

Master of Science Program in Science and Technology Education (International Program)

Revised Volume A.D. 2012

Institute for Innovative Learning, Mahidol University

1. Program Title : Master of Science Program in Science and Technology Education
(International Program)

2. Name of Degree

Full Name : Master of Science (Science and Technology Education)

Abbreviation : M.Sc. (Science and Technology Education)

3. Philosophy and Justification

To produce Master of Science graduates in science and technology education who have knowledge, moral, ethics, and a code of ethics in academic research and profession. The graduates should be able to research and apply educational innovations, to manage learning in appropriate ways and corresponds to social context, and to effectively and efficiently transfer knowledge in science and technology.

4. Objectives

Upon completion of this curriculum, the graduates will be able to

- (1) behave morally and ethically, have a code of ethics in academic research and profession, and have social responsibility;
- (2) apply science and technology education knowledge, principles, and theories to improve innovations in science and technology learning which are suitable for social context;
- (3) think, perform, create, inquire knowledge by themselves through searching information from knowledge resources and resource persons, and devote to the improvement of self competency;
- (4) effectively communicate and transfer academic knowledge;
- (5) produce and publish academic works affecting the basic education and manage learning using appropriate media or learning processes;
- (6) work in team efficient, both as a leader and a follower.

5. Qualifications of Prospective Students

- (1) Hold a bachelor's degree in any field of basic science, education, art (science, mathematics, and technology major), or health science.
- (2) Have a cumulative GPA of at least 2.50.
- (3) Have good English skills in listening, speaking, reading, and writing.
- (4) Exceptions to the above items may be considered for enrollment by the program director and the dean of the faculty of graduate studies.

6. Curriculum Structure

Remedial Course	No credit
Required Courses	12 credits
Elective Courses (at least)	12 credits
Thesis	12 credits
Total (at least)	36 credits

7. Courses

credits (lecture-lab-self study)

(1) Remedial Course (for students who have no basic of education only)

ILSE 603	Basic Knowledge in Education	2 (2-0-4)
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(2) Required Courses

ILSE 601	Science Teaching	2 (2-0-4)
ILSE 608	Evolution of Science, Mathematics, and Technology	2 (2-0-4)
ILSE 613	Innovations in Science and Technology Education	3 (3-0-6)
ILSE 616	Research in Science and Technology Education	3 (3-0-6)
ILSE 623	Seminar in Science and Technology Education	1 (1-0-2)
ILSE 624	Seminar in Innovative Learning	1 (1-0-2)

(3) Elective Courses

ILSE 604	Computers and Other Technologies in Science Teaching	3 (3-2-5)
ILSE 606	Mini Project Research in Science, Mathematics and Technology Education	4 (0-12-24)
ILSE 614	Scientific Attitude for Science Educators	2 (2-0-4)
ILSE 625	Chemistry Education	2 (2-0-4)
ILSE 631	Biology Education	2 (2-0-4)
ILSE 642	Physics Education	2 (2-0-4)
ILSE 652	Mathematics Education	2 (2-0-4)
ILSE 653	Computer Science Education	2 (2-0-4)
ILSE 654	Technology Education	2 (2-0-4)
ILSE 655	Measurement and Evaluation in Education	2 (2-0-4)

Students can select other elective graduate courses from other faculties/universities with the approval of the program director or academic advisor.

(4) Thesis

ILSE 698	Thesis	12 (0-48-0)
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8. Emphasis of research projects

Research on innovations and development of learning processes with emphasis on content and development of quality instructional in science and technology by adapting from existing materials to suit Thai educational context. The scope of research projects are as follows;

- (1) Intelligent adaptive tutoring system.
- (2) Development of models in science and mathematics to enhance learning.
- (3) Enhancement of learning by using computational technology, media, game, and simulation.
- (4) Development of learning-teaching approaches based on knowledge construction in science and mathematics.

9. Study Plan

Year	Summer Semester	Semester 1		Semester 2	
1	Remedial Course*	ILSE 601 Science Teaching 2 (2-0-4)	ILSE 608 Evolution of Science, Science, Mathematics, and Technology 2 (2-0-4)	ILSE 613 Innovations in Science and Technology Education 3 (3-0-6)	ILSE 623 Seminar in Science and Technology Education 1 (1-0-2)
		ILSE 616 Research in Science and Technology Education 3 (3-0-6)	Elective Courses 2 credits	Elective Courses 8 credits	
		Total 9 credits		Total 12 credits	
2		ILSE 698 Thesis 6 (0-24-0)	ILSE 624 Seminar in Innovative Learning 1 (1-0-2)	ILSE 698 Thesis 6 (0-24-0)	
		Elective Courses 2 credits	<i>Proposal Examination</i>		
		Total 9 credits		Total 6 credits	
				Thesis Examination and Graduation	

* For students who have no basic of education only

10. Requirements for Graduation

- (1) Complete the study within 5 academic years.
- (2) Complete all courses in the curriculum (courses at least 24 credits and thesis 12 credits) and obtain the overall GPA of at least 3.00.
- (3) Pass the English proficiency requirement announced by the Faculty of Graduate Studies, Mahidol University.
- (4) Pass the thesis examination and submit the complete thesis and other requirements announced by the Faculty of Graduate Studies, Mahidol University.
- (5) Submit a document that shows that the thesis or a part of the thesis is published or accepted for publication in a journal or an academic printed matter which has a peer review or is presented in an academic conference which has a peer review and proceedings.

11. Course Description

		credits (lecture-lab-self study)
ILSE 603	Basic Knowledge in Education Educational components; education psychology; concepts, theories, and philosophy of education; educational reform; curriculum; learning theories; learning-teaching approaches; ethics for teacher; measurement and evaluation in education	2 (2-0-4)
ILSE 601	Science Teaching Reform in learning and science teaching; science curricula; learning theories; principles in science teaching; ethics for science teaching; content knowledge and teaching pedagogy; science teaching methods; exploring student perception; learning assessment; teaching plans; micro-teaching	2 (2-0-4)
ILSE 608	Evolution of Science, Mathematics, and Technology Nature, role, and methodology of science, mathematics, and technology; evolution of knowledge in science, mathematics, and technology; discovery in science, mathematics, and technology of notable persons; interaction between science and society; morals and ethics in the construction of knowledge in science, mathematics, and technology	2 (2-0-4)
ILSE 613	Innovations in Science and Technology Education Creativity and innovation; key databases of innovations in science education; educational innovations in science, mathematics and technology; morals and ethics in the development of innovations in science and technology education; morals and ethics in using innovations to develop learning processes in science and mathematics; designing innovations to enhance learning; evaluation of the quality of innovations in science and technology education	3 (3-0-6)
ILSE 616	Research in Science and Technology Education Research paradigms; quantitative research; qualitative research; research question; research framework; research methodology; data collection; data analysis; ethics for research in science and technology education; evaluation of research in science and technology education; writing research proposal in science and technology education	3 (3-0-6)
ILSE 623	Seminar in Science and Technology Education Seminar concerning the ideas and research work on science and technology education; special topics in science and technology education; ethical issue concerning research in science and technology education; current topics in science and technology education	1 (1-0-2)
ILSE 624	Seminar in Innovative Learning Seminar on innovative learning and country development; special topics concerning innovative learning in scientific laboratory class; selected topics concerning innovative instructional learning media; selected topics concerning innovative learning and Thai society; ethical issues concerning the development of innovations for learning; selecting research topic on innovative learning	1 (1-0-2)

credits (lecture-lab-self study)

ILSE 653 Computer Science Education**2 (2-0-4)**

Educational reform that effects the learning and teaching of computer science; computer science curricula; synthesis of learning theories and teaching-learning approaches in promoting the learning of programming, data structure, and algorithm; the use of technology in learning and teaching of computer science; instrument selection for measurement and evaluation; constructing learning and teaching plans in computer science; micro-teaching of a computer-science subject

ILSE 654 Technology Education**2 (2-0-4)**

Relationships between technology and educational reform; roles of technology in the development of learning process; using technology in learning and teaching; ethics in using educational technologies for learning; technology for measurement and evaluation in education; relationships among technology, science, and society

ILSE 655 Measurement and Evaluation in Education**2 (2-0-4)**

Roles of measurement and evaluation in education; approached for measurement and evaluation during learning; approaches for measurement and evaluation at the end of learning; approaches for authentic measurement and evaluation; instruments for measurement and evaluation in cognitive domain; instruments for measurement and evaluation in affective domain; instruments for measurement and evaluation in psychomotor domain; morals and ethics in measurement and evaluation

Thesis

credits (lecture-lab-self study)

ILSE 698 Thesis**12 (0-48-0)**

Identifying science and technology educational research proposal; conducting research with ethics; analyzing research findings; presenting and publishing research in academic journals or conference proceedings; ethics for presenting and publishing research findings

Faculty

Program Committee

Item	Name –Surname	Degree (field of study) Institution: Year of Graduation
1.	Lect.Dr. Namkang Sriwattanaoathai	Ph.D. (Science and Technology Education) Mahidol University: 2009 M.Sc. (Biochemistry) Mahidol University: 2006 B.Sc. (Biology) Chiang Mai University: 2003
2.	Lect.Dr. Parames Laosinchai	Ph.D. (Science and Technology Education) Mahidol University: 2011 M.S. (Finance) Washington University in Saint Louis: 1998 M.B.A. (Finance and Investment) Baruch College, CUNY: 1993 B.Eng. (Computer) Chulalongkorn University: 1986
3.	Assist.Prof.Dr. Piyachat Jittam	Ph.D. (Science and Technology Education) Mahidol University: 2008 M.Sc. (Biochemistry) Mahidol University: 2005 B.Sc. (General Science) Prince of Songkla University: 1996
4.	Assist.Prof.Dr. Suchai Nopparatjamjomras	Ph.D. (Science and Technology Education) Mahidol University: 2008 M.Sc. (Physics) Mahidol University: 2003 B.Sc. (Electronics Physics) Thammasat University: 1998
5.	Assist.Prof.Dr.Thasaneeya R. Nopparatjamjomras	Ph.D. (Science Education) Kasetsart University: 2006 Diploma (Professional in Science Teaching) Kasetsart University: 1998 B.Sc. (Biology) Kasetsart University: 1997
6.	Lect.Dr.Wararat Wongkia	Ph.D. (Science and Technology Education) Mahidol University: 2012 Diploma (Teaching Profession) Mahidol University: 2006 B.Sc. (Mathematics) Mahidol University: 2005

Lecturers

Item	Name –Surname	Degree (field of study) Institution: Year of Graduation
1.	Assoc.Prof.Dr. Khajornsak Buarapan	Ph.D. (Science Education) Kasetsart University: 2006 B.Ed. (Physics) Rajabhat Institute Chiang Rai: 1997
2.	Assist.Prof.Dr. Patcharin Panjaburee	Ph.D. (Science and Technology Education) Mahidol University: 2010 Diploma (Teaching Profession) Chiang Mai Rajabhat University: 2006 B.Sc. (Computer) Chiang Mai University: 2005
3.	Assist.Prof.Dr. Watcharee Ketpichainarong	Ph.D. (Science and Technology Education) Mahidol University: 2009 Diploma (Teaching Profession) Mahidol University: 2004 B.Sc. (Biology) Mahidol University: 2003
4.	Lect.Dr.Artorn Nokkaew	Ph.D. (Science and Technology Education) Mahidol University: 2013 Diploma (Teaching Profession) Rajabhat Mahasarakham University: 2005 B.Sc. (Computer Science) Rajabhat Mahasarakham University: 2004
5.	Lect.Dr. Monamorn Precharattana	Ph.D. (Physics) Mahidol University: 2011 Diploma (Teaching Science Profession) Kasetsart University: 2007 B.Sc. (Physics) Kasetsart University: 2006
6.	Lect.Dr.Pratchayapong Yasri	Ph.D. (Education) University of Glasgow: 2014 M.Sc. (Science Education and Communication) University of Glasgow: 2009 M.Sc. (Molecular Genetics and Genetic Engineering) Mahidol University: 2008 B.Sc. (Biology) Chulalongkorn University: 2006
7.	Lect.Dr. Pirom Chenprakhon	Ph.D. (Science and Technology Education) Mahidol University: 2011 Diploma (Science Teaching Profession) Silpakorn University: 2005 B.Sc. (Chemistry) Ubon Ratchathani University: 2004
8.	Lect.Dr. Supan Yodyindiyong	Ph.D. (Science and Technology Education) Mahidol University: 2010 Diploma (Teaching Profession) Rajabhat Mahasarakham University: 2005 B.Sc. (Chemistry) Rajabhat Mahasarakham University: 2004