

COURSE SYLLABUS

ILSE 642 Physics Education

Semester A (2022), 3(3-0-6) credit hours

Course coordinator:

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Instructors:

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Course Description

This course is designed to introduce graduate students to the nature and the practical of physics educational research by reviewing literature on the well-known physics educational researchers' works. Students will understand the theoretical backgrounds (i.e., learning theory, learning style and learning process, some teaching and learning approaches, and assessment and evaluation) that are the very necessary information for developing students' research based on their interest and local context in one of these topics: teaching mathematics for physics, mechanics, thermodynamics, electricity and magnetism, light and optics, nuclear physics, relativity.

Course Learning Outcomes:

Course Learning Outcome	ELO	Sub-ELO
1. To prepare students to be able to design their own simple physics education research prototype.	4	4.1
2. To become familiar with some of the major components in teaching and learning research such as learning theories, learning styles, teaching and learning approach, and assessment and evaluation.	6	6.1

3. To develop an understanding of the nature and appropriateness of different approaches in teaching and learning physics.	2	2.1 & 2.2
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Readings: Physics education research articles and related educational books

Class period: Thursday, 09.00-12.00

Room: 303

<https://mahidol.webex.com/mahidol/j.php?MTID=m141e31030d44d5ed254cf41a4fb335a5>

Meeting number: 2642 710 4382

Password: ILSE642

Host key: 553282

Course Outline

Week	Date	Topic	Teaching approach*	Instructors	CLO
1	11 August 2022	Physics Language: Teaching mathematics for physics	Lecture; Discussion	PL, SN	CLO1
2	18 August 2022	Teaching some concepts in “Mechanics”	Discussion	PL, MP, SN, TP	CLO1
3	25 August 2022	Teaching some concepts in “Thermodynamics”	Discussion	PL, MP, SN, TP	CLO1
4	1 September 2022	Students’ physics teaching I**	Presentation; Discussion	PL, SN, TP	CLO2
5	8 September 2022	Teaching some concepts in “Electricity and magnetism”	Discussion	PL, SN	CLO1
6	15 September 2022	Teaching some concepts in “Light and optics”	Discussion	SN	CLO1
7	22 September 2022	Students’ physics teaching II**	Presentation; Discussion	PL, SN, TP	CLO2
8	29 September 2022	Teaching some concepts in “Nuclear physics”	Discussion	PL, SN	CLO1
9	6 October 2022	Teaching some concepts in “Relativity”	Discussion	PL, SN	CLO1
10	20 October 2022	Students’ physics teaching III**	Presentation; Discussion	PL, SN, TP	CLO2

Week	Date	Topic	Teaching approach*	Instructors	CLO
11	27 October 2022	Physics concepts related to students' interest	Presentation; Discussion	PL, SN, TP, MP	CLO2
12	3 November 2022	Development of Learning tools related to students' interest topic	Presentation; Discussion	PL, SN, TP, MP	CLO2
13	10 November 2022	Development of conceptual test in physics education research	Presentation; Discussion	PL, SN, TP, MP	CLO2
14	17 November 2022	Micro teaching rehearsal**	Presentation; Discussion	PL, SN, TP, MP	CLO3
15	24 November 2022	Nature of Physics education research	Lecture; Discussion	PL, SN, TP	CLO3

***Remark:** Online learning is available for students in any circumstances where face-to-face meetings are not possible.

****** Student must choose one of these topics: teaching mathematics for physics, mechanics, thermodynamics, electricity and magnetism, light and optics, nuclear physics, relativity.

Presentation

Each student is required to present their teaching idea and approach about the assignment topics to the class. They are also expected to share some useful information and comments with the class.

Micro teaching rehearsal

Students are required to review, design, and practice their micro teaching on the selected topic to the class.

Assessment

Presentation (To evaluate the 1 st and 2 nd course learning objective)	75%
Participation and discussion (To evaluate the 1 st , 2 nd and 3 rd course learning objective)	10%
Micro teaching rehearsal (To evaluate the 2 nd and 3 rd course learning objective)	15%

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

90-100%	=	A,
80-90%	=	B ⁺ ,
70-79%	=	B,

60-69%	=	C ⁺ ,
50-59%	=	C,
Lower 50%	=	I

For audit students to get a passing grade, they are required to attend at least 80% of class time (12 out of 15 sessions) with active participation as required for credit students. Also, it's mandatory for audit students to complete assignments given by the instructors

Assessment criteria for the presentation:

	Criteria	Score	mark
1	Correctness and completeness of the contents	5	
2	Understanding of the contents	10	
3	Classroom management	5	
4	Ability to answer the questions	3	
5	Time management	2	
	Total	25	

Rubric for participation

	Present (1)	Attentive (2)	Engaging (3)	Satisfactory (4)	Exemplary (5)
Active contribution	Show up but never contribute to class discussion	Seldom contribute to class discussion, unless asked	Occasionally contribute to class discussion	Regularly contribute to class discussion	Proactively and regularly contribute to class discussion
Active listening	Lack of attention to the discussed topic	Listen when others discuss and occasionally respond to the discussed topic	Listen when others discuss and sometimes respond to the discussed topic	Appropriately listen when others discuss and consistently respond to the discussed topic	Appropriately listen when others discuss and usefully respond to the discussed topic

1st – 5th criteria are used for the three assigned students' physics teaching mentioned in the course outline.

1st, 3rd – 5th criteria are used for the Micro teaching rehearsal mentioned in the course outline.

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