

**COURSE SYLLABUS**  
**ILSE 655 Measurement and Evaluation in Education**  
**Semester B (2022), 2(1-2-3) credit hours**

**Course coordinator**

Pirom Chenprakhon (Ph.D. in Science and Technology Education)

Office: Institute for Innovative Learning, Panyaphiphat Building, Room 206

Email: pirom.che@mahidol.edu

**Instructors**

Khajornsak Buaraphan	(KB)	Ph.D.(Science Education)	khajornsak.bua@mahidol.ac.th
Monamorn Precharattana	(MP)	Ph.D. (Physics)	monamorn.teaching@gmail.com
Parames Laosinchai	(PL)	Ph.D.(Science and Technology Education)	parames.lao@mahidol.edu
Patcharapan Siriwat	(PS)	Ph.D.(Education)	patcharapan.sir@mahidol.edu
Pirom Chenprakhon	(PC)	Ph.D.(Science and Technology Education)	pirom.che@mahidol.edu
Piyachat Jittam	(PJ)	Ph.D.(Science and Technology Education)	pjittam@gmail.com
Supan Yodyingyong	(SY)	Ph.D.(Science and Technology Education)	supan.yod@mahidol.edu
Suthiporn Sajjapanroj	(SS)	Ph.D.(Education)	suthiporn.saj@mahidol.edu
Tinnapob Phengpom	(TP)	Ph.D.(Systems Engineering)	tinnapob.phe@mahidol.ac.th

**Course Description**

Principle of measurement and evaluation for improving learner; formative assessment; summative assessment; authentic assessment; principle and practice in measurement and evaluation of cognitive, affective, and psychomotor domains; quality of measurement and evaluation tool; ethics in measurement and evaluation

**Class Period**

Tuesday, 9.00-12.00 hrs.

**Room:** Smart Classroom (*Online learning is also available in any circumstances where fact-to-face meetings are not possible*)

**Online:** WebEx Meeting

- Meeting link:  
<https://mahidol.webex.com/mahidol/j.php?MTID=mcf569399d9846eb37083f6e3a36f0076>
- Meeting number: 2642 429 8134
- Password: ILSE
- Host key: 176553

**Course Learning Outcomes:** After finishing this course, the students should be able to

Course Learning Outcomes (CLOs)	M.Sc.		Ph.D.	
	PLOs	Sub-PLOs	PLOs	Sub-PLOs
1) Describe and apply roles of measurement and evaluation in education correctly	2	2.1	2	2.1
2) Describe and apply formative assessment, summative assessment, and authentic assessment correctly	2	2.1	2	2.1
3) Analyze, critique, and create tools for measuring and evaluating cognitive, psychomotor, and affective domains of learning in an appropriate level	4, 5, 6	4.1, 5.1, 5.2, 5.3, 5.4, 6.1	4, 5, 6	4.1 5.1, 5.2, 5.3, 5.4, 6.1
4) Describe and raise examples of ethics and moral in measurement and evaluation correctly	1	1.1, 1.2	1	1.1, 1.2
5) Practice communication and interpersonal skills to present the created measurement tools	7	7.1, 7.2	7	7.1, 7.2

### Course Outline

Week	Topics	Teaching approach	Assessment/ Assignment	CLOs	Instructors 2022
1 <sup>st</sup> (10 Jan 2023)**	Roles and ethics in measurement and evaluation in education	Active lecture, Class discussion	Formative Assessment	1, 4	PC, KB
2 <sup>nd</sup> (17 Jan 2023)**	*Authentic assessment and tools	Active lecture, Class discussion	Class assignments	1, 2	<u>KB</u> , PJ, PC
3 <sup>rd</sup> (24 Jan 2023)**	*Formative assessment and tools Application for assessment	Active lecture, Class discussion	Class assignments	1, 2	<u>PJ</u> , PS
4 <sup>th</sup> (31 Jan 2023)**	*Summative assessment and tools	Active lecture, Class discussion	Class assignments	1, 2	<u>KB</u> , PC
5 <sup>th</sup> (7 Feb 2023)	Cognitive, psychomotor, and affective domains of learning	Active lecture, Class discussion	Formative Assessment	1, 2	KB, PL, PC
6 <sup>th</sup> (14 Feb 2023)	Tools for measuring and evaluating cognitive domain of learning; item analysis (1)	Active lecture, Class discussion	Formative Assessment	1, 3	KB, PL
7 <sup>th</sup> (21 Feb 2023)	*Tools for measuring and evaluating cognitive domain of learning; item analysis (2)	Active lecture, Class discussion	Class assignments	1, 3	<u>KB</u> , PL
8 <sup>th</sup> (28 Feb 2023)	Tools for measuring and evaluating affective domain of learning (1)	Active lecture, Class discussion	Formative Assessment	1, 3	KB, SS
9 <sup>th</sup> (7 Mar 2023)	*Tools for measuring and evaluating affective domain of learning (2)	Active lecture, Class discussion	Class assignments	1, 3	<u>KB</u> , SS
10 <sup>th</sup> (14 Mar 2023)	*Tools for measuring and evaluating psychomotor domain of learning	Active lecture, Class discussion	Class assignments	1, 3	<u>PC</u> , SY, MP, TP
11 <sup>th</sup> (21 Mar 2023)	Factor analysis	Active lecture, Class discussion	Formative Assessment	1, 3	SS PL
12 <sup>th</sup> (28 Mar 2023)	Student working on ASSIGNMENT 1 (Analysis of measurement tool)	Self-study	-	-	-

<b>Week</b>	<b>Topics</b>	<b>Teaching approach</b>	<b>Assessment/ Assignment</b>	<b>CLOs</b>	<b>Instructors 2022</b>
13 <sup>th</sup> (4 Apr 2023)	Presentation of ASSIGNMENT 1: Analysis of measurement tool	Active lecture, Class discussion, Student presentation	Assignments 1	1, 3, 5	All
14 <sup>th</sup> (11 Apr 2023)	Student working on ASSIGNMENT 2 (Doing field work for establishing quality of measurement tools)	Self-study	-	-	-
15 <sup>th</sup> (18 Apr 2023)	Presentation of ASSIGNMENT 2: Creation and quality of measurement tools (1 <sup>st</sup> round)	Active lecture, Class discussion, Student presentation	Assignments 2	1, 2, 4, 6, 7	All
16 <sup>th</sup> (25 Apr 2023)	Presentation of ASSIGNMENT 2: Creation and quality of measurement tools (2 <sup>nd</sup> round)	Active lecture, Class discussion, Student presentation	Assignments 2	1, 2, 4, 6, 7	All

*Remark \* is a week for student's assignments (5 points each)*

*\*\* The class will be delivered online from Weeks 1-4.*

## Assessment and evaluation

Class assignment	30%
Analysis of measurement tool	20%
Creation and quality of measurement tools	40%
Student active participation	10%

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

90 - 100%	=	A,
80 - 89%	=	B <sup>+</sup> ,
70 - 79%	=	B, and
Lower 70%	=	I.

### Important remarks:

- 1) The final score for each student will be rounded to the nearest whole number prior applying to the assessment criteria. In addition, a student's final grade may be higher than the suggested guideline if the student's score is close enough (< 1% gap) to the next higher score. That is, close scores will likely earn the same final grade.
- 2) For credit students to get an evaluation, they must attend at least 80% of class time.
- 3) For audit students to get a passing grade, they must attend at least 80% of class time with active participation as the same as credit students. Also, the assignment given by instructors has to be included in this evaluation

### Appeal:

Please note that any formal appeal made to raise a concern about the courses, including learning, teaching, and assessment methods, as well as the IL program, including facilities and infrastructures, can be made through the Education website (<https://il.mahidol.ac.th/eng/education/>)

## APPENDIX

### 1) Class Attendance and Participation (10%) – to evaluate CLO 5

Each student is expected to participate actively in the class. The active participation will be, for example, questioning, sharing, discussing, questioning, participating in the learning activity, and working cooperatively.

#### *Scoring rubric for class attendance and participation*

	<b>Quantity (2 points)</b>	<b>Quality (8 points)</b>
Low performance	Absent (0 points)	Little to no interaction with instructor/classmates (0 ≥ 2 points)
Moderate performance	Attend most of the class but either came late or left early (1 point)	Some interaction with instructor/classmates. No verbal contribution during class discussion. (3-5 points)
High performance	Attend entire class (2 points)	Good verbal contributions during chat sessions showing understanding of the knowledge and application of the topic area (6-8 points)

### 2) Class assignments (30%) – to evaluate CLOs 1, 2, and 3

There are **6 assignments** (*please refer to the symbol \* in the course outline table*). Each assignment is scored for **5**. The assignment's detail is different according to contents and learning objectives in each week. The students are required to complete each assignment within the class. However, if time is not available, the assignment may be assigned as homework.

#### **Scoring rubric for assignment**

Criteria*	Unacceptable <b>1</b>	Marginal <b>2</b>	Fair <b>3</b>	Acceptable <b>4</b>	Exceptional <b>5</b>
Content knowledge	The response is completely incorrect or irrelevant.	The application, if attempted, is irrelevant.	The application of the concept to the practical problem or task is adequate.	The concept has been applied to practical problems or tasks.	Effective application of the concept to a practical problem or task reveals insight into the biology education principle
Ethical behaviour	No evidence that the students consider ethical concerns.	Students appear to be aware of some ethical issues but do not fully understand what it means to work ethically and professionally.	Students demonstrate understanding of the significant ethical issues and not full responsibility to work ethically and professionally.	Students demonstrate an understanding of the significant ethical issues and have a responsibility to work ethically and professionally.	Students can analyze a complex ethical situation and demonstrate an understanding of significant and subtle ethical issues. They also show moral and professional teaching in their response

*Remark: \* The instructor may add another criterion according to contents and learning objectives each week.*

*Weighing for each measure depends on the instructor.*

**3) Assignment 1: Analysis of measurement tool (20%): to evaluate CLO 3, 4 and 5**

Each student is required to choose **ONE** measurement tool from the literature, which has been created to measure a specific domain of learning (cognitive, psychomotor, or affective domain of learning). Then, he/she analyzes the chosen measurement tool, which may include these aspects: purpose, structure, construction process, quality, strengths and weaknesses. At final, the student must show how to further improve that tool in order to utilize in his/her thesis.

**4) Assignment 2: Creation and quality of measurement tools (40%): to evaluate CLO 1, 2, 3, 4 and 5**

This assignment aims to help each student create quality measurement tools (e.g. test, survey, questionnaire, interview protocol, observation protocol, etc.), which he or she will use in his or her future thesis. Each student is required to create **TWO** tools for measuring and evaluating two specific domains of learning (a student chose two from three domains: Cognitive, Psychomotor, and/or Affective domains of learning). The student must show the quality process in creating those tools, which may include these aspects: purpose, structure, construction process, quality, strengths and weaknesses. At final, the student must show how to further improve that tool in order to utilize in his/her thesis.

### Presentation of Analysis of Measurement Tool (20%)

Name of Evaluator.....

**Description:**

A student is required to choose **ONE measurement tool** from the literature, which has been created to measure a specific domain of learning (cognitive, psychomotor, and/or affective). Then, he/she analyzes the chosen measurement tool: purpose, structure, construction process, quality, strengths and weaknesses. At final, the student must show how to further improve that tool in order to utilize in his/her thesis. (20 minute for presentation and Q&A)

**Instruction:** Please evaluate the presenter according to these aspects.

**(1 = Poor, 2 = Can be accepted, 3 = Good, 4 = Very good, 5 = Excellent)**

No.	Aspect	Students			
1.	Clearly present the <u>history</u> of development of the chosen tool.				
2.	Clearly present the <u>purpose</u> of the tool.				
3.	Clearly present the <u>structure</u> of the tool.				
4.	Clearly present the <u>construction process</u> of the tool.				
5.	Clearly present the <u>quality</u> of the tool (e.g. validity, reliability, etc.).				
6.	Can analyze all <u>strengths</u> of the tool.				
7.	Can analyze all possible <u>weaknesses</u> of the tool.				
8.	Present the possible, potential way to <u>further improve</u> the tool for using in his/her future thesis.				
	<b>Total scores (40)</b>				
	<b>Suggestion</b>				

**Thank you for your evaluation**



**Creation and quality of measurement tools (1<sup>st</sup> Presentation) (20%)**

**Description:** Students create tool for measuring Cognitive, Psychomotor or Affective domains of learning, which will be used in the future theses. Students must show the quality process in creating those tools, which may include: the purpose, structure, and construction process of the tool, the process to establish quality of the tool, the results about quality of the tool, analyses of strengths and weaknesses of the tool, and ways for further improvement of the tool.

**Instruction:** Please evaluate the presenter according to these aspects.

**(1 = Very Poor, 2 = Poor, 3 = Acceptable, 4 = Good, 5 = Very good)**

**Evaluator** .....

Aspect	Presenter			
1. Clearly state the information of purposes of the tool and its structure and construction process ( <b>5 scores</b> )				
2. Show innovative ideas in the tool (minor adaptation/ major adaptation/ create new tool) ( <b>5 scores</b> )				
3. Use appropriate process to establish the quality (validity, reliability, item analysis) of the tool ( <b>5 scores</b> )				
4. Clearly present results and correctly analyze the results to indicate the quality (validity or/and reliability) of the tool ( <b>5 scores</b> ) (* The <b>target population, sample size, and quality</b> of the tool are not concern, but this aspect emphasis on using results to analyze the quality of the tools)				
5. Correctly analyze the strengths and weaknesses of the tool ( <b>5 scores</b> )				
6. Propose <u>possible effective ways</u> to further improve the tool for the future thesis ( <b>5 scores</b> )				
<b>Total (30 scores)</b> <b>*Please sum up</b>				
<b>Comment:</b>				

**Assignment 2(2): Creation and quality of measurement tools (2<sup>nd</sup> Presentation) (20%)**

**Description:** Students create tool for measuring Cognitive, Psychomotor or Affective domains of learning, which will be used in the future theses. Students must show the quality process in creating those tools, which may include: the purpose, structure, and construction process of the tool, the process to establish quality of the tool, the results about quality of the tool, analyses of strengths and weaknesses of the tool, and ways for further improvement of the tool.

**Instruction:** Please evaluate the presenter according to these aspects.

**(1 = Very Poor, 2 = Poor, 3 = Acceptable, 4 = Good, 5 = Very good)**

**Evaluator** .....

Aspect	Presenter			
1. Clearly state the information of purposes of the tool and its structure and construction process <b>(5 scores)</b>				
2. Show innovative ideas in the tool (minor adaptation/ major adaptation/ create new tool) <b>(5 scores)</b>				
3. Use appropriate process to establish the quality (validity, reliability, item analysis) of the tool <b>(5 scores)</b>				
4. Clearly present results and correctly analyze the results to indicate the quality (validity or/and reliability) of the tool <b>(5 scores)</b> (* The <b>target population</b> , <b>sample size</b> , and <b>quality</b> of the tool are not concern, but this aspect emphasis on using results to analyze the quality of the tools)				
5. Correctly analyze the strengths and weaknesses of the tool <b>(5 scores)</b>				
6. Propose possible effective ways to further improve the tool for the future thesis <b>(5 scores)</b>				
<b>Total (30 scores)</b> <b>*Please sum up</b>				
<b>Comment:</b>				

**The PLOs and key performance indicators of the Master of Science Program in Science and Technology Education (International Program) in Academic Year 2022.**

<b>Expected Learning Outcomes (ELOs)</b>	<b>Key Performance Indicators</b>
ELO 1: Display moral and ethical behavior for science and technology educators	1.1 Display moral and ethical behavior that aligns with the code of conduct for science and technology educators 1.2 Follow the ethical code of conduct in educational research
ELO 2: Apply principle in science and technology education to design and implement learning activities in science and/or technology classes appropriately	2.1 Adopt instructional sciences to improve learning in science and technology education
ELO 4: Conduct science and technology education research by integrating knowledge in the field of study	4.1 Propose a research project in science and technology education predicated on educational research methodology
ELO 5: Create innovations in science and technology education consistent to knowledge in the field of study and social contexts	5.1 Display ability to search for existing innovations in science and technology education consistent to knowledge in the field of study 5.2 Analyze strengths and weaknesses of the existing innovation 5.3 Propose an innovation to improve the existing ones 5.4 Use the created innovation for others' benefits and/or applicable to social contexts
ELO 6: Enhance knowledge of oneself	6.1 Classify criteria for self-evaluation
ELO 7: Display the ability to control and improve oneself	7.1 Display the ability to control oneself 7.2 Display the ability to improve oneself

**Table for summary the expected learning outcomes, teaching and learning approach, and summative assessment method used in the course**

CLOs	ELOs	Sub-ELOs	Teaching and learning approaches		Summative assessment method				Total
			Active lecture	Class discussion	Class participation	Class assignments	Presentation of Assignments 1	Presentation of Assignments 2	
1	2	2.1	√	√		4		4	8
2	2	2.1	√	√		4		4	8
3	4	4.1	√	√		3	2	3	8
3	5	5.1	√	√		3.75	2	3	8.75
3	5	5.2	√	√		3.75	2	3	8.75
3	5	5.3	√	√		3.75	2	3	8.75
3	5	5.4	√	√		3.75	2	3	8.75
3	6	6.1	√	√		4	2	3	9
4	1	1.1	√	√			2	4	6
4	1	1.2	√	√			2	4	6
5	7	7.1	√	√	5		2	3	10
5	7	7.2	√	√	5		2	3	10
<b>Total</b>					<b>10</b>	<b>30</b>	<b>20</b>	<b>40</b>	<b>100</b>