Regulations on Qualifications Framework for Higher Education B.E. 2558 and/or subsequent revision.

1.2 Summer instruction: Summer semester may be available based on the program committee's decision. Summer semester lasts at least 8 weeks.

1.3 Credit transfer in the bi-semester system: None

2. Program implementation

2.1 Instruction period

Semester 1	July - November
Semester 2	December - April
Summer semester	April - June

2.2 Student qualifications

2.2.1 Student qualifications for each type of study plan

(1) Type 1.1 Thesis equivalent to 48 credits

Graduates with a master's degree or equivalent in mathematics or related fields, with a GPA of 3.25 or higher, or by department's approval

(2) Type 1.2 Thesis equivalent to 72 credits

Graduates with a bachelor's degree with honors in science or equivalent in mathematics or related fields

(3) Type 2.1 Thesis equivalent to 36 credits and additional courses not less than 15 credits. Graduates with a master's degree or equivalent in mathematics or related fields

(4) Type 2.2 Thesis equivalent to 48 credits and additional courses no less than 27 credits. Graduates with a bachelor's degree with first-class honors or equivalent in mathematics or related fields

2.2.2 Candidates must provide proof of English proficiency from a language institute at CEFR standard at a minimum of A2 level as specified by the university.

2.2.3 Candidates who do not have all the qualifications in 2.2.1 must have their cases considered by the department and the dean of the graduate school.

2.3 Problem of incoming students

None

2.4 Strategy for the correction of students problem/limitation in 2.3

None

2.5 Admission plan and graduation projection during the next 5 years

Type 1.1

Year	Number of students in each academic year				
	2020	2021	2022	2023	2024
Year 1	1	1	1	1	1
Year 2		1	1	1	1
Year 3			1	1	1
Total	1	2	3	3	3
Number of expected graduates	0	0	3	3	3

Type 1.2

Year	Number of students in each academic year				
	2020	2021	2022	2023	2024
Year 1	1	1	1	1	1
Year 2		1	1	1	1
Year 3			1	1	1
Year 4				1	1
Year 5					1
Total	1	2	3	4	5
Number of expected graduates	0	0	0	0	1

Type 2.1

Year	Number of students in each academic year				
	2020	2021	2022	2023	2024
Year 1	3	3	3	3	3
Year 2		3	3	3	3
Year 3			3	3	3
Total	3	6	9	9	9
Number of expected graduates	0	0	3	3	3

Type 2.2

Year	Number of students in each academic year				
	2020	2021	2022	2023	2024
Year 1	1	1	1	1	1
Year 2		1	1	1	1
Year 3			1	1	1
Year 4				1	1
Year 5					1
Total	1	2	3	4	5
Number of expected graduates	0	0	0	0	1

2.6 Planned budget

2.6.1 Revenue budget (Unit: Baht)

Revenue budget	Fiscal Year				
	2020	2021	2022	2023	2024
Tuition fee	600,000	1,200,000	1,800,000	1,900,000	2,000,000
Total	600,000	1,200,000	1,800,000	1,900,000	2,000,000

2.6.2 Expenditure budget (Unit: Baht)

Budgetary items	Fiscal Year				
	2020	2021	2022	2023	2024
a. Operation budget					
Remuneration	60,000	120,000	180,000	190,000	200,000
Operation expense	60,000	120,000	180,000	190,000	200,000
Scholarship	120,000	240,000	360,000	380,000	400,000
Expense at the university level	-	-	-	-	-
Total (a)	240,000	480,000	720,000	760,000	800,000
b. Investment budget					
Equipment	60,000	120,000	180,000	190,000	200,000
Total (b)	60,000	120,000	180,000	190,000	200,000
Total (a)+(b)	300,000	600,000	900,000	950,000	1,000,000
Number of students	6	12	18	19	20
Expense per one student	50,000	50,000	50,000	50,000	50,000

2.7 Study format

[✓] Classroom

[ ] Distance learning through the primary source of printed media

[ ] Distance learning through the primary source of audio-visual media

[ ] Distance learning through the primary source of E-learning media

[ ] Distance learning through the primary source of Internet media

[ ] Other (please specify)

2.8 Course/credit transfer and inter-university course registration

All regulations are in accordance with Silpakorn University's Regulations on Graduate Study B.E. 2561 (2018, Appendix 1) and/or subsequent revision.

3. Program and instructors

3.1 Program

3.1.1 Number of credits The total number of credits required for each program are as follows:

Type 1.1	equivalent to 48 credits
Type 1.2	equivalent to 72 credits
Type 2.1	not less than 51 credits
Type 2.2	not less than 75 credits

3.1.2 Program structure

3.1.2.1 Type 1 (Thesis)

Courses	Credits	
	Type 1.1 Students with a master's degree	Type 1.2 Students with a bachelor's degree
Seminars (non-credit)	4*	5*
Thesis (equivalent to)	48	72
Total credits	**48**	**72**

3.1.2.2 Type 2 (Thesis and additional courses)

Courses	Credits	
	Type 2.1 Students with a master's degree	Type 2.2 Students with a bachelor's degree
Seminars (non-credit)	3*	4*
Required courses (non-credit)	1*	1*
Required courses	-	6
Core courses	9	15
Elective courses (no less than)	6	6
Thesis (equivalent to)	36	48
Total credits (no less than)	**51**	**75**

Note: * credits are not counted toward graduation and graded as S/U.

3.1.3 Courses

3.1.3.1 Course number

Course numbers are specified by 6 digits which are divided into two groups of three digits.

The first three digits refers to the department that is in charge of the course as follows.

511 Department of Mathematics, Faculty of Science

Of the last three digits, the first digit, which can be either 5, 6, 7 or 8, refers to the graduate level, the second digit refers to the field of specialization as follows:

0 – Advanced Mathematics
1 – Algebra
2 – Analysis
3 – Geometry
4 – Number Theory
5 – Combinatorics
6 – Differential Equations
7 – Applied Mathematics
8 – Computational Science and Computer
9 – Seminar and Research

The last digit is the serial number of the course.

3.1.3.2 Criterion for calculation of credits:

Theoretical courses: each credit is equivalent to 15 hours of lecture or discussion per semester.

Practical courses: each credit is equivalent to 30 hours of practice or experiment per semester.

Thesis: each credit is equivalent to 45 hours of conducting research per semester.

The number of credits for a course is calculated by the following formula:

$$\text{The number of credits} = \frac{l+p+s}{3}$$

Where "l", "p" and "s" refer to the numbers of lecture, practical and self-study hours per week, respectively.

The credit number for each course consists of 4 digits as follows;

The first digit which is outside the parenthesis is the total number of credits.

The second, third and fourth digits which are inside the parenthesis represent the following:

The second digit represents the number of lecture hours per week.
The third digit represents the number of practical hours per week.
The fourth digit represents the number of self-study hours per week.

3.1.3.3 Curriculum courses

Type 1

Type 1.1

(1) Seminars (credits are not counted toward graduation and graded as S/U) 4 credits

511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)

Note: Courses with an asterisk " * " are required courses whose credits are not counted toward graduation and graded as S/U.

511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)

Students must register for 511 592 Discussion in Mathematics in every semester until they graduate.

(2) Thesis (equivalent to) 48 credits

511 891	Thesis (equivalent to)	48 credits

Type 1.2

(1) Seminars (credits are not counted toward graduation and graded as S/U) 5 credits

511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)
511 794	Seminar in Advanced Mathematics IV	1*(0-2-1)

Students must register for 511 592 Discussion in Mathematics in every semester until they graduate.

(2) Thesis (equivalent to) 72 credits

511 892	Thesis (equivalent to)	72 credits

Type 2

Type 2.1

(1) Seminars (credits are not counted toward graduation and graded as S/U) 3 credits

511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)

Students must register for 511 592 Discussion in Mathematics in every semester until they graduate.

(2) Required courses (credits are not counted toward graduation and graded as S/U) 1 credit

511 585	Computer Tools for Mathematics Students	1*(0-2-1)

(3) Core courses

Students are required to earn 9 credits of core courses.

511 512	Abstract Algebra I	3(3-0-6)
511 513	Abstract Algebra II	3(3-0-6)
511 515	Advanced Linear Algebra	3(3-0-6)
511 516	Universal Algebra	3(3-0-6)
511 517	Algebraic Coding Theory	3(3-0-6)
511 522	Real Analysis I	3(3-0-6)
511 523	Real Analysis II	3(3-0-6)
511 524	Functional Analysis	3(3-0-6)

Note: Courses with an asterisk " * " are required courses whose credits are not counted toward graduation and graded as S/U.

511 525	Complex Analysis	3(3-0-6)
511 531	Topology	3(3-0-6)
511 532	Differentiable Manifolds	3(3-0-6)
511 534	Algebraic Geometry	3(3-0-6)
511 541	Analytic Number Theory	3(3-0-6)
511 551	Combinatorics	3(3-0-6)
511 552	Graph Theory	3(3-0-6)
511 561	Theory of Ordinary Differential Equations	3(3-0-6)
511 562	Partial Differential Equations	3(3-0-6)
511 572	Numerical Analysis	3(3-0-6)
511 576	Probability Theory	3(3-0-6)
511 577	Stochastic Processes	3(3-0-6)

(4) Elective courses

Students are required to earn at least 6 credits of elective courses. Students can select courses from the following list, from the core courses, or from the new courses that the department will approve later.

511 533	Lie Groups and Lie Algebras	3(3-0-6)
511 553	Advanced Combinatorics	3(3-0-6)
511 571	Mathematical Modeling	3(3-0-6)
511 573	Mathematical Theory of Inverse Problems	3(3-0-6)
511 574	Numerical Methods for Partial Differential Equations	3(3-0-6)
511 575	Financial Mathematics	3(3-0-6)
511 581	Multigrid Techniques for Differential Equations	3(3-0-6)
511 582	Numerical Methods for Image Registration	3(3-0-6)
511 583	Variational Techniques and Partial Differential Equations in Image Processing	3(3-0-6)
511 584	Optimization	3(3-0-6)
511 701	Selected Topics in Mathematics I	3(3-0-6)
511 702	Selected Topics in Mathematics II	3(3-0-6)
511 711	Selected Topics in Algebra	3(3-0-6)
511 712	Selected Topics in Coding Theory	3(3-0-6)
511 721	Selected Topics in Analysis	3(3-0-6)
511 731	Selected Topics in Geometry	3(3-0-6)
511 741	Selected Topics in Number Theory	3(3-0-6)
511 751	Selected Topics in Combinatorics	3(3-0-6)
511 752	Selected Topics in Graph Theory	3(3-0-6)
511 761	Selected Topics in Differential Equations	3(3-0-6)
511 771	Selected Topics in Applied Mathematics	3(3-0-6)
511 781	Selected Topics in Computational Science	3(3-0-6)
511 782	Selected Topics in Optimization	3(3-0-6)

(5) Thesis (equivalent to) 36 credits

511 893	Thesis	equivalent to 36 credits

Type 2.2

(1) Seminars (credits are not counted toward graduation and graded as S/U) 4 credits

511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)

Students must register for 511 592 Discussion in Mathematics in every semester until they graduate.

(2) Required courses (credits are not counted.toward graduation and graded as S/U) 1 credit

(3) Required courses 6 credits

511 514	Linear Algebra with Applications	3(3-0-6)
511 521	Mathematical Analysis	3(3-0-6)
511 585	Computer Tools for Mathematics Students	1*(0-2-1)

(4) Core courses

Students are required to earn 15 credits of core courses. Students must enroll in at least two courses from two different groups of the three groups below:

Algebra

511 512	Abstract Algebra I	3(3-0-6)
511 513	Abstract Algebra II	3(3-0-6)
511 515	Advanced Linear Algebra	3(3-0-6)

Analysis

511 522	Real Analysis I	3(3-0-6)
511 524	Functional Analysis	3(3-0-6)
511 525	Complex Analysis	3(3-0-6)

Applied Mathematics

511 561	Theory of Ordinary Differential Equations	3(3-0-6)
511 562	Partial Differential Equations	3(3-0-6)
511 572	Numerical Analysis	3(3-0-6)

In addition, students can enroll in the following courses:

511 516	Universal Algebra	3(3-0-6)
511 517	Algebraic Coding Theory	3(3-0-6)
511 523	Real Analysis II	3(3-0-6)
511 531	Topology	3(3-0-6)
511 532	Differentiable Manifolds	3(3-0-6)
511 534	Algebraic Geometry	3(3-0-6)
511 541	Analytic Number Theory	3(3-0-6)

Note: Courses with an asterisk " * " are required courses whose credits are not counted toward graduation and graded as S/U.

511 551	Combinatorics	3(3-0-6)
511 552	Graph Theory	3(3-0-6)
511 576	Probability Theory	3(3-0-6)
511 577	Stochastic Processes	3(3-0-6)

(5) Elective courses

Students are required to earn at least 6 credits of elective courses. Students can select courses from the following list, from the core courses, or from the new courses that the department will approve later.

511 533	Lie Groups and Lie Algebras	3(3-0-6)
511 553	Advanced Combinatorics	3(3-0-6)
511 571	Mathematical Modeling	3(3-0-6)
511 573	Mathematical Theory of Inverse Problems	3(3-0-6)
511 574	Numerical Methods for Partial Differential Equations	3(3-0-6)
511 575	Financial Mathematics	3(3-0-6)
511 581	Multigrid Techniques for Differential Equations	3(3-0-6)
511 582	Numerical Methods for Image Registration	3(3-0-6)
511 583	Variational Techniques and Partial Differential Equations in Image Processing	3(3-0-6)
511 584	Optimization	3(3-0-6)
511 701	Selected Topics in Mathematics I	3(3-0-6)
511 702	Selected Topics in Mathematics II	3(3-0-6)
511 711	Selected Topics in Algebra	3(3-0-6)
511 712	Selected Topics in Coding Theory	3(3-0-6)
511 721	Selected Topics in Analysis	3(3-0-6)
511 731	Selected Topics in Geometry	3(3-0-6)
511 741	Selected Topics in Number Theory	3(3-0-6)
511 751	Selected Topics in Combinatorics	3(3-0-6)
511 752	Selected Topics in Graph Theory	3(3-0-6)
511 761	Selected Topics in Differential Equations	3(3-0-6)
511 771	Selected Topics in Applied Mathematics	3(3-0-6)
511 781	Selected Topics in Computational Science	3(3-0-6)
511 782	Selected Topics in Optimization	3(3-0-6)

(6) Thesis (equivalent to) 48 credits

511 891	Thesis	equivalent to 48 credits

3.1.4 Study Plan

Courses with an asterisk " * " are required courses whose credits are not counted toward graduation

Type 1.1

Year 1 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
Total credits		0

Year 1 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
Total credits		0

Year 2 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 2 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 3 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 3 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Note: Students who do not graduate by the time indicated in the study plan must register for 511 592 Discussion in Mathematics in every semester until they graduate.

Type 1.2

Year 1 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
Total credits		0

Year 1 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
Total credits		0

Year 2 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)
Total credits		0

Year 2 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 794	Seminar in Advanced Mathematics IV	1*(0-2-1)
Total credits		0

Year 3 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Year 3 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Year 4 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Year 4 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Year 5 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Year 5 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 892	Thesis (equivalent to)	12
Total credits		12

Note: Students who do not graduate by the time indicated in the study plan must register for 511 592 Discussion in Mathematics in every semester until they graduate.

Type 2.1

Year 1 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 xxx	Core courses	6
511 585	Computer Tools for Mathematics Students	1*(0-2-1)
511 592	Discussion in Mathematics	1*(0-2-1)
Total credits		6

Year 1 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 xxx	Core courses	3
511 xxx	Elective course	3
511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
Total credits		6

Year 2 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 xxx	Elective course	3
511 592	Discussion in Mathematics	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
Total credits		3

Year 2 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 893	Thesis (equivalent to)	12
Total credits		12

Year 3 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 893	Thesis (equivalent to)	12
Total credits		12

Year 3 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 893	Thesis (equivalent to)	12
Total credits		12

Note: Students who do not graduate by the time indicated in the study plan must register for 511 592 Discussion in Mathematics in every semester until they graduate.

Type 2.2

Year 1 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 514	Linear Algebra with Applications	3(3-0-6)
511 521	Mathematical Analysis	3(3-0-6)
511 585	Computer Tools for Mathematics Students	1*(0-2-1)
511 592	Discussion in Mathematics	1*(0-2-1)
Total credits		6

Year 1 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 xxx	Core courses	6
511 592	Discussion in Mathematics	1*(0-2-1)
Total credits		6

Year 2 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 xxx	Core courses	6
511 xxx	Elective courses	3
511 592	Discussion in Mathematics	1*(0-2-1)
Total credits		9

Year 2 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 xxx	Core courses	3
511 xxx	Elective courses	3
511 592	Discussion in Mathematics	1*(0-2-1)
511 791	Seminar in Advanced Mathematics I	1*(0-2-1)
Total credits		6

Year 3 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 792	Seminar in Advanced Mathematics II	1*(0-2-1)
Total credits		0

Year 3 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 793	Seminar in Advanced Mathematics III	1*(0-2-1)
511 891	Thesis (equivalent to)	6
Total credits		6

Year 4 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 4 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 5 Semester 1

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	12
Total credits		12

Year 5 Semester 2

Course number	Course title	Number of credits (l-p-s)
511 592	Discussion in Mathematics	1*(0-2-1)
511 891	Thesis (equivalent to)	6
Total credits		6

Note: Students who do not graduate by the time indicated in the study plan must register for 511 592 Discussion in Mathematics in every semester until they graduate.

3.1.5 Course Descriptions

511 512 Abstract Algebra I **3(3-0-6)**

Groups. Group actions. Sylow theorems and applications. Finite abelian groups. Basic properties of rings. Unique factorization domains. Polynomial rings. Fields and field extensions.

511 513 Abstract Algebra II **3(3-0-6)**

Prerequisite : 511 512 Abstract Algebra I or with the approval of the department

Jordan-Hölder theorem. Solvable groups. Classification of field extensions: algebraic, transcendental, normal and separable extensions. Galois theory. Modules.

511 514 Linear Algebra with Applications **3(3-0-6)**

Vector spaces. Linear transformations. Linear functionals. Diagonalization. Jordan canonical forms. Inner product spaces. Orthonormal basis. Spectral decomposition. Applications.

511 515 Advanced Linear Algebra 3(3-0-6)

Prerequisite : 511 514 Linear Algebra with Applications or with the approval of the department

Rigorous treatment of linear algebra. Quotient spaces. Dual spaces. Cayley-Hamilton theorem and minimal polynomials. Canonical forms. Bilinear, quadratic and Hermitian forms. Multilinear functions and tensor products.

511 516 Universal Algebra 3(3-0-6)

Prerequisite : 511 512 Abstract Algebra I or with the approval of the department

Lattices and orders. The elements of universal algebra. Birkhoff's subdirect representation theorem. Free algebra. Equational classes and Birkhoff's variety theorem. Mal'cev-type conditions. Selected topics of interest.

511 517 Algebraic Coding Theory 3(3-0-6)

Prerequisite : 511 512 Abstract Algebra I or with the approval of the department

Error detection and correction. Encoding and decoding. Finite fields. Linear codes. Cyclic and BCH codes. Weight-distributions. Bounds in coding theory and constructions of Codes. Self-orthogonal codes, self-dual codes, complementary dual codes and applications.

511 521 Mathematical Analysis 3(3-0-6)

Real number system. Metric and topological spaces. Sequences. Series. Continuous functions. Derivatives. Riemann integrals. Sequences and series of functions.

511 522 Real Analysis I 3(3-0-6)

Algebras of sets. Outer measure. Lebesgue measure. Lebesgue Measurable functions. Riemann and Lebesgue integrals. Differentiation and integration. L^p spaces.

511 523 Real Analysis II 3(3-0-6)

Prerequisite : 511 522 Real Analysis I or with the approval of the department

Abstract measure spaces. Measurable functions. Integration. Modes of convergence. Product measures. Abstract L^p spaces.

511 524 Functional Analysis 3(3-0-6)

Normed spaces. Banach spaces. Bounded linear operators and functionals. Open mapping theorem. Closed graph theorem. Uniform boundedness principle. Hahn-Banach extension theorem. Inner product spaces. Hilbert spaces. Orthogonality. Riesz representation theorem. Adjoint operators. Compact operators.

511 525 Complex Analysis 3(3-0-6)

Analytic functions. Complex integration. Cauchy's theorem and applications. Singularities. Residues and applications. Maximum principles. Normal families and Montel's theorem. Riemann's mapping theorem. Harmonic functions.

511 531 Topology 3(3-0-6)

Topological spaces. Compact and locally compact spaces. Connected and locally connected spaces. Countability axioms. Separability axioms. Product spaces. Topology of the plane. Euclidean spaces.

511 532 Differentiable Manifolds 3(3-0-6)

Manifolds and submanifolds. Immersions, embeddings, and submersions. Tangent bundles and tangent maps. Vector fields. Derivations. Sard's theorem. Tensors. Differential forms.

511 533 Lie Groups and Lie Algebras 3(3-0-6)

Prerequisite : 511 532 Differentiable Manifolds or with the approval of the department

Lie groups. Lie algebras. Lie algebra of a Lie group. Relationships between Lie groups and Lie algebras. Introduction to representation.

511 534 Algebraic Geometry 3(3-0-6)

Prerequisite : 511 513 Abstract Algebra II or with the approval of the department

Algebraic varieties. Sheaves. Projective varieties. Group law on a plane cubic curve. Tangent space of an affine and a projective variety. Projective embeddings. Riemann-Roch theorem.

511 541 Analytic Number Theory 3(3-0-6)

Arithmetic functions. Dirichlet series. Riemann zeta function. L-functions. Dirichlet's theorem. The prime number theorem.

511 551 Combinatorics 3(3-0-6)

The pigeonhole principle and Ramsey's theorem. Generating functions. Recurrence relations. The inclusion-exclusion principle. Pólya's theorem. Block designs.

511 552 Graph Theory 3(3-0-6)

Graphs and subgraphs. Trees. Connectivity. Matchings and factorization of graph. Eulerian graphs. Hamiltonian graphs. Planar graphs. Colorings and the four-color theorem.

511 553 Advanced Combinatorics 3(3-0-6)

(0,1)-matrices. Latin squares. Hadamard matrices. Young tableaux. Strongly regular graphs. Designs. Combinatorial games.

511 561 Theory of Ordinary Differential Equations 3(3-0-6)

Linear systems of first order ordinary differential equations. Phase line diagram. Linear systems. Vector and matrix equations. Stability of linear systems. Floquet theory. Autonomous systems. Phase plane diagrams. Phase plane diagram for linear systems. Stability for nonlinear autonomous systems. Lyapunov functions. Stability theorem.

511 562 Partial Differential Equations 3(3-0-6)

First and second order partial differential equations. Elliptic, hyperbolic, and parabolic equations. Existence and uniqueness of solutions. Maximum principles and energy methods. Methods of solving partial differential equations on bounded and unbounded domains. Weak solutions. Sobolev spaces.

511 571 Mathematical Modeling 3(3-0-6)

Mathematical concept in a modeling frame work. Practical problems chosen from common experiences encompassing many academic disciplines. Implementations of analytical and numerical analysis with the use of mathematical tool. Evaluation of mathematical model or real data.

511 572 Numerical Analysis 3(3-0-6)

Accuracy of approximations. Interpolations. Analysis of linear and nonlinear system. Analysis of numerical differentiations and integrations. Analysis of numerical solutions of ordinary differential equations and partial differential equations.

511 573 Mathematical Theory of Inverse Problems 3(3-0-6)

Fundamental properties of an ill-posed inverse problem. Basic theorems for the construction and analysis of regularization methods. General theory of regularization. Classical regularization methods. Truncated singular value decomposition. Tikhonov and iterative regularization methods. Projection methods.

511 574 Numerical Methods for Partial Differential Equations 3(3-0-6)

Basic concept of mathematical techniques for initial and boundary value problems in partial differential equations. Finite difference and finite element discretization techniques for parabolic, hyperbolic, and elliptic problems. Direct and iterative methods for discrete problems. Cases studies.

511 575 Financial Mathematics 3(3-0-6)

Interest rates. Time value of money. Stock and bonds. Other securities. Simple financial market model. Risk-free assets. Risky assets. Discrete time market models. Portfolio management. Derivatives. Applications.

511 576 Probability Theory 3(3-0-6)

Condition : only with the approval of the department

Probability space. Axiomatic theory of probability. Random variables. Independence of random variables. Distribution functions. Expectations. Moment generating functions. Characteristic functions. Convergence of random variables. Weak and strong laws of large numbers. Central limit theorem.

511 577 Stochastic Processes 3(3-0-6)

Condition : only with the approval of the department

Random variables and probability distribution functions. Conditional Expectation. Martingales. Markov chains. Poisson processes. Renewal theory. Random walks. Brownian motion. Applications of stochastic process.

511 581 Multigrid Techniques for Differential Equations 3(3-0-6)

Finite difference methods for ordinary and partial differential equations. Basic iterative methods for finite difference equations. Basic idea and theory of multigrid methods. Nonlinear multigrid method. Selected applications.

511 582 Numerical Methods for Image Registration 3(3-0-6)

Basic concepts of image registration. Mathematical modeling of image registration. Similarity measures. Parametric and non-parametric image registration. Variational techniques. Regularization techniques for image registration. Numerical methods for elastic-based, diffusion-based, and curvature-based image registration.

511 583 Variational Techniques and Partial Differential Equations in Image Processing 3(3-0-6)

Basic concepts of mathematical image processing. Variational techniques for image processing. Sobolev space and the space of functions of bounded variation. Image denoising. Image deblurring. Image inpainting. Image segmentation. Optical flow computation. Image registration.

511 584 Optimization 3(3-0-6)

Basic concepts of optimization. One-dimensional search methods. Gradient methods. Newton's method. Conjugate direction methods. Quasi-Newton methods. Global search algorithms. Theory of constrained optimization. Algorithms for constrained optimizations. Selected applications.

511 585 **Computer Tools for Mathematics Students** 1(0-2-1)

Condition : Graded as S or U

Mathematical document creation. Concepts and techniques of presentation. Tools for solving mathematical problems.

511 592 **Discussion in Mathematics** 1(0-2-1)

Condition : Graded as S or U

Discussion on topics of interest in mathematics.

511 701 **Selected Topics in Mathematics I** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in mathematics relevant and complementary to current research and topics of current interest.

511 702 **Selected Topics in Mathematics II** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in mathematics relevant and complementary to current research and topics of current interest.

511 711 **Selected Topics in Algebra** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in advanced algebra relevant and complementary to current research and topics of current interest.

511 712 **Selected Topics in Coding Theory** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in coding theory relevant and complementary to current research and topics of current interest.

511 721 **Selected Topics in Analysis** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in advanced analysis relevant and complementary to current research and topics of current interest.

511 731 **Selected Topics in Geometry** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in geometry relevant and complementary to current research and topics of current interest.

511 741 **Selected Topics in Number Theory** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in number theory relevant and complementary to current research and topics of current interest.

511 751 **Selected Topics in Combinatorics** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in combinatorics relevant and complementary to current research and topics of current interest.

511 752 **Selected Topics in Graph Theory** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in advanced graph theory relevant and complementary to current research and topics of current interest.

511 761 **Selected Topics in Differential Equations** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in differential equations relevant and complementary to current research and topics of current interest.

511 771 **Selected Topics in Applied Mathematics** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in applied mathematics relevant and complementary to current research and topics of current interest.

511 781 **Selected Topics in Computational Science** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in computational science relevant and complementary to current research and topics of current interest.

511 782 **Selected Topics in Optimization** 3(3-0-6)

Condition : only with the approval of the department

Selected topics in optimization relevant and complementary to current research and topics of current interest.

511 791 **Seminar in Advanced Mathematics I** 1(0-2-1)

Condition : only with the approval of the department

Graded as S or U

Seminar on current research in advanced mathematics.

511 792 **Seminar in Advanced Mathematics II** 1(0-2-1)

Condition : only with the approval of the department

Graded as S or U

Seminar on current research in advanced mathematics.

511 793 **Seminar in Advanced Mathematics III** 1(0-2-1)

Condition : only with the approval of the department

Graded as S or U

Seminar on current research in advanced mathematics.

511 794 **Seminar in Advanced Mathematics IV** 1(0-2-1)

Condition : only with the approval of the department

Graded as S or U

Seminar on current research in advanced mathematics.

511 891 **Thesis** (equivalent to) 48 credits

Research topics in mathematics under the supervision of thesis advisor(s).

511 892 **Thesis** (equivalent to) 72 credits

Research topics in mathematics under the supervision of thesis advisor(s).

511 893 **Thesis** (equivalent to) 36 credits

Research topics in mathematics under the supervision of thesis advisor(s).

3.2 Full names, national identification numbers, positions and academic qualifications of instructors

3.2.1 Instructors in Charge of the Program

Order	Position, Name and National Identification Number	Qualifications, Major, Institution, Year of graduation	Average Teaching Load (hr/week/academic year)	
			Current	Revised
1	Asst. Prof. Dr. Somjate Chaiya x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Illinois at Urbana- Champaign, USA (2008) M.S. (Mathematics) Oregon State University, USA (2002) B.Sc. (Mathematics) Kasetsart University (2000)	14	14

Order	Position, Name and National Identification Number	Qualifications, Major, Institution, Year of graduation	Average Teaching Load (hr/week/academic year)	
			Current	Revised
2	Asst. Prof. Dr. Chalermpong Worawannotai x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Wisconsin-Madison, USA (2012) B.A. (Mathematics) University of Virginia, USA (2006)	14	14
3	Dr. Supap Kirtsaeng x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Southern California, USA (2010) M.A. (Mathematics) University of Southern California, USA (2005) B.A. (Mathematics) Cornell University, USA (2002)	14	14

3.2.2 Program Designated Instructors

Order	Position, Name and National Identification Number	Qualifications, Major, Institution, Year of graduation	Average Teaching Load (hr/week/academic year)	
			Current	Revised
1	Asst. Prof. Dr. Somjate Chaiya x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Illinois at Urbana- Champaign, USA (2008) M.S. (Mathematics) Oregon State University, USA (2002) B.Sc. (Mathematics) Kasetsart University (2000)	14	14
2	Asst. Prof. Dr. Chalermpong Worawannotai x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Wisconsin-Madison, USA (2012) B.A. (Mathematics) University of Virginia, USA (2006)	14	14
3	Dr. Supap Kirtsaeng x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Southern California, USA (2010) M.A. (Mathematics) University of Southern California, USA (2005) B.A. (Mathematics) Cornell University, USA (2002)	14	14
4	Assoc. Prof. Dr. Suabsagun Yooyuanyoung x-xxxx-xxxxx-xx-x	Ph.D. (Applied Mathematics) Curtin University of Technology, Australia (1997) M.Sc. (Applied Mathematics) Mahidol University (1985) B.Ed. (Physics) Srinakharinwirot University, Bangsaen (1982)	14	14

Order	Position, Name and National Identification Number	Qualifications, Major, Institution, Year of graduation	Average Teaching Load (hr/week/academic year)	
			Current	Revised
5.	Asst. Prof. Dr. Noppadol Chumchob x-xxxx-xxxxx-xx-x	Ph.D. (Mathematical Science) University of Liverpool, UK (2010) M.Sc. (Mathematics) Silpakorn University (2001) B.Sc. (Mathematics) Thaksin University (1996)	14	14
6	Asst. Prof. Dr. Ratana Srithus x-xxxx-xxxxx-xx-x	Dr.rer.nat. (Mathematics) University of Potsdam, Germany (2009) M.Sc. (Mathematics) Silpakorn University (2002) B.Sc. (Mathematics) Silpakorn University (1999)	14	14
7	Asst. Prof. Dr. Pornsarp Pornsawad x-xxxx-xxxxx-xx-x	Dr.rer.nat. (Numerical Mathematics) University of Potsdam, Germany (2011) M.Sc. (Applied Mathematics) Mahidol University (2003) B.Sc. (Mathematics) Mahidol University (2001)	14	14
8	Asst. Prof. Dr. Klot Patanarapeelert	Ph.D. (Mathematics) Mahidol University, Thailand (2006) M.Sc. (Applied Mathematics) Mahidol University (2002) B.Sc. (Applied Mathematics) King Mongkut's Institute of Technology North (1998)	14	14
9	Asst. Prof. Dr. Jittisak Rakbud x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) Mahidol University, Thailand (2006) M.Sc. (Mathematics) Chiangmai University (2002) B.Sc. (Mathematics) Mahidol University (2000)	14	14
10	Asst. Prof. Dr. Sawanya Sakuntasathien x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Nebraska-Lincoln, USA (2008) M.Sc. (Mathematics) Chulalongkorn University (2001) B.Sc. (Mathematics) Mahidol University (1998)	14	14
11	Asst. Prof. Dr. Malinee Chaiya x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of Illinois at Urbana-Champaign, USA (2008) M.S. (Actuarial Science) University of Illinois at Urbana-Champaign, USA (2006) M.S. (Mathematics) University of Illinois at Urbana-Champaign, USA (2004) M.Sc. (Petroleum Technology) Chulalongkorn University, Thailand (2001) B.Sc. (Chemical Engineering) Chulalongkorn University (1999)	14	14

Order	Position, Name and National Identification Number	Qualifications, Major, Institution, Year of graduation	Average Teaching Load (hr/week/academic year)	
			Current	Revised
12	Asst. Prof. Dr. Nairat Kanyamee x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) Wayne State University, USA (2010) M.A. (Mathematical Statistics) Wayne State University, USA (2010) M.S.(Mathematics) Washington State University, USA (2005) M.Sc. (Applied Mathematics) Mahidol University (2002) B.Sc. (Mathematics) Chiangmai University (2000)	14	14
13	Dr. Sittisede Polwiang x-xxxx-xxxxx-xx-x	Ph.D. (Mathematics) University of New South Wales, Australia (2012) B.Sc. (Mathematics) University of New South Wales, Australia (2008)	14	14
14	Asst. Prof. Dr. Somphong Jitman x-xxxx-xxxxx-xx-x	Ph.D.(Mathematics) Chulalongkorn University (2011) M.Sc.(Mathematics) Chulalongkorn University (2007) B.Sc.(Mathematics) Prince of Songkla University (2005)	14	14
15	Dr. Passawan Noppakaew x-xxxx-xxxxx-xx-x	Ph.D. (Mathematical Science) University of Bath, UK (2014) M.Sc. (Mathematical Science with Distinction) University of Bath, UK (2009) B.Sc. (Mathematics) Silpakorn University (2007)	14	14
16	Dr. Worakrit Supaporn x-xxxx-xxxxx-xx-x	Dr.rer.nat. (Mathematics) University of Potsdam, Germany (2015) M.Sc. (Mathematics) Silpakorn University (2005) B.Sc. (Mathematics) The University of the Thai Chamber of Commerce (2000)	14	14

3.2.3 Special instructors None

4. Fieldwork experience component None

5. Project/Research Stipulation

5.1 Summary explanation

The program requires students to conduct research on the topic of their interest or on the topic that can be useful to the community. The thesis must be completed within a specified time limit and must be conducted under the supervision of an advisor. As proof of a sufficiently high standard, the thesis in programs Type 1 and Type 2 must result in at least 2 publications and at least 1 publication, respectively, in peer-reviewed international journals.

5.2 Learning outcome standards

The program focuses on training students to gain knowledge and understanding in a systematic research process. Students should strive for a high standard in their research. The program also aims to educate students on morality, ethics, knowledge, intellectual and social skills, analysis skills, communication skills, and information technology skills so that they will be capable of successfully transferring knowledge to the society.

5.3 Instruction period

Type 1.1	From first semester of Year 2 to second semester of Year 3
Type 1.2	From first semester of Year 3 to second semester of Year 5
Type 2.1	From second semester of Year 2 to second semester of Year 3
Type 2.2	From second semester of Year 3 to second semester of Year 5

5.4 Number of credits

Type 1.1	Thesis	equivalent to 48 credits
Type 1.2	Thesis	equivalent to 72 credits
Type 2.1	Thesis	equivalent to 36 credits
Type 2.2	Thesis	equivalent to 48 credits

5.5 Preparation

Students choose areas of research that they are interested in. It is the responsibility of a student to choose and contact his/her thesis advisors. Students have to conduct research under the guidance of their advisors. The advisors may assist the students with the topic selection and the research methodology. Students in all plans must be individually assigned a research project advisor. Students must pass the qualifying examination and prior to the approval of their thesis proposal and in accordance with Silpakorn University's Regulations on Graduate Study B.E. 2561(2018, Appendix 1) and/or subsequent revision.

5.6 Evaluation Process

The research evaluation must be in accordance with Silpakorn University's Regulations on Graduate Study B.E. 2561(2018, Appendix 1) and/or subsequent revision in the following topics: Approval of the thesis proposal, thesis registration, and thesis approval. Students must present their research progress to the program committee at the end of every academic year. The program committee must appoint a thesis examination committee consisting of at least 5 members. This committee shall consist of the thesis advisor, program designated instructors, and at least one qualified professional from outside Silpakorn University.

Section 4 Learning outcome, Teaching Strategies and Evaluation

1. Development of students' special characters

Graduates of the Doctoral Program in Mathematics, Silpakorn University, shall be able to understand, explain and analyze problems, and then apply mathematical knowledge to solve problems appropriately. Graduates shall be knowledgeable in the development of research works and be able to integrate knowledge in mathematics with the knowledge in related fields in order to develop new ideas and inventions that will advance science and technology in Thailand. Graduates shall be capable of appropriate leadership and team-work. Graduates shall possess good moral and ethical standards and place the first priority on the interest of the community and the nation. In addition, graduates shall be able to effectively transfer mathematical knowledge to others.

Features	Plans or activities for students
(1) Possess good qualities, knowledge, understanding, and ability to effectively transfer mathematical knowledge to others.	(1) Provide suitable course structures in the program. (2) Provide in-class presentation activities and seminars. (3) Provide trainings in teaching. (4) Encourage students to be teaching assistants for elementary courses in the department.
(2) Possess a potential to conduct mathematical research publishable at an international level.	(1) Encourage students to participate in 511 592 Discussion in Mathematics in every semester to keep themselves updated about current research trends. (2) Encourage students to participate in international conferences. (3) Encourage students to do research with mathematicians inside and outside the country.
(3) Possess high moral and ethical standards in research and publication.	Encourage and advise students in seminar courses to understand and realize the importance of morality and ethics in research.
(4) Possess responsibility, honesty, discipline, and ability to effectively work with others.	Allow students to be leaders in organizing activities with support from the program.

2. Program Learning Outcomes

Program Learning Outcomes (PLOs)	Teaching Strategies	Evaluation Strategies
PLO1 Be able to correctly explain important mathematical theories.	(1) Lectures (2) Discussions (3) Providing examples/case studies (4) Research assignments and presentations in class (5) Seminars	(1) Exams (2) Research reports or in-class presentations
PLO2 Be able to teach in higher education.	(1) Report/thesis writing (2) Work presentations and discussions (3) Providing training in teaching	(1) Research reports or in-class presentations (2) In-class teaching practices
PLO3 Be able to present mathematical research at an international level.	(1) Work presentations (2) Questioning and answering (3) Simulating situations in presentations as in real conferences	(1) Correctness of the contents of in-class presentations (2) Confidence of students during in-class presentations (3) Presenting work at an international level
PLO4 Be able to use mathematical knowledge to think critically.	(1) Doing research and thesis (2) Training in applying theoretical knowledge to solve research problems (3) Questioning-based teaching (4) Assignments for students to study or analyze problems before class	(1) Research proposals (2) Research results (3) Different types of research presentations (4) Presentations in seminars (5) Homework and exams
PLO5 Be able to properly use information technology and mathematical research instruments.	(1) Lectures and providing examples (2) Training in computer programs (3) Improving skills through real situations in doing research and thesis	(1) Exams (2) Selection and use of instruments in research
PLO6 Be able to design and conduct research to generate new and advanced mathematical knowledge.	(1) Training in literature review (2) Training in questioning and constructing hypothesis (3) Training in hypothesis testing	Thesis and research

Program Learning Outcomes (PLOs)	Teaching Strategies	Evaluation Strategies
PLO7 Be able to search and acquaint oneself with mathematical advances.	(1) Research assignments (2) Searching and studying supplementary material used in seminars	Assignments
PLO8 Be able to work with others.	(1) Group assignments and presentations (2) Practices in coordinating and organizing activities such as seminars and thesis defenses	(1) Participation in group activities (2) Success/smoothness of organizing activities
PLO9 Be honest, disciplined, responsible, and able to follow social norms and research ethics.	(1) Motivating students to behave morally and ethically in their daily lives, for example, getting to classes on time, being honest, and not copying others' work (2) Lectures and giving examples about ethics for researchers (3) Teaching students in ethics for researchers during the orientation for new students	(1) Punctuality of students in classes and meetings (2) Homework, exams, and assignments (3) Reports and presentations in seminars, and thesis

The relation between Program Learning Outcomes and the domains of learning in Thai Qualification Framework (TQF)

Thai Qualification Framework (TQF) / Program Learning Outcomes (PLOs)	*1.Morality and Ethics*	*2.Knowledge*	*3. Cognitive Skills*	*4. Interpersonal Skills and Responsibility*	*5. Analytical, Communication, and IT Skills*
PLO1 Be able to correctly explain important mathematical theories.		✓			
PLO2 Be able to teach in higher education.		✓	✓		✓
PLO3 Be able to present mathematical research at an international level.		✓	✓		✓
PLO4 Be able to use mathematical knowledge to think critically.		✓	✓		
PLO5 Be able to properly use information technology and mathematical research instruments.			✓		✓
PLO6 Be able to design and conduct research to generate new and advanced mathematical knowledge.			✓		✓
PLO7 Be able to search and acquaint oneself with mathematical advances.			✓		✓
PLO8 Be able to work with others.				✓	
PLO9 Be honest, disciplined, responsible, and able to follow social norms and research ethics.	✓			✓	

Key : The check marks ✓ indicate the relation between Program Learning Outcomes and the domains of learning in Thai Qualification Framework (TQF)

The distribution of Program Learning Outcomes in each course (Curriculum Mapping)

Course number/Course title	PLOs : Program-Level Learning Outcomes								
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
511 512 Abstract Algebra I	●			●					
511 513 Abstract Algebra II	●			●					
511 514 Linear Algebra with Applications	●			●					
511 515 Advanced Linear Algebra	●			●					
511 516 Universal Algebra	●			●					
511 517 Algebraic Coding Theory	●			●			●		
511 521 Mathematical Analysis	●	●		●					
511 522 Real Analysis I	●			●					
511 523 Real Analysis II	●	●		●					
511 524 Functional Analysis	●			●					
511 525 Complex Analysis	●			●					
511 531 Topology	●			●			●	●	●
511 532 Differentiable Manifolds	●			●			●	●	●
511 533 Lie Groups and Lie Algebras	●			●			●		●
511 534 Algebraic Geometry	●			●			●		●
511 541 Analytic Number Theory	●			●					
511 551 Combinatorics				●	●				
511 552 Graph Theory	●			●					
511 553 Advanced Combinatorics	●			●	●				
511 561 Theory of Ordinary Differential Equations	●	●		●	●				
511 562 Partial Differential Equations	●	●		●	●				
511 571 Mathematical Modeling	●	●			●		●		
511 572 Numerical Analysis	●			●	●				
511 573 Mathematical Theory of Inverse Problems	●			●	●		●		
511 574 Numerical Methods for Partial Differential Equations	●			●	●		●		
511 575 Financial Mathematics	●			●					

Course number/Course title	PLOs : Program-Level Learning Outcomes								
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
511 576 Probability Theory	●			●					
511 577 Stochastic Processes	●			●					
511 581 Multigrid Techniques for Differential Equations		●		●					
511 582 Numerical Methods for Image Registration	●	●			●				
511 583 Variational Techniques and Partial Differential Equations in Image Processing	●	●			●				
511 584 Optimization	●	●		●					
511 585 Computer Tools for Mathematics Students		●	●		●			●	●
511 592 Discussion in Mathematics	●	●		●	●	●	●	●	
511 701 Selected Topics in Mathematics I	●			●			●		
511 702 Selected Topics in Mathematics II	●			●			●		
511 711 Selected Topics in Algebra	●			●			●		
511 712 Selected Topics in Coding Theory	●			●			●		
511 721 Selected Topics in Analysis	●			●			●		
511 731 Selected Topics in Geometry	●			●			●		
511 741 Selected Topics in Number Theory	●			●			●		
511 751 Selected Topics in Combinatorics	●			●			●		
511 752 Selected Topics in Graph Theory	●			●			●		
511 761 Selected Topics in Differential Equations	●			●			●		
511 771 Selected Topics in Applied Mathematics	●			●			●		
511 781 Selected Topics in Computational Science	●			●			●		

Course number/Course title	PLOs : Program-Level Learning Outcomes								
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9
511 782 Selected Topics in Optimization	●			●			●		
511 791 Seminar in Advanced Mathematics I		●	●	●	●		●	●	●
511 792 Seminar in Advanced Mathematics II		●	●	●	●		●	●	●
511 793 Seminar in Advanced Mathematics III		●	●	●	●		●	●	●
511 794 Seminar in Advanced Mathematics IV		●	●	●	●		●	●	●
511 891 Thesis		●	●	●	●	●	●	●	●
511 892 Thesis		●	●	●	●	●	●	●	●
511 893 Thesis		●	●	●	●	●	●	●	●

Key : The symbol ● indicates that the teaching and evaluation process must correspond to the Program Learning Outcome (PLOs) and that the student's achievement standard review process must be conducted.

The distribution of Program Learning Outcomes in each required course (in each year)

Key : R = Remembering; U = Understanding; Ap = Applying; An = Analyzing; E = Evaluating; C= Creating; S = Psychomotor Domain (Skills); At = Affective Domain (Attitude)

Note: Courses with an asterisk " * " are required courses whose credits are not counted toward graduation.

Type 1.1

Year/Course number/Course title	Credits	PLOs : Program-Level Learning Outcomes								
		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
Year 1										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 791 Seminar in Advanced Mathematics I	1*		Ap	Ap	An	E		S	S	At
511 792 Seminar in Advanced Mathematics II	1*		Ap	Ap	An	E		S	S	At
Year 2										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 793 Seminar in Advanced Mathematics III	1*		Ap	Ap	An	E		S	S	At
511 891 Thesis (equivalent to)	12		Ap	Ap	An	E	C	S	S	At
Year 3										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 891 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At

Type 1.2

Year/Course number/Course title	Credits	PLOs : Program-Level Learning Outcomes								
		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
Year 1										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 791 Seminar in Advanced Mathematics I	1*		Ap	Ap	An	E		S	S	At
511 792 Seminar in Advanced Mathematics II	1*		Ap	Ap	An	E		S	S	At
Year 2										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 793 Seminar in Advanced Mathematics III	1*		Ap	Ap	An	E		S	S	At
511 794 Seminar in Advanced Mathematics IV	1*		Ap	Ap	An	E		S	S	At
Year 3										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 892 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At
Year 4										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 892 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At
Year 5										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 892 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At

Type 2.1

Year/Course number/Course title	Credits	PLOs : Program-Level Learning Outcomes								
		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
Year 1										
511 585 Computer Tools for Mathematics Students	1*		Ap	Ap		E			S	At
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 791 Seminar in Advanced Mathematics I	1*		Ap	Ap	An	E		S	S	At
Year 2										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 792 Seminar in Advanced Mathematics II	1*		Ap	Ap	An	E		S	S	At
511 893 Thesis (equivalent to)	12		Ap	Ap	An	E	C	S	S	At
Year 3										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 893 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At

Type 2.2

Year/Course number/Course title	Credits	PLOs : Program-Level Learning Outcomes								
		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
Year 1										
511 514 Linear Algebra with Applications	3	U			An					
511 521 Mathematical Analysis	3	U	Ap		An					
511 585 Computer Tools for Mathematics Students	1*		Ap	Ap		E			S	At
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
Year 2										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 791 Seminar in Advanced Mathematics I	1*		Ap	Ap	An	E		S	S	At
Year 3										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 792 Seminar in Advanced Mathematics II	1*		Ap	Ap	An	E		S	S	At
511 793 Seminar in Advanced Mathematics III	1*		Ap	Ap	An	E		S	S	At
511 891 Thesis (equivalent to)	6		Ap	Ap	An	E	C	S	S	At
Year 4										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 891 Thesis (equivalent to)	24		Ap	Ap	An	E	C	S	S	At
Year 5										
511 592 Discussion in Mathematics	2*	U	Ap		An	E	C	S	S	
511 891 Thesis (equivalent to)	18		Ap	Ap	An	E	C	S	S	At

Expectation of Learning Outcomes at the end of each academic year

Type 1.1 and Type 2.1

Year	Expectation of Learning Outcomes at the end of each academic year	Remark
1	PLO1 Be able to correctly explain important mathematical theories. PLO4 Be able to use mathematical knowledge to think critically. PLO5 Be able to properly use information technology and mathematical research instruments. PLO7 Be able to search and acquaint oneself with mathematical advances.	
2	PLO2 Be able to teach in higher education. PLO6 Be able to design and conduct research to generate new and advanced mathematical knowledge. PLO8 Be able to work with others. PLO9 Be honest, disciplined, responsible, and able to follow social norms and research ethics.	
3	PLO3 Be able to present mathematical research at an international level.	

Type 1.2 and Type 2.2

Year	Expectation of Learning Outcomes at the end of each academic year	Remark
1	PLO1 Be able to correctly explain important mathematical theories. PLO5 Be able to properly use information technology and mathematical research instruments.	
2	PLO4 Be able to use mathematical knowledge to think critically. PLO8 Be able to work with others.	
3	PLO7 Be able to search and acquaint oneself with mathematical advances. PLO9 Be honest, disciplined, responsible, and able to follow social norms and research ethics.	
4	PLO2 Be able to teach in higher education. PLO6 Be able to design and conduct research to generate new and advanced mathematical knowledge.	
5	PLO3 Be able to present mathematical research at an international level.	

Section 5 Evaluation criteria

1. Grading regulations or criteria

Assessment and evaluation are consistent with Silpakorn University's Regulations on Graduate Study B.E. 2561 (2018) Section 4 in appendix 1 and/or subsequent revision.

2. Student evaluation

The program plans the student evaluation process as follows.

(1) The program will evaluate new students by using the information gathered from the entrance examination and the interview. The derived information will be analyzed by the instructors in charge of the program for planning the future improvement.

(2) The students will be evaluated throughout the program under several methods such as writing exams, assignments, writing reports, oral reports, group projects, etc. Each course must evaluate student's achievement in each aspect according to the CLOs. The instructors must submit the course evaluation details to the program and make public to student prior to the first day of the semester.

(3) At the end of program, students will be evaluated via the thesis defense. Students must properly and correctly present their thesis results to the thesis examination committee.

3. Student's achievement standard review process

The review process of student's achievement standard in all courses is as follows:

3.1 Review of student's learning outcome before graduation

The department will set up a review system of students' learning outcome as part of SAR. The department will set up a course review as follows:

1. Students are required to do a course evaluation.
2. A committee reviews exams in order to verify compliance with the syllabus.
3. A committee reviews the grading of the exams, reports, projects and other assignments.

3.2 Review of student's learning outcome after graduation

The emphasis is on a continuous monitoring of the achievements of a student and on the use of research results to improve on instructional process and integrated curriculum as well as to evaluate the quality of the curriculum. Components to be reviewed are:

1. Evaluation of the employment rate in each class of graduates.
2. Interview or questionnaire survey of employer's opinions and satisfaction at different intervals, for example, after one or three years of employment.
3. Evaluation by other educational institutes through interview or questionnaire survey on the level of satisfaction on the graduate's knowledge, readiness and other qualifications.

4. Evaluation by graduates with employment in terms of the readiness and knowledge gained from mathematics and other courses provided in the program including the relevancy of these courses to graduate's employment.

5. Concrete and measurable student's achievement such as:

5.1 Number of social and professional awards of recognition.

5.2 Number of research publications.

4. Graduation criteria

Graduation criteria shall be in accordance with Silpakorn University's Regulations on Graduate Study B.E. 2561 (2018), Section 8 in Appendix 1 and/or subsequent revision. The addition criterions are the following.

(1) Students may graduate after having completed a minimum of 6 semesters in programs Type 1.1 and Type 2.1, and a minimum of 8 semesters in Type 1.2 and Type 2.2.

(2) Students must submit a proof of English proficiency from a language institute at CEFR standard as specified by the university at a minimum of B2 level to the program committee. The language test shall be taken within 2 years from the start of the program and it cannot be substituted by passing courses provided by the university.

(3) The thesis in the program Type 1 must result in at least 2 publications in peer-reviewed international journals. The thesis in the program Type 2 must result in at least 1 publication in a peer-reviewed international journal. All students must give at least 1 oral presentation in an international conference.

Section 6 Teaching staff development

1. New instructor's orientation

1. Provide new instructors an orientation to the university's and program's policies.

2. New instructors are required to participate in an orientation session for new personnel organized by the university to learn about relevant rules and regulations together with suitable conducts for instructors.

3. Provide grants to new instructors to encourage them to carry out research projects in the field of their expertise.

2. Development of teaching staff's knowledge and skills

2.1 Teaching and evaluation skills

1. Evaluate instructor performance.

2. Enhance student-oriented instruction skills and modern evaluation technique.

3. Encourage instructors to enhance their knowledge in workshops and seminars to review and enhance instructional and research experiences.

2.2 Academic and other professional skills development

1. Encourage instructors to enhance their knowledge and experiences by promoting teaching and research on a continuous basis. Promote instructors to further their education, attend training sessions, and to participate in academic study and professional tours to various organizations and attending academic meetings both nationally and internationally.

2. Encourage instructors to conduct research and develop teaching skills in order to become experts in their fields.

3. Stimulate, promote and encourage instructors to produce academic works: books or textbooks and academic publications in order to achieve higher academic position.

4. Allocate a research budget and support instructors to participate in various research groups in the faculty.

5. Promote and endorse the presentation of academic work in various formats.

Section 7 Curriculum Quality Assurance

1. Quality Control

The Doctor of Philosophy Program in Mathematics (revised 2020) will be effective in the first semester of the academic year 2020. To ensure that the program has good quality and meets the 2015 Graduate-Level Curriculum Standard Criteria, every academic year the program will undergo the quality assurance in all areas according to the specified key performance indicators; student recruitment plan, examination of applicant qualifications according to the program criteria; qualification of instructors, program committee, program instructors, thesis advisors, thesis co-advisors and thesis committee; monitor the TQF3 and TQF5 reports; verification and evaluation the learning outcome of each course according to the TQF.

2. Graduates

Desirable graduates must have the following characteristics:

2.1 Graduates have a good understanding of mathematical knowledge and are able to pass it on to others.

2.2 Graduates can do quality research in pure or applied mathematics that can be published both nationally and internationally.

2.3 Graduates conduct and publish research under high ethical standards.

2.4 Graduates are responsible, honest, disciplined and able to work effectively with others.

3. Students

3.1 Admission and Orientation

The program committees and instructors together set the guidelines for the number of new students and their qualification. The guidelines are based on the faculty-to-student ratio, the needs of the job market and employers.

To prepare new students academically the program has an orientation designed to explain the history, objectives and the structure of the program, and to introduce the department and its faculties, staff and facilities. It also clarifies rules and regulations of the program which will allow students to understand the program and be well prepared for the study. Students will be supervised by program instructors and teaching instructors.

3.2 Thesis Advisors

The program will compile a list of instructors who qualify for thesis advisors along with their research interests and specialties. Students can use this list as a guidance for planning their study and thesis. The program will follow up thesis supervision by considering the academic report of the seminars and the thesis courses.

3.3 Performance Management (Students' Retention, Graduation, Satisfaction and Appeals)

Academic advisors are responsible for following up the academic progress of the students through the academic registrar system of the university. The thesis advisors are responsible for supervising dissertations in the field of mathematics.

The program has a survey of student satisfaction towards handling complaints but has not found any complaints by the students. This is because the program instructors are assigned as students' advisors so they can advise students effectively. Instructors are close to the students so the students can inquire and discuss their problems. Moreover, the program organizes activities to develop the potential of the students in various aspects that will benefit their study and work.

4. Instructors

The process for instructor administration and development is as follows.

4.1 Instructor Administration and Development

Existing and new instructors will meet all the qualifications in the 2015 Graduate-Level Curriculum Standard Criteria and the recruitment requirements of the university.

4.2 Preparation for New Instructors

New instructors must participate in the orientation so that they understand the policy, philosophy, aspiration of the university, faculty and program including the objectives of the program, rules and guidelines, and the process of developing academic potential including earning academic positions.

4.3 Instructor Promotion and Development System

In promoting and developing academic and research skills of the instructors, the program offers grants and various projects in cooperation with the university, the faculty and the department. The instructors are encouraged to attend seminars and/or academic services in various agencies both in Thailand and abroad at least once a year. There is support for the program instructors to obtain higher academic positions.

5. Program, Courses and Student Assessment

In order to continuously manage the course effectively and efficiently, the program will use the following processes.

5.1 Program Design and Management

The program is designed to comply with the 12th National Social and Economic Development Plan (2017-2021) and the National Strategy (2018-2037) aimed at improving the quality of all Thai people of all ages so that they can become a force to develop the economy and society of the country using the following means: elevating the development of Thai educational quality to international standards and increase educational and learning opportunities in various ways; promoting

lifelong learning; creating continuous learning opportunities for people of all groups and ages to have access to a variety of learning resources and knowledge. In order to produce mathematics graduates with this qualities and respond to the needs of the personnel both in the public and private sectors, the program strives to comply with the 2015 Graduate-Level Program Standard Criteria and/or the subsequent changes

5.2 Instructor Placement and Teaching Management

The program selects instructors from both within the program and from other universities. All instructors must meet the 2015 Graduate-Level Program Standard Criteria and/or the subsequent changes. In each course, the instructor is the selection is based on their expertise and related research.

5.3 Student Assessment

The program learning assessment system complies with TQF. In each course the instructor will conduct learning evaluation of students according to the evaluation strategy stated in the course's TQF3. Then the instructor reports the result to the program and it will be examined by the program committee.

5.4 Teaching and Learning Activities

The program emphasizes on teaching and learning activities that will have to develop skills pertinent to the 21st century.

5.5 Program Implementation according to Thai Qualification Framework

The program devises the program development plan, administers the implementation, evaluates the result according to the components of the academic quality assurance, find ways to improve the program in order to achieve the goal, and proposes a plan for the next year.

6. Learning Resources

6.1 Budget Management

The Department of Mathematics allocates an annual budget from both the national budget and the income budget to purchase adequate learning resources according to international standards, to support the classroom teaching and to create an environment suitable for students' self-learning.

6.2 Existing Learning Resources

The Institute, through the central library, is equipped with books, textbooks and academic database. The faculty and the department also have books, specialized textbooks and equipment used to support teaching and learning as follows.

(1) School buildings including classrooms, lecture rooms and seminar rooms

(2) Meeting rooms

(3) Computers with instructional software and computer network systems such as the internet and audio-visual equipment

(4) Computer labs that can allow students to search for information via the internet as well as the appropriate amount of books and/or texts

(5) The office of the faculty's and the office of the department with support personnel to work with instructors and students

6.3 Additional Teaching Resources Procurement

(1) A committee plans the procurement and monitors the usage of learning resources.

(2) Instructors and students can propose related medias and texts to the committee.

(3) The department allocates annual budget for purchasing various texts and media according to the needs of the program.

(4) Monitor the needs and use of teaching and learning resources.

6.4 Assessing the Adequacy of Resources

The committee plans to procure and monitor the use of teaching resources of the faculty. The audio-visual staff, which facilitates the use of the instructor's media, together with the committee assess the sufficiency and demand of the instructors.

7. Key Performance Indicators

7.1 Key Performance Indicators for Curriculum Outcome for Type 1.1 and Type 2.1

Types of indicator : process

Standard criteria : Level

Key Performance Indicators	Year 2020	Year 2021	Year 2022	Year 2023
1. Not less than 80 % of the instructors in charge of the program will participate in a meeting with the program designated instructors for planning, monitoring, and reviewing of curriculum performance.	X	X	X	X
2. Curriculum details provided in the TQF 2 are consistent with the national qualification standard or the academic discipline qualification standard (if any).	X	X	X	X
3. Complete details of all offered courses in the TQF 3 prior to instruction commencement, except those courses offered by other institutes.	X	X	X	X
4. Prepare performance outcome report of all courses in accordance with TQF 5 within 45 days after the semester has ended, except those courses offered by other institutes.	X	X	X	X
5. Prepare performance outcome report of the curriculum in accordance with TQF 7 within 60 days after the academic year has ended.	X	X	X	X

Key Performance Indicators	Year 2020	Year 2021	Year 2022	Year 2023
6. Review student's achievement in at least 25 % of the offered courses in each semester in accordance with the learning outcome specified in TQF 3, except those courses offered by other institutes.	X	X	X	X
7. Develop/improve instructional process, teaching strategies or learning performance outcome based on the performance evaluation results reported last year in TQF 7.		X	X	X
8. All new instructors (if any) will receive orientation or advice on instructional management.	X	X	X	X
9. All program designated instructors will receive academic development training at least once a year.	X	X	X	X
10. Not less than 50% of instructional support personnel (if any) will receive academic and/or professional development training each year.	X	X	X	X
11. The average level of final year students/ new graduates' satisfaction for the quality of the curriculum is not less than 3.5 from the total score of 5.0.			X	X
12. The level of employer's satisfaction of new graduates is not less than 3.5 from the total score of 5.0.				X
Total number of key performance indicators in each year	**9**	**10**	**11**	**12**

7.2 Key Performance Indicators for Curriculum Outcome for Type 1.2 and Type 2.2

Types of indicator: process

Standard criteria: Level

Key Performance Indicators	Year 2020	Year 2021	Year 2022	Year 2023	Year 2024	Year 2025
1. Not less than 80 % of the instructors in charge of the program will participate in a meeting with the program designated instructors for planning, monitoring, and reviewing of curriculum performance.	X	X	X	X	X	X
2. Curriculum details provided in the TQF 2 are consistent with the national qualification standard or the academic discipline qualification standard (if any).	X	X	X	X	X	X

Key Performance Indicators	Year 2020	Year 2021	Year 2022	Year 2023	Year 2024	Year 2025
3. Complete details of all offered courses in the TQF 3 prior to instruction commencement, except those courses offered by other institutes.	X	X	X	X	X	X
4. Prepare performance outcome report of all courses in accordance with TQF 5 within 45 days after the semester has ended, except those courses offered by other institutes.	X	X	X	X	X	X
5. Prepare performance outcome report of the curriculum in accordance with TQF 7 within 60 days after the academic year has ended.	X	X	X	X	X	X
6. Review student's achievement in at least 25 % of the offered courses in each semester in accordance with the learning outcome specified in TQF 3, except those courses offered by other institutes.	X	X	X	X	X	X
7. Develop/improve instructional process, teaching strategies or learning performance outcome based on the performance evaluation results reported last year in TQF 7		X	X	X	X	X
8. All new instructors (if any) will receive orientation or advice on instructional management.	X	X	X	X	X	X
9. All program designated instructors will receive academic development training at least once a year.	X	X	X	X	X	X
10. Not less than 50% of instructional support personnel (if any) will receive academic and/or professional development training each year.	X	X	X	X	X	X
11. The average level of final year students/ new graduates' satisfaction for the quality of the curriculum is not less than 3.5 from the total score of 5.0.					X	X
12. The level of employer's satisfaction of new graduates is not less than 3.5 from the total score of 5.0.						X
Total number of key performance indicators in each year	9	10	10	10	11	12

Evaluation criteria

A standardized curriculum according to a competency (qualification) standard framework must pass the following evaluation criteria.

Achieve the objectives of not less than 80% of the Overall Performance Indicators, based on the number of Overall Performance Indicators designated for each year.

Type 1.1 and Type 2.1

Academic Year	Standardized curriculum according to the competency (qualification) standard framework
2020	Achieve the objectives of 9 Overall Indicators
2021	Achieve the objectives of 10 Overall Indicators
2022	Achieve the objectives of 11 Overall Indicators
2023	Achieve the objectives of 12 Overall Indicators

Type 1.2 and Type 2.2

Academic Year	Standardized curriculum according to the competency (qualification) standard framework
2020	Achieve the objectives of 9 Overall Indicators
2021	Achieve the objectives of 10 Overall Indicators
2022	Achieve the objectives of 10 Overall Indicators
2023	Achieve the objectives of 10 Overall Indicators
2024	Achieve the objectives of 11 Overall Indicators
2025	Achieve the objectives of 12 Overall Indicators

Section 8 Curriculum evaluation and revision

1. Teaching efficiency evaluation

1.1 Teaching strategy evaluation

The program committee collects the information from student evaluations concerning the instructor's teaching strategy. Organize a meeting of the program's teaching staff to evaluate the data and provide suggestions for improvement of teaching strategy.

1.2 Evaluation of instructor's skills in using teaching strategies.

(1) Students evaluate each instructor at the end of each course via the online form provided by the university.

(2) The evaluation results will be sent to the instructors and the chair of the program to improve the teaching.

(3) The faculty collect the results in order to create development plans and/or to adjust the teaching strategies to be more suitable for the courses.

2. Overall curriculum evaluation

2.1 By students and graduates

Collect survey data for the curriculum evaluation from current students in all years and graduates every year.

2.2 By eminent persons and/or external assessors

The curriculum evaluation by eminent persons and/or external assessors is held annually.

2.3 By employers

(1) Collect data from employers and/or supervisors via surveys and interviews.

(2) Collect data from other related persons (if any)

3. Curriculum operation evaluation

The internal evaluation of the quality of academic programs is held annually by using the AUN-QA criteria or other criteria specified by the university. The qualifications of internal evaluation committee are specified by the university.

Every program must be revised and updated on a regular basis. At least once every 5 years an evaluation of the program must be conducted.

4. Review of evaluation outcome and improvement planning

4.1 Course improvement

At the end of each semester, the program committee collects the information from TQF 5 of each course to plan for course improvement if needed. The revision of any courses can be done immediately if it does not affect the structure of the curriculum.

4.2 Curriculum improvement

The curriculum improvement and revision must be held every 5 academic years. The revision processes are the following.

(1) The department appoints the revision committee.

(2) Collect survey data for the curriculum evaluation from current students, graduates, eminent persons and employers.

(3) Create development plans and revise the curriculum.

(4) Appoint a committee consisting of at least 3 eminent persons from outside the university to evaluate the revised curriculum.

(5) The revised curriculum will be summitted to the faculty, the graduate school and the university respectively.

Annex C

ANNOUNCEMENT
FACULTY OF ECONOMICS CHIANG MAI UNIVERSTIY
ADMISSION TO THE MASTER OF ECONOMICS (INTERNATIONAL PROGRAM)

Introduction

The Faculty of Economics at Chiang Mai University (CMU) is the only public educational institution in Northern Thailand that offers training in economics at both undergraduate and graduate levels. The graduate economics degree program, which began in 1983, aims to promote education, impart knowledge of economics, and produce scholars and professional economists to meet the demands of both governmental and private agencies in Thailand (particularly the northern region), as well as throughout Asia.

Requirements for admission

Candidates must hold a Bachelor's Degree in Economics or related field.

Titles of the degrees

Name of the Curriculum : Master of Economics Program (International Program)
Name of the Degree : Master of Economics
Abbreviation of the Degree : M. Econ.

Class hours

The classes for the international master degree program will be conducted during regular hours between 08:00 and 16:30 Monday through Friday.

Time period of regular study program

The minimum time requirement is one and a half years and does not exceed three years.

Tuition fee

1. Tuition fees for the duration of the three semesters are charged on a lump sum basis of 105,000 Baht for the whole degree program or 35,000 Baht per semester. This lump sum includes the student enrollment fee, university registration fee, university fee, library service fee, healthcare fee, university sporting activities fee, university activity fee, insurance fee, student card fee, laboratory fee, technology and computer service fees, registration document fee, and economic student fee.

2. If the students cannot complete their study within three semesters, they are required to pay a student status fee of 10,000 Baht per semester.

Academic Year	Semester	Tuition fee	Student Status fee	Foreign Student fee	Total
1st	1st	35,000	-	-	35,000
	2nd	35,000	-	-	35,000
2nd	1st	35,000	-	-	35,000
Student cannot complete study within three semesters of regular program (or 1.5 years)					
	2nd	-	10,000	-	10,000
3rd	1st	-	10,000	-	10,000
	2nd	-	10,000	-	10,000

* Other fees may also be added if there is an announcement by the Chiang Mai University Administration.

Course requirement

For a total normal duration of 18 months (or three semesters), students will take intensive courses taught entirely in English.

Thesis

Students will take 10 courses (carrying 30 credit hours) and write a thesis (carrying an additional 12 credit hours), totaling 42 credit hours. Each student will have to pass a foreign language test, as required by the Graduate School.

Structure

- **Degree Requirements**

Coursework	: a minimum of	30 credits
Thesis	:	12 credits
Total	: a minimum of	42 credits

- **Curriculum Structure**

A. Coursework — **a minimum of** — **30 credits**

1. Graduate courses — a minimum of — 30 credits

1.1 Field of concentration courses — a minimum of — 30 credits

1.1.1 Required courses — 18 credits

751701	ECON701	Microeconomic Theory
751702	ECON702	Macroeconomic Theory
751703	ECON703	Econometrics
751705	ECON705	Quantitative Analysis in Economics
751706	ECON706	Globalization and World Economy
751708	ECON708	Research Methodology in Economics

1.1.2 Elective courses — a minimum of — 12 credits

Must be choose from the following courses:

Group I	Quantitative Economics
Group II	Theory of Economics
Group III	Monetary and Fiscal Economics
Group IV	Resources Economics
Group V	International Economics
Group VI	Development Economics

B. Thesis **12 credits**

751799 ECON799 Master's Thesis

C. Non - credit courses

1. Graduate School requirement: English proficiency
2. Program requirement: In order to graduate,

1) A student must organize and present a seminar at least once every semester for at least three semesters and must attend one seminar per semester until graduation.

2) At least part of the thesis (primarily authored by the student) must be published in a peer-reviewed journal or other academic media, or it must be presented during the international conference proceedings presided over by an editorial board. Moreover, it must be copyrighted by the author and must be accessible in both printed and electronic form.

Study program

Recommended Study Program Leading to The Master of Economics (International program)

FIRST YEAR

1st Semester

Courses Code			Credits
751701	ECON	701	3
751702	ECON	702	3
751703	ECON	703	3
751705	ECON	705	3
751.....	ECON	.....	3
		Total	15
* Submit Thesis Title			

2nd Semester

Courses Code			Credits
751706	ECON	706	3
751708	ECON	708	3
751.....	ECON	.....	3
751.....	ECON	.....	3
751.....	ECON	.....	3
		Total	15
* Thesis Proposal Defense			

SECOND YEAR

1st Semester

Courses Code			Credits
751799	ECON	799	12
		Total	12
* Thesis Oral Examination			

* All courses in the Study Program must be approved by the Graduate Studies Committee in every semester.

Admission schedule
Faculty of Economics Chiang Mai University A Master of Economics
(International Program)

The Faculty of Economics, Chiang Mai University (CMU) announces the admission schedule for the 1st semester academic Year 2020 enrollment for the following program:

No	Contents	Venue	Date
1	Apply online	http://www.grad.cmu.ac.th	1 Nov 2019 – 31 Mar 2020
2	Submit required documents	E-mail to: meconcmu@gmail.com	1 Nov 2019 – 31 Mar 2020
3	Admission result announcement	http://www.grad.cmu.ac.th	TBA
4	New student registration	http://www.reg.cmu.ac.th	6 Jun 2020
5	Enrollment & tuition fee payment	Faculty of Economics	TBA
6	Beginning of Classes	Faculty of Economics	22 Jun 2020

Required Documents

Applicants must submit all required supporting documents (PDF format) as part of the application process to e-mail: meconcmu@gmail.com. Inability to do so will result in an incomplete application. If documents are issued in local language, official translation of the documents in English are required and must be sealed by the university.

Please be informed that all copies of documents must be certified as original copies of all documents. **Your application will not be taken into consideration if you do not fulfill the admission requirements.**

1. A complete Application Form with recent I.D. type photographs
2. A Copy of Official Bachelor's Degree Transcript
3. A Copy of Bachelor's Degree Certificate
4. A Copy of National Identity Card
5. A Copy of Passport
6. A Copy of English Proficiency Test with the CMU-eTEGS(65), CU-TEP(65%), TU-GET(65%), KU-EPT(65%), IELTS(5.5) or TOEFL (PBT523,ITP523,CBT193,IBT69) (Applicants who do not meet the English Proficiency Test requirement will be considered on the basis of the application and might receive a conditional offer)
7. Two Letters of Recommendation (Must be signed and sealed by the referees)
8. Curriculum Vitae
9. Statement of Intentions:
   9.1 Purpose of Study
   9.2 Fields Research of Interest
   9.3 Future Career Plan

Conditions for Submission of Academic Records

• Official transcripts or academic records for all university-level studies you have completed are required.

• In general, transcripts or academic records must be issued by the university and should include the university's stamp or embossed seal and the signature of the authorizing official.

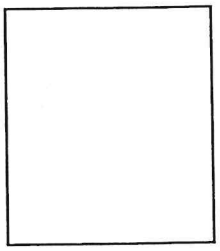
• If the transcripts or academic records are not in Thai or English, the documents must be issued in the original language and accompanied by English translations (usually prepared or certified by your university or Ministry of Education or Ministry of Foreign Affairs or other government agencies).

Faculty of Economics, CMU
239 Huay Kaew Road, Suthep,
Mueang, Chiang Mai 50200 Thailand
Tel: +66 53 942251 Fax: +66 53 942214
E-mail: chaokhieowong@gmail.com

The Graduate School, CMU
239 Huay Kaew Road, Suthep,
Mueang, Chiang Mai 50200 Thailand
Tel: +66 53 942405-6 Fax: +66 53 942422

Application Form

A Master of Economics (International Program)
Faculty of Economics Chiang Mai University
1st Semester Academic Year 2020



Personal Information

Title:
First Name:
Family Name:
Name in Passport:
Gender:
Date of Birth:
Race:
Nationality:
Religion:
Blood Type:
Disability:
Citizen ID/Passport No:
Date of Issue:
Date of Expired:

Mailing Address

Address No:
Street:
District:
Sub District:
Postcode:

Permanent Address

Address No:
Street:
District:
Sub District:
Postcode:
E-mail:
Telephone:

English Test Result (if any). The test must have been taken within last 2 years

English Test Result:
Score:
Date tested:

Education Background

⌋ Graduate
- Received Degree (Abbreviation):
- Program:

⌋ Study in the last semester

Degree Granted

⌋ High Graduate Diploma ⌋ Bachelor ⌋ Master's

From:

GPA:

Academic Year:

Work Experience

Occupation (Present):

Work Place:

Position:

Start Date: End date:

Job Description:

Period of Time Working:

How did you know about this matriculation?

⌋ Internet ⌋ Billboard ⌋ Others.....

⌋ Friends/Relatives ⌋ Faculty

⌋ Brochure ⌋ Poster

Name:

Date:

LETTER OF RECOMMENDATION

A Master of Economics (International Program)
Faculty of Economics Chiang Mai University
1st Semester Academic Year 2020

To be completed by the applicant before submitting this form to the referee

Name of applicant_____

Major field of study applied for Economics (International Program)

Faculty Economics Semester 1st Academic Year 2020

Program of Study:

☐ Doctor's Degree (thesis only)
☑ Master's Degree (course works and thesis)
☐ Doctor's Degree (course works and thesis)
☐ Master's Degree (course works only)
☐ Master's Degree (thesis only)
☐ Graduate Diploma
☐ Others (please specify)_____

Area of Concentration of Option (if required)_____

To be completed by the referee

TO THE PERSON EVALUATING THE APPLICANT:

The person whose name appears above is applying for admission to the program indicated above at Chiang Mai University. In considering the applicant, particular emphasis is placed on comments from people the applicant has chosen as referees. Your prompt submission of this form will be most helpful as the applicant cannot be considered without your comments.

The Admission Office of the Graduate School realizes that considerable time and effort is involved in preparing this evaluation. Your assistance in giving this appraisal is greatly appreciated.

Name of person completing this form_____

Position/Title_____

Organization_____

_____

Address_____

_____

E-mail_____ TEL_____

How long have you known the applicant?_____Years_____Months

You have known the applicant as a/an:

☐ Undergraduate student
☐ graduate student
☐ Research assistant
☐ teaching assistant
☐ Employee
☐ in other capacities (please specify)_____

You have served as the applicant's

- ☐ division/dept,/school head
- ☐ teacher inseveral classes
- ☐ teacher in only one class
- ☐ research supervisor
- ☐ employer
- ☐ immediate superior in theorganization
- ☐ in other capacities (please specify)_____

Do you feel graduate study is appropriate for the applicant at this time? Why?

In comparison with other graduate school candidates that you have known, how would you rate the applicant with respect to the following qualities:

	Poor Bottom 1/3	Average Middle 1/3	Good Top 1/3	Outstanding Top 5%	Inadequate Opportunity to Observe
Intellectual Ability					
Maturity					
English Comprehension					
Undergraduate Performance					
Academic Promise					

What is your candid opinion of the applicant's chances of completing the program applied for, considering; intellectual capacity, promise of productive scholarship, and potential for research; relative standing among contemporary graduates; ability to follow a course in which the medium of instruction is English; and practical experience, if any, in the chosen area of study?

If the applicant has applied for financial aid, which is awarded competitively, please state any outstanding qualities of the applicant including scholastic performance, leadership, personality, and potential for contributing to the development of his/her country, that would justify selection against other well qualified applicants.

You, therefore
- ☐ strongly recommend
- ☐ recommend
- ☐ recommend with some reservation
- ☐ do not recommend

that this applicant be admitted to the applied program at CMU.

Signature_____
Name (_____)
Position _____
Date _____

Recommendation must be signed and sealed by the referee

LETTER OF RECOMMENDATION

A Master of Economics (International Program)
Faculty of Economics Chiang Mai University
1st Semester Academic Year 2020

To be completed by the applicant before submitting this form to the referee

Name of applicant_____

Major field of study applied for_____Economics (International Program)_____

Faculty_____Economics_____Semester_____1st_____Academic Year_2019_____

Program of Study:

- ☐ Doctor's Degree (thesis only)
- ☐ Doctor's Degree (course works and thesis)
- ☐ Master's Degree (thesis only)
- ☑ Master's Degree (course works and thesis)
- ☐ Master's Degree (course works only)
- ☐ Graduate Diploma
- ☐ Others (please specify)_____

Area of Concentration of Option (if required)_____

To be completed by the referee

TO THE PERSON EVALUATING THE APPLICANT:

The person whose name appears above is applying for admission to the program indicated above at Chiang Mai University. In considering the applicant, particular emphasis is placed on comments from people the applicant has chosen as referees. Your prompt submission of this form will be most helpful as the applicant cannot be considered without your comments.

The Admission Office of the Graduate School realizes that considerable time and effort is involved in preparing this evaluation. Your assistance in giving this appraisal is greatly appreciated.

Name of person completing this form_____

Position/Title_____

Organization_____

_____

Address_____

_____

E-mail_____TEL_____

How long have you known the applicant?_____Years_____Months

You have known the applicant as a/an:

- ☐ Undergraduate student
- ☐ graduate student
- ☐ Research assistant
- ☐ teaching assistant
- ☐ Employee
- ☐ in other capacities (please specify)_____

You have served as the applicant's

- ☐ division/dept,/school head
- ☐ teacher inseveral classes
- ☐ teacher in only one class
- ☐ research supervisor
- ☐ employer
- ☐ immediate superior in the organization
- ☐ in other capacities (please specify)_____

Do you feel graduate study is appropriate for the applicant at this time? Why?

In comparison with other graduate school candidates that you have known, how would you rate the applicant with respect to the following qualities:

	Poor Bottom 1/3	Average Middle 1/3	Good Top 1/3	Outstanding Top 5%	Inadequate Opportunity to Observe
Intellectual Ability					
Maturity					
English Comprehension					
Undergraduate Performance					
Academic Promise					

What is your candid opinion of the applicant's chances of completing the program applied for, considering; intellectual capacity, promise of productive scholarship, and potential for research; relative standing among contemporary graduates; ability to follow a course in which the medium of instruction is English; and practical experience, if any, in the chosen area of study?

If the applicant has applied for financial aid, which is awarded competitively, please state any outstanding qualities of the applicant including scholastic performance, leadership, personality, and potential for contributing to the development of his/her country, that would justify selection against other well qualified applicants.

You, therefore
- ☐ strongly recommend
- ☐ recommend
- ☐ recommend with some reservation
- ☐ do not recommend

that this applicant be admitted to the applied program at CMU.

Signature_____

Name (_____)

Position _____

Date _____

Recommendation must be signed and sealed by the referee

Statement of Intentions

A Master of Economics (International Program)
Faculty of Economics Chiang Mai University
1st Semester Academic Year 2020

1) Purpose of Study

2) Fields Research of Interest

3) Future Career Plan

Annex D

Master of Economics in Applied Economics (International Program)
Faculty of Economics, Khon Kaen University

Admission requirement:

(๑) Statement of purpose
(๒) Transcript
(๓) Two letters of recommendation
(๔) English Proficiency Test Result:

The result is to be active during the admission process. (Within 2 years after the test date)

English Proficiency Test	**Scores**
TOEFL (iBT)	80
TOEFL (CBT)	213
IELTS (Academic Module)	6.0