

COURSE SYLLABUS
Institute for Innovative Learning, Mahidol University
ILSE 657 Research Seminar in Science and Technology Education
Semester A (2022), 1 (1-0-2) credit hours

Course coordinator:

Monamorn Precharattana (Ph.D. in Physics)

Office Data: Institute for Innovative Learning

Panyapipat Building, Room 203

Mobile 0 86 526 4623

Email: mprecharattana@mahidol.edu

Office Hours: by appointment

Instructors

(MP) Monamorn Precharattana, Ph.D.

monamorn.teaching@gmail.com

(PC) Pirom Chenprakhon, Ph.D.

pirom.che@mahidol.ac.th

(PS) Patcharapan Siritwat, Ph.D.

patcharapan.sir@mahidol.edu

(TP) Tinnapob Phengpom, Ph.D.

tinnapob.phe@mahidol.edu

(WW) Wararat Wongkia, Ph.D.

wararat.won@mahidol.ac.th

Office: Institute for Innovative Learning, Mahidol University

Course description

Current issue concerning research in science and technology education; selected interdisciplinary topics; ethics in using and publishing academic work

Course learning outcomes

At the end of this course, students will be able to:

Course learning outcomes	ELO	Sub-ELO
1. Communicate with knowledge and academic etiquette	ELO7	Sub-ELO7.1
2. Display ethical behavior in using academic work	ELO1	Sub-ELO 1.1
3. Determine the direction of research science and technology education	ELO3, ELO5	Sub-ELO 3.1, Sub-ELO 5.1, Sub-ELO 5.3
4. Analyze contemporary issues in research topic on science and technology education	ELO3, ELO5	Sub-ELO 3.1, Sub-ELO 5.1

5. Work collaboratively with others	ELO8	Sub-ELO 8.2
6. Apply ICT to communicate research findings effectively	ELO5	Sub-ELO 5.1

Class period

Monday 13:00 – 15:00 h (During August 15, 2022 – October 3, 2022)

Venue: Fully online-learning by Webex and Google Classroom or other platforms where Webex is not possible

<https://mahidol.webex.com/mahidol/j.php?MTID=maaa38d06f8311a96eb0fcd636bf87321>

Meeting number: 2644 743 6897

Password: ILSE657

Host key: 198662

Learning Materials: Google Classroom class code “jaizvg4”



Course schedule

Week	Date	Topic	CLO	Teaching Approach	Instructor
1	Monday Aug 15, 2022 (13:30-14:30)	- Introduction to <i>Seminars in Science and Technology Education</i> - Course overview/ Objectives/Schedule/Assignments and Evaluation - Value and Learning through Seminars	1	Lecture	MP
2	Aug 22, 2022 (13:00-16:00)	STEM Education through Robotics	1, 3, 4, 5	Seminar	Assoc. Prof. Waipot Ngamsaad School of Science, University of Phayao
3	Aug 29, 2022 (13:00-16:00)	The Rise of Innovative Learning Technology in The Next Normal of Education: THE THREE UNLOCKS	1, 3, 4, 5	Seminar	Asst. Prof. Charoenchai Wongwatkit School of Information

Week	Date	Topic	CLO	Teaching Approach	Instructor
					Technology, Mae Fah Luang University
4	Sep 5, 2022 (13:00-16:00)	Survival Guide for Online Presentation	1, 3, 4, 5	Workshop	Dr. Rapee Boonplueang Fac. of Science, Mahidol University
5	Sep 12, 2022 (13:30-14:30)	<ul style="list-style-type: none"> - Preparing for Seminar (as Speaker/ Audience/ Facilitator) - Ethical issues concern in Science and Technology Education - Ethical issues concern in Academic presentation - Behavior and ethics in seminars <i>In-Class activity: Do and Don't</i>	1, 2, 5, 6	Group works; Discussion	MP
6	Sep 19, 2022 (13:00-16:00)	Special topics in science and technology education: Students' presentation	1, 2, 3, 4, 5, 6	Seminar	All staff
7	Sep 26, 2022 (13:00-16:00)	Special topics in science and technology education: Students' presentation	1, 2, 3, 4, 5, 6	Seminar	All staff
8	Oct 3, 2022 (13:30-14:30)	<ul style="list-style-type: none"> - Draw conclusion of <i>Seminars in Science and Technology Education</i> - Direction of research on Science and Technology. Synthesis and improvement of learning solution for the future - Ethical issues concern in Science and Technology Education <i>Out-Class activity: Individual summary on Research direction on Science and Technology Education (individual-based opinion)</i>	1, 2, 3, 6	Take Home Examination	MP

Assessment

- **Class participation 40% (CLO 1, CLO 3, CLO 5)**

Students are expected to participate (10%), share, discuss and suggest peer interested publication during class (20%). They are also expected to show cooperative working as PR and, in the class, as moderator during each talk of seminar (10%).

- **Student Assignment 40% (CLO 2, CLO 3, CLO 4, CLO 6)**

Each student is required to analyze issues and to keep a summary, which reflects what you have learned regarding to the topic identified in each speech, and summary on Research direction on Science and Technology Education for your final assignment.

- **Student presentation 20% (CLO 1, CLO 2, CLO 3, CLO 4, CLO 5, CLO 6)**

Students are required to make 15-20 minutes for oral presentation and 15 minutes for questions and discussions.

For audit students to get a passing grade, they are required to attend at least 80% of class time with active participation as required for credit students. Also, it's mandatory for audit students to complete assignments given by the instructors.

Criteria

Class participation Criteria

- **10% Class attendance (Aspect: Class attendance, Class Punctuality)**

Aspect	Score	Details
Attendance	1	Attend to the class
	0	Absent
Punctuality	1	Punctual
	0	10 minutes Late / Absent

- **20% student questions and comments on the classmates' presentation and those on the invited speaker's**

Criteria	Score	Details
10 or More than 10 questions in total	20	
Less than 10 questions in total	Actual score	2 scores per question

- **10% Seminar organization (Aspect: PR, Moderator)**

Aspect	Score	Details
PR	2	<u>Punctually</u> PR the presentation topic
	1	<u>Unpunctually</u> PR the presentation topic
	0	Not PR
Moderator	2	<u>Completely</u> moderate the talk for the speaker by opening and closing seminar / time keeper / manage Q&A section
	1	<u>Fairly</u> moderate the talk for the speaker by opening and closing seminar / time keeper / manage Q&A section by some duties are neglected
	0	Not moderate, or cannot moderate the seminar

Reflective Journal Writing Criteria

Aspect: Completeness and Responsibility

Aspect	Score	Details
Responsibility	0	<u>Punctually</u> submit the Reflective Journal.
	-1	1-7 days late in submission.
	-2	More than 7 days late in submission.
	-3	Not Submit.

Aspect	Score	Details
Completeness in KEY CONCEPT OF THE TALK	4	The content is well organized. Information is correct, complete, and get to the point.
	3	The content is well organized. Some part of information is catch up (not all).
	2	The content is complete, but it is written in a short bullet without clarification.
	1	The content is complete, but it is written in a short bullet without clarification. No clarification. Some part of information is noted (not all).
	0	Not written. Content is inaccurate or irrelevance.
Completeness in REFLECTION ON THE CONCEPT OF THE TALK TOWARDS MYSELF/ RESEARCHES/ APPLICATIONS	4	State about <u>how</u> the student could apply knowledge from the topic to either his/her-self, research, or other applications.
	2	State about <u>what</u> the student could apply knowledge from the topic to either his/her-self, research, or other applications.
	0	Not written. Content is inaccurate or irrelevance.

Research Direction in Science and Technology Education Essay Criteria

Aspect: Responsibility, Components, and Communication

Aspect	Sub-Aspect	Score				
		Very good	Good	Fair	Poor	None
1. Components	Introduce the reader to the importance of the topic	4	3	2	1	0
	Emphasize on the research direction in Science and Technology Education to improve such problem	4	3	2	1	0
2. Communication	Smoothness of content flow and sequence	4	3	2	1	0
	Show analytic thinking and academic reasoning	4	3	2	1	0
	Correctness of language used	4	3	2	1	0
	Demonstrate ethical concern by giving citation sources	4	3	2	1	0
3. Overall Completeness of the Essay / Overall quality		4	3	2	1	0
4. Responsibility		0 <u>(Punctually</u> submit the		-1	-2 (More than 7 days late	-3 (Not Submit)

Aspect	Sub-Aspect	Score				
		Very good	Good	Fair	Poor	None
		Reflective Journal)		(1-7 days late in submission)	in submission)	

Student Presentation Criteria

Assessment Criteria	1 point	2 points	3 points	4 points	Write Scores Here
Subject Knowledge	<input type="checkbox"/> Does not have grasp of information <input type="checkbox"/> Cannot answer questions about subject	<input type="checkbox"/> Superficial knowledge of topic <input type="checkbox"/> Only able to answer basic questions	<input type="checkbox"/> Adequate knowledge of most topics <input type="checkbox"/> Answers questions, but fails to elaborate	<input type="checkbox"/> Demonstrates in depth knowledge <input type="checkbox"/> Answers questions with explanations and elaboration	
Organization/ Structure of presentation	<input type="checkbox"/> Little or no organization, difficult to follow <input type="checkbox"/> Missing or ineffective introduction <input type="checkbox"/> Confusing or no background <input type="checkbox"/> Key points unclear	<input type="checkbox"/> Some problems with sequencing, lacks clear transitions <input type="checkbox"/> Incomplete or overly detailed introduction <input type="checkbox"/> Emphasis given to less important information	<input type="checkbox"/> Most information presented in logical sequence <input type="checkbox"/> Clear introduction adequate background <input type="checkbox"/> Some irrelevant information	<input type="checkbox"/> Presented in logical sequence <input type="checkbox"/> Introduction and background give proper context <input type="checkbox"/> Key points and conclusions are clear and well developed	
Quality of Visuals (figures, graphs, tables, etc.)	<input type="checkbox"/> Confusing layout, text extremely difficult to read <input type="checkbox"/> Many graphics, sounds, animations distract from the presentation	<input type="checkbox"/> Difficult to read, cluttered appearance <input type="checkbox"/> Images improperly sized <input type="checkbox"/> Some distracting graphics or animations	<input type="checkbox"/> Adequate layout, but with some fonts, colors, backgrounds difficult to read	<input type="checkbox"/> Visually pleasing and easy to grab idea <input type="checkbox"/> Good use of white space, color, backgrounds <input type="checkbox"/> Images and graphics support	

Assessment Criteria	1 point	2 points	3 points	4 points	Write Scores Here
				and enhance content	
Delivery	<input type="checkbox"/> Audience cannot hear presentation <input type="checkbox"/> No eye contact <input type="checkbox"/> Hard to understand, monotone <input type="checkbox"/> Speaker uncomfortable and uninterested <input type="checkbox"/> Reads slides word for word	<input type="checkbox"/> Difficult to hear <input type="checkbox"/> Occasional eye contact <input type="checkbox"/> Some mumbling, little or no expression <input type="checkbox"/> Nervous, some distracting mannerisms <input type="checkbox"/> Reads much of slides	<input type="checkbox"/> Most of audience can hear presentation <input type="checkbox"/> Eye contact most of the time <input type="checkbox"/> Clear voice, but not as expressive <input type="checkbox"/> A little nervous, not as polished	<input type="checkbox"/> All of audience can hear presentation <input type="checkbox"/> Maintains eye contact with audience <input type="checkbox"/> Clear, expressive voice <input type="checkbox"/> Poised, good posture, no distracting mannerisms	
Awareness of Audience	<input type="checkbox"/> Fails to increase audience understanding or knowledge of topic	<input type="checkbox"/> Raises audience understanding and knowledge of some points	<input type="checkbox"/> Raises audience understanding and awareness of most points	<input type="checkbox"/> Significantly increases audience understanding and knowledge of topic	
Audience interaction	<input type="checkbox"/> Completely lost audience attention <input type="checkbox"/> Started responding before questions finished <input type="checkbox"/> Answers often unrelated to the question asked	<input type="checkbox"/> Difficulty holding audience attention, facts presented with little or no imagination <input type="checkbox"/> Lengthy answers, sometimes without answering the question asked	<input type="checkbox"/> Held audience attention most of the time <input type="checkbox"/> Polite in answering questions, but not as directly	<input type="checkbox"/> Held audience's attention throughout, points made in creative way <input type="checkbox"/> Listened carefully to audience questions and responded directly to question asked	
Time management	<input type="checkbox"/> Too Short (< 10 mins) or Too long (> 30 mins) <input type="checkbox"/> Rushed or dragging throughout	<input type="checkbox"/> Too Short (< 10 mins) or Too long (> 30 mins) <input type="checkbox"/> Rushed or dragging in some parts	<input type="checkbox"/> Adequate (15-20 mins) <input type="checkbox"/> Most of the presentation well-paced	<input type="checkbox"/> Appropriate (15-20 mins) <input type="checkbox"/> Well-paced throughout	

Evaluation (For credit students)

Final grade in the course will be determined by the total points earned, that is,

≥ 90%	=	A
≥ 80% and < 90%	=	B ⁺
≥ 70% and < 80%	=	B
Lower 70%	=	I

Evaluation (For audit students)

Final grade in the course will be determined by the total points earned, that is,

≥ 80%	=	Pass
Lower 80%	=	Not Pass

Reading

International science and technology education research publications according to students' interest; however the examples of journals recommended are as follows

- Science (<http://www.sciencemag.org/journals/>)
- Nature(<http://www.nature.com/nature/index.html>)
- Research in Science and Technology Education
- International Journal of Science and Mathematics Education
- Biochemistry and Molecular Biology Education
- Educational Technology Research and Development
- Innovations in Education and Teaching International
- International Journal of Technology and Design Education
- Innovative Higher Education
- Education and Information Technologies
- Life Science Education
- Nurse Education Today
- Journal of Cell Biology Education
- Journal of Chemistry Education
- The Physics Teachers
- Computer & Education
- Journal of Engineering Education
- Journal of Computer Assisted Learning
- Expert Systems with Applications
- American Association of Physics Teachers (<http://www.aapt.org/>)