Course Plan

Chemistry Research Instrument

3 credit hours

Course Outcome:

After finishing this course, students are able to:

(CO-1) demonstrate the value of honesty, independence and responsibility in determining attitudes in the process of developing good chemistry education research instruments

(CO-2) analyse the concept of a good instrument, its development procedure in producing a reliable instrument for retrieval of research data with the help of software

(CO-3) collaborate with colleagues to support appropriate decision making regarding the selection and procedure for developing chemistry education research instruments to provide appropriate solutions in solving certain problems.

(CO-4) develop educational research instruments for collecting research data in the field of chemistry education.

(CO-5) analyse reliable educational research instruments for collecting research data in the field of chemistry education.

(CO-6) develop context-based chemistry problems using local home country context

Relations between course outcome and program learning outcomes are as follows:

Course Outcome (CO)	Program Learning Outcome (PLO)								
	1	2	3	4	5	6	7	8	9
CO-1		√							
CO-2				√					
CO-3						√			
CO-4					√				
CO-5							√		
CO-6									√

Program Learning Outcome

(PLO-2) Demonstrating a responsible attitude towards work in his/her area of expertise independently.

(PLO-4) Integrating chemistry concepts, pedagogical chemistry knowledge, curriculum, methodology, media, evaluation, classroom management, and ICT in chemistry learning (technological pedagogical and content knowledge) as a support in conducting chemistry education research.

(PLO-5) Understanding the research methodology of chemistry education and the characteristics of its research procedures in supporting educational programs for sustainable development and increasing the relevance of chemistry education to society.

(PLO-6) Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology that pays attention to and applies humanities values in accordance with the research field of chemistry education.

(PLO-7) Planning, managing, and evaluating chemistry learning in schools according to the characteristics of the material (content knowledge) and the characteristics of students, learning approaches, learning resources, learning media (pedagogical knowledge), as well as relevant information and communication technology (technological knowledge) innovative and adaptive.

(PLO-9) Developing problem-solving plans in supporting educational programs for sustainable development and increasing the relevance of chemistry education to society.

Description:

The Chemistry Education Research Instrument course equips students in the practice of developing the test and non-test instruments to be used in chemistry education research that meet the requirements of good instruments including the validity and reliability analysis using certain software. Through this course, students not only trained to prepare general test instruments, but also the context-based chemistry problems using local context.

Textbooks and Suggested Readings:

1. Leech, et al. 2005. SPSS for Intermediate Statistics: Use and Interpretation
2. Anderson, L.W. & Krathwohl, D.R. (2001). A taxonomy for learning, teaching and assessing: Revision of Bloom's taxonomy of educational objectives. New York: Longman, Inc.
3. Arther, J. & McTighe, J. (2001). Scoring rubrics in the classroom. California: Corwin Press.
4. Azwar, S. (2010). Penyusunan skala psikologi. Yogyakarta: Pustaka Pelajar.
5. Azwar, S. (2011). Reliabilitas dan validitas. Yogyakarta: Pustaka Pelajar
6. Brookhart, Susan B. (2010). How to assess higher order thinking skills in your classroom. Virginia: ASCD.
7. Gronlund, N. E. (1981), Measurement and Evaluation in Teaching, 4th edition, Mac Millan Publishing Co., Inc., New York
8. Creswell. J.W. 2008. Educational Research (3th ed). New Jersey: Pearson Prentice Hall
9. Ultay, E. (2017). Examination of context-based problem-solving abilities of pre-service physics teachers. *Journal of Baltic Science Education, 16*(1), 1648-3898.

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Evaluation:

Course evaluation will be carried out through (1) assignments, (2) final exam, and (3) activity. Determination of final grade is as follows:

Final score = 50% assignments + 30% final exam + 20% activity

The final score then converted into the grade as follows:

Final score	Conversion	
	Grade	Points
86 – 100	A	4.00
81 – 85	A-	3.67
76 – 80	B+	3.33
71 – 75	B	3.00
66 – 70	B-	2.67
61 – 65	C+	3.33
56 – 60	C	2.00
41 – 55	D	1.00
0 – 40	E	0.00

For passing this course, students must obtain grade C or higher.

Lecture Plan:

Week	Date and Time	Topics	Notes
1	Tba	Position of instruments in chemistry education research	
2	Tba	Types and forms of chemistry education research instruments	
3	Tba	Criteria for a good instrument	Assignment 1 due
4	Tba	Procedure for adoption and adaptation of research instruments	
5	Tba	Analysis of instrument validity including: –Content validity –Face validity –Empirical validity	Assignment 2 due
6	Tba	Instrument reliability analysis	Assignment 3 due
7-8	Tba	Preparation of test instruments	Assignment 4 due
9-10	Tba	Practicing the analysis of the validity and reliability of test instruments with software	Assignment 5 due
11-12	Tba	Preparation of non-test instruments	Assignment 6 due
13-14	Tba	Practicing the analysis of validity and reliability of non-test instruments	Assignment 7 due
15-16	Tba	Preparation of context-based chemistry problems using local home country context	Assignment 8 due

Coordinator of Study Programme	Coordinator of Educational Courses
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