Program Structure and Specification
Doctor of Philosophy Program in Materials Science and Innovation
(International Program)
Curriculum Last Revised in 2019
for
Students Entering in Academic Year 2019

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1. Program Title Doctor of Philosophy Program in Materials Science and Innovation (International Program)

2. Name of Degree
Full name: Doctor of Philosophy (Materials Science and Innovation)
Abbreviation: Ph. D. (Materials Science and Innovation)

3. Responsible Units
3.1. Department of Chemistry, School of Science, Walailak University – Teaching Institution
3.2. Department of Physics, School of Science, Walailak University – Teaching Institution
3.3. Department of Petrochemical and Polymers, School of Engineering and Technology, Walailak University – Teaching Institution
3.4. College of Graduate Studies, Walailak University – Awarding Institution

4. Philosophy and Expected Learning Outcomes of the Program
4.1. Philosophy of the Program:
To produce graduate students (Ph.D.) knowledgeable in Materials Science based on a firm understanding in chemistry and physics with high quality research output at the international level, having good research ethics and morality, and able to contribute new knowledge in Materials Science and a high level of innovation to society.

4.2. Expected Learning Outcomes of the Program:
Expected Learning Outcomes of our doctoral program are formulated according to the skills needed internationally for jobs in Materials Science and Innovation, feedback received from stakeholders and the past record of our three graduates' programs (Chemistry, Physics and Materials Science and Engineering) employment and the direction of the National Strategy (2018-2037): Upon completion of the doctoral program, graduates must be able to:

Be a creative and critical thinker:
1. Demonstrate broad and coherent knowledge of pertinent areas of materials science related to their field of interest.
2. Exhibit an in-depth understanding of the underlying principles and applications of the various instrumentation, techniques and/or software critical to their research projects.

3. Properly collect, analyse, assess, and evaluate the data gathered in their experiments to make logical, reasonable, and valid scientific arguments.

Be an effective communicator:

4. Effectively communicate the fundamental aspects of their field of interest as well as their research ideas and experimental results, both in oral and written form.

Be a reflective life-long leaner:

5. Work efficiently in a highly dynamic, multi-cultural and interdisciplinary environment.
6. Acquire sufficient skills and competencies needed to embark on a professional career.

Be a service-driven citizen:

7. Always conduct themselves ethically and responsibly in the pursuit of their scientific and professional objectives.

5. Admission Requirements

5.1. Applicants must be studying in their final year at the bachelor level, or hold a B.Sc. degree (any area) or a bachelor's degree in Chemistry, Physics, Materials Science, or related area with a GPA of at least 3.25 or

5.2. Applicants must be studying in their final year at the M.Sc. level, or hold a M.Sc. degree (in Chemistry, Physics, Materials Science, or related area) with GPA of at least 3.50.

5.3. Applicants must have a TOEFL score of at least 500 (173 for computer-based or 61 for internet-based score) or an IELTS of at least 5.5. Applications must be submitted online via the College of Graduate Studies website (https://grad.wu.ac.th/apply-now/).

5.4. The entrance examinations are arranged by the Administrative Program Committee consisting of 1) English Proficiency Test (submit the English score), and 2) Subject-Specific Test, the latter involves an interview with the interview committee in English covering general knowledge in a topic of research interest, 3) Concept proposal, after interview the applicant will submit a concept proposal to the interview committee within four weeks.

5.5. Applicants may receive an exception to any of the requirements above, if permission is granted by the Administrative Program Committee in concurrence with the College of Graduate Studies.

6. Selection Method

Applicants are selected based on academic/research credentials, concept proposal and interview according to the rules and regulations of the program and the College of Graduate Studies, Walailak University. International applicants may be subject to a phone/online interview and must provide proof of financial support during the study period to be considered for admission. Final judgment will be made under the consideration of the Administrative Program Committee in concurrence with the Dean College of Graduate Studies, Walailak University.

7. Academic System

7.1. Semester system
Trimester system

7.2. Credit Assignment
The number of credits assigned to each subject is determined as follows:

7.2.1. Lecture or discussion consuming 12 hours per semester is equal to 1 credit hour.
7.2.2. Laboratory or practice consuming 24 hours per semester is equal to 1 credit hour.
7.2.3. Thesis consuming 36 hours per semester is equal to 1 credit hour.

8. Language

English is used in teaching and learning as well as in the assessment processes.

9. Registration

9.1. Students must register as full-time students.

9.2. Students must register for no less than 1 credit and no more than 18 credits per regular trimester, or according to program study plan.

10. Evaluation and Graduation Requirements

10.1. Evaluation

Student evaluation is in accordance with the oral, written and research assessments with the performance of the students marked against detailed rubrics or marking schemes.

10.2. Graduation Requirements

10.2.1. Students holding a bachelor's degree must register for compulsory courses for which credits will not be counted, 6 credits for developing skills and 4 credits of seminar work and 90 credits of thesis. The total credits acquired must be no less than 90 credits.

10.2.2. Students holding a master's degree must register for compulsory courses for which credits will not be counted, 6 credits for developing skills and 4 credits of seminar work and 60 credits of thesis. Total credits acquired must be no less than 60 credits.

All students must

10.2.3. Pass the English Proficiency Examination offered by the College of Graduate Studies, Walailak University with a TOEFL score of at least 500 (173 for computer based or 61 for internet-based score) or an IELTS of at least 5.5.

10.2.4. Pass a qualifying examination.

10.2.5. Present a thesis and pass an oral thesis examination according to the regulations of the College of Graduate Studies, Walailak University.

10.2.6. Publish at least one or two publications or a manuscript that has been accepted for publication in an international peer-reviewed journal according to regulations of College of Graduate Studies, Walailak University for type 1.1 and 1.2 respectively.

11. Library

The Center for Library Resources and Educational Media (CLM) possesses more than 10,000 books. Many journals can be accessed online. In addition, textbooks and journals (in both electronic and printed formats) are made available to the students.

12. Program Structure

12.1. The number of credits required for the program

12.1.1. Type 1.1, number of credits required for the program is no less than 60 credits (for students from M.Sc.)

12.1.2. Type 1.2, number of credits required for the program is no less than 90 credits (for students from B.Sc.)

12.2. Curriculum Structure

The program is set according to the Ministry of Education Announcement titled "Standard Criteria for Graduate Studies 2015", with specified Type 1.1 and 1.2 curricula.

12.2.1. Type 1.1 for students with a master's degree

1)	Compulsory courses	9 credits*
	a. Developing skills	6 credits
	b. Seminar	3 credits

2) Thesis 60 credits
Total **60 credits**
* All compulsory courses will not count as credits but must be graded as S.

12.2.2. Type 1.2 for students with a bachelor's degree

1) Compulsory courses 10 credits*
   a. Developing skills 6 credits
   b. Seminar 4 credits
2) Thesis 90 credits
Total **90 credits**
* All compulsory courses will not count as credits but must be graded as S.

12.3. Course Requirements

12.3.1. Compulsory courses

Developing skills

MSI62-600	Scientific Writing I	2(1-3-3)
MSI62-601	Scientific Writing II	2(1-3-3)
MSI62-602	Innovation of Materials Technology	2(1-3-3)

Seminar

MSI62-681	Seminar I	1(0-4-2)
MSI62-682	Seminar II	1(0-4-2)
MSI62-781	Seminar III	1(0-4-2)
MSI62-782	Seminar IV	1(0-4-2)

Note: All compulsory courses will not count as credits but must be graded as S.

12.3.2. Thesis

MSI62-930	Thesis	60 credits
MSI62-931	Thesis	90 credits

12.3.3. Research Projects of the Program

Staff at the Department of Chemistry, Department of Physics and Department of Petrochemical and Polymer has received many research grants from local agencies (e.g. National Science and Technology Development Agency (NSTDA), Thailand Research Fund (TRF), TRF-Golden Jubilee, National Research Council of Thailand (NRCT). Major research interests in the Departments are:

- Functional materials for medical, agricultural, and environmental applications.
- Magnetic materials for high density storage, quantum computer and thermal sensors.
- Porous materials for alternative energy storage.
- Wood technology and composites.
- Plasma and microwave technology for medical, agricultural, and environmental applications.

12.4. Course Code Explanation

The course code in PhD program is composed of three letters followed by two numbers and a further set of three numbers, MSI62-XXX

First set: Three letters and two number

MSI meaning Materials Science and Innovation

62 meaning The revision year (Buddhist calendar)

Second set: Three numbers

The first numbers represent postgraduate program level

6 meaning 1st year

7 meaning 2nd year

8 meaning 3rd year

9 meaning Thesis

The second numbers represent course group

0 meaning Developing skills

8 meaning Seminar

The third numbers represent an order in the course group

12.5. Study Plan

Type 1.1 (Total credits 60)

Year	Term 1		Term 2		Term 3	
1	MSI62-930 Thesis MSI62-681 Seminar I* MSI62-602 Innovation of Materials Technology*	6 credits 1 credit 2 credits	MSI62-930 Thesis CHM60-682 Seminar II* MSI62-600 Scientific writing I*	10 credits 1 credit 2 credits	MSI62-930 Thesis	8 credits
	Total	**6 credits**	**Total**	**10 credits**	**Total**	**8 credits**
2	MSI62-930 Thesis MSI62-781 Seminar III*	8 credits 1 credit	MSI62-930 Thesis	8 credits	MSI62-930 Thesis MSI62-601 Scientific writing II*	8 credits 2 credits
	Total	**8 credits**	**Total**	**8 credits**	**Total**	**8 credits**
3	MSI62-930 Thesis	4 credits	MSI62-930 Thesis	4 credits	MSI62-930 Thesis	4 credits
	Total	**4 credits**	**Total**	**4 credits**	**Total**	**4 credits**

* Credits will not count but must be graded as S.

Type 1.2 (total credits 90)

Year	Term 1		Term 2		Term 3	
1	MSI62-931 Thesis MSI62-681 Seminar I* MSI62-602 Innovation of Materials Technology*	6 credits 1 credit 2 credits	MSI62-931 Thesis CHM60-682 Seminar II* MSI62-600 Scientific writing I*	8credits 1 credit 2 credits	MSI62-931 Thesis	10 credits
	Total	**6 credits**	**Total**	**8 credits**	**Total**	**10 credits**
2	MSI62-931 Thesis MSI62-781 Seminar III*	10 credits 1 credit	MSI62-931 Thesis MSI62-781 Seminar IV*	10 credits 1 credit	MSI62-931 Thesis MSI62-601 Scientific writing II*	10 credits 2 credits
	Total	**10 credits**	**Total**	**10 credits**	**Total**	**10 credits**

Year	Term 1		Term 2		Term 3	
3	MSI62-931 Thesis	8 credits	MSI62-931 Thesis	8 credits	MSI62-931 Thesis	8 credits
	Total	**8 credits**	**Total**	**8 credits**	**Total**	**8 credits**
4	MSI62-931 Thesis	4 credits	MSI62-931 Thesis	4 credits	MSI62-931 Thesis	4 credits
	Total	**4 credits**	**Total**	**4 credits**	**Total**	**4 credits**

* Credits will not count but must be graded as S.

13. Qualifying Examination

13.1. Before taking the qualifying exam, the student must pass an English Proficiency Examination with a TOEFL score of at least 500 (173 for the computer-based exam or 61 for the internet-based exam) or an IELTS of 5.5 or higher.

13.2. The Qualifying examination is a written and oral examination, the content of which is covered by the essential basic knowledge and practical skills which relate to the thesis project. Exam questions are divided into three tasks. Each task is graded independently by 3 staff members. Approximately 50% of the exam questions/assignments will test general knowledge in chemistry, physics or materials science. The other 50% of the questions/assignment are designed test the students' ability to interpret experimental results and propose experiments to test hypothetical models. A score of 70% or more is required to pass each exam question and the students must pass all 3 tasks in order to pass the qualifying examination.

13.3. If the student fails to pass the qualifying examination at the first attempt, a re-examination will be scheduled. The student must pass the examination with approval from the Qualifying Examination Committee to become a "Ph.D. candidate".

14. Thesis Research Proposal Examination

At the start of his/her study, the student must submit a document to the College of Graduate Studies for appointment of a Thesis Advisory Committee to provide guidance to the student regarding his/her preliminary research. After passing the qualifying examination, the student must submit a document to College of Graduate Studies for appointment of a Thesis Proposal Committee consisting of at least 3 faculty members, one of which is the student's major advisor while other two can be any academic staff within or outside Walailak University. After approval of the thesis proposal, this same committee will monitor and provide guidance to the student regarding his/her doctoral research.

15. Thesis Defense

Upon completion of the doctoral research and the thesis, and with approval from the Thesis Advisory Committee, the student must submit a document to the College of Graduate Studies for appointment of a Thesis Defense Committee consisting of at least 5 members: a committee chair, who is an external examiner, a second external examiner, and the Thesis Advisory Committee (if the Thesis Advisory Committee are less than 3, the 5th examiner can be an internal examiner). After passing the oral thesis defense, the student can submit the final written thesis to the College of Graduate Studies.

16. Collaboration with Other Departments

Many of our faculty members are members of Centers of Excellence such as the Center for Excellence in Functional Materials and Nanotechnology (FuNTech), the Center for Excellence in Plasma Science and Electromagnetic Wave (PEWave) and the Center for Excellence in Wood Science and Engineering. We also have collaborations with scientists at other research institutes and universities in Thailand and overseas.

17. Students Job Opportunities

A large number of our student alumni from the three programs work as staff in universities, or researchers in research institutes.