Term Information

Effective Term	Spring 2024
Previous Value	*Summer 2012*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

1) Rename the course "Advanced Topics in Chemical Education".

2) Allow multiple enrollments in a term when the course is offered in 7-week sessions.

What is the rationale for the proposed change(s)?

This course has never been offered under the current title "Advanced Topics in Theoretical Chemistry". The Chemistry grad program has faculty who are interested in teaching Chemical Education courses, but it is not known yet whether the courses will become permanent or remain periodic offerings.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

There are no negative implications to offering this ocurse. Chemical Education is a new division in the Chemistry grad program and offering these courses will introduce this area of study to Chemistry students and will likely increase interest in pursuing Chemical Education research.

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Chemistry
Fiscal Unit/Academic Org	Chemistry - D0628
College/Academic Group	Arts and Sciences
Level/Career	Graduate
Course Number/Catalog	8699
Course Title	Advanced Topics in Chemical Education
Previous Value	*Advanced Topics in Theoretical Chemistry*
Transcript Abbreviation	Adv Top Chem Ed
Previous Value	*Topics Theor Chem*
Course Description	Advanced, specialized topics in Chemical Education
Previous Value	*Advanced, specialized topics in Theoretical Chemistry.*
Semester Credit Hours/Units	Variable: Min 1.5 Max 3

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	Yes
Allow Multiple Enrollments in Term	Yes
Previous Allow Multiple Enrollments in Term	*No*

Max Credit Hours/Units Allowed	30
Max Completions Allowed	10
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq: Permission of instructor.
Exclusions	
Electronically Enforced	No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	40.0511
Subsidy Level	Doctoral Course
Intended Rank	Doctoral

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- Course goals, objectives, and outcomes will vary by instructor and offering.

Previous Value

Content Topic List

- Topic varies by instructor and offering.

Previous Value

- *Topic varies by instructor and offering*

Sought Concurrence

No

Attachments

- Adv Topics Chem Ed Topic List.docx: topic list

  (Other Supporting Documentation. Owner: Hambach,Jennifer Lynn)

- Adv Topics Chemistry Education Research Course Learning Objectives.docx: course goals and objectives

  (Other Supporting Documentation. Owner: Hambach,Jennifer Lynn)

- CHEM 8699 sample syllabus_Nardo.docx: sample syllabus - Wu (inst.)

  (Syllabus. Owner: Hambach,Jennifer Lynn)

- CHEM 8699 sample syllabus_WU.docx: sample syllabus - Nardo (inst.)

  (Syllabus. Owner: Hambach,Jennifer Lynn)

Comments

- Two sample syllabi, course goals and objectives, and list of topics is attached to provide an idea of potential content and format of this advanced topics course *(by Hambach,Jennifer Lynn on 06/20/2023 11:15 AM)*
- Hi Jennifer, thanks for helping solve the course number issue a few days ago.There are a couple of issues left:
  - The first one is that another term of implementation than AU23 needs to be selected. This course request will need to be reviewed by the NMS subcommittee in early Fall so the earliest the new course could be offered is SP24.
  -For topics courses, the reviewing faculty need to see at least 2 sample syllabi. Indeed, considering that by definition a topics course will involve a variety of courses/topics, the committee wants to know for sure that at least 2 topics are fully developed and ready to go. See ASC Curriculum handbook p. 15 (PDF page 17) https://asccas.osu.edu/sites/default/files/2023-02/2022-2023_ascc_handbook.pdf *(by Vankeerbergen,Bernadette Chantal on 06/16/2023 05:00 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Hambach,Jennifer Lynn	05/10/2023 12:31 PM	Submitted for Approval
Approved	Wade,Christine M.T	05/10/2023 12:43 PM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	06/16/2023 05:00 PM	College Approval
Submitted	Hambach,Jennifer Lynn	06/20/2023 11:15 AM	Submitted for Approval
Approved	Jackman,Jane E	08/18/2023 09:33 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	09/08/2023 10:43 AM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Neff,Jennifer Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	09/08/2023 10:43 AM	ASCCAO Approval

Chemistry 8699
Advanced Topics in Chemical Education

Spring 2023

3 Credit Hours – Lectures on MWF 4:10PM-5:05PM

Description The following course goals or learning objectives/outcomes (knowledge, skills, and attitudes/perspectives) are to be obtained by students at time of successful completion of the course. The main course objectives include:

(1) Learning to review the primary chemistry education research literature (improving library research skills, increase familiarity with scientific writing and reading scientific journals)

(2) Dissect and critique theoretical underpinnings of chemistry education research

(3) Deconstruct and critically evaluate chemistry education research methods (specification of a testable research idea, develop hypotheses in chemistry education research)

(4) Organize, prepare, and facilitate scholarly presentations and discussions (individually and as a team) by choosing the appropriate research method to test specific hypotheses, ethical guidelines, and how to collect data.

(5) Curate an annotated bibliography of chemistry education research literature with a citation manager of your choice (e.g., Zotero, Mendeley, etc.)

(6) Presentation of the results (including both a verbal and written presentation).

We will cover the "nuts and bolts" of putting together the history of the chemistry education community and its consequential research trajectories. Classes will consist of lectures and discussions and/or exercises related to the assigned readings. Thus, it is critical that students read the assigned chapters prior to class. Homework and/or on-line quizzes will be assigned to facilitate learning and in-class discussions.

Materials:	All materials will be posted on the Carmen web site.
Course Instructors:	Dr. Jocelyn Nardo; nardo.11@osu.edu
Office Hours	By appointment
Website	Carmen, https://carmen.osu.edu/
Grading	**Graded A-E** Homework = 200 points

	Midterm 1 = 200 points Midterm 2 = 200 points Presentation = 100 points Final Exam = 300 points TOTAL POINTS = 1000 93% - 100% A 90% - 93% A- 87% - 90% B+ 83% - 87% B 80% - 83% B- 77% - 80% C+ 73% - 77% C 70% - 73% C- 67% - 70% D+ 60% - 76% D 0% E
Exams	2 midterms and 1 final exam
Attendance	Students are permitted to miss two classes during the semester without penalty. For each class missed beyond 2, 10 points will be deducted from your total points at the end of the semester.
Participation	Classes will consist of lectures and discussions and/or exercises related to the assigned readings. Thus, it is critical that students read the assigned chapters prior to class and participate in the discussions.
Misconduct	No form of academic misconduct will be tolerated. Signing in to Zoom for an attendance-graded class when you are not actually "attending" is a form of academic misconduct. You will also be held to a high standard of treating your instructors and peers with the utmost respect. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct http://studentlife.osu.edu/csc/.

Disabilities	The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let us know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.
Mental Health	As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614--292--5766 and 24-hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.
Title IX	Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate

	resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu
Diversity	The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

CLASS CALENDAR AND LIST OF TOPICS:

Date	**Topic calendar**	**Topics**
WK1	Introduction and syllabus review How do we know what we know? Educational philosophy as a science.	Plagiarism
WK2	How to get an experimental idea. Basic Methods	
WK3	Ethics in chemistry education research	Reading the literature

WK4	Data Collection & Research Designs	Library research assignment due Ethics
WK5	**Reviewing for Exam** **Exam 1**	Journal Summary 1 due Observational research
WK6	Sampling	APA paper correction
WK7	Describing the Results	APA organizing and formatting IV & DV exercise
WK8	Presenting results: How to write an APA style manuscript	Journal Summary 2 due
SPRING BREAK		
WK9	Designing experiments. Control & Factorial designs	

WK10	Review of Experimental Designs **Exam 2**	Pilot group projects
WK11	Non-Experimental Designs: Survey & Correlational designs	First draft of class exp paper due Survey research exercise
WK12	Non-Experimental Designs: Quasi-experiments and specialized designs	Run group projects
WK13	Basic statistics and Interpreting results	Descriptive statistics
WK14	Basic statistics and Interpreting results Review of semester	Inferential statistics Posters Sessions Final Papers Due
Finals Week	**Final Exam**	

Chemistry 8699
Advanced Topics in Chemical Education

Spring 2023

3 Credit Hours – Lectures on MWF 4:10PM-5:05PM

Description The following course goals or learning objectives/outcomes (knowledge, skills, and attitudes/perspectives) are to be obtained by students at time of successful completion of the course. The main course objectives include:

(1) Review primary chemistry education research literature

(2) Dissect, critique, and integrate significant models and theories about learning and instruction for chemistry education research

(3) Organize, prepare, and facilitate scholarly presentations and discussions (individually and as a team) by choosing the appropriate research method to test specific hypotheses, ethical guidelines, and how to collect data.

(5) Curate an annotated bibliography of chemistry education research literature with a citation manager of your choice (e.g., Zotero, Mendeley, etc.)

(6) Generate a portfolio of laboratory experiments, demonstrations, and activities within one chemistry discipline/course that exemplifies course principles

We will critically examine various theories as it applies to chemistry learning and instruction. Classes will consist of lectures and discussions and/or exercises related to the assigned readings. Thus, it is critical that students read the assigned chapters prior to class. Homework and/or on-line quizzes will be assigned to facilitate learning and in-class discussions.

Materials:	All materials will be posted on the Carmen web site.
Course Instructors:	Dr. Matt Wu; wu.6250@osu.edu
Office Hours	By appointment
Website	Carmen, https://carmen.osu.edu/
Grading	**Graded A-E** Homework and In-Class Activities = 100 points Presentation 1 = 200 points Presentation 2 = 200 points

	Journals = 200 points Final Exam = 300 points TOTAL POINTS = 1000 93% - 100% A 90% - 93% A- 87% - 90% B+ 83% - 87% B 80% - 83% B- 77% - 80% C+ 73% - 77% C 70% - 73% C- 67% - 70% D+ 60% - 76% D 0% E
Exams	2 individual presentations and 1 final exam
Attendance	Students are permitted to miss two classes during the semester without penalty. For each class missed beyond 2, 10 points will be deducted from your total points at the end of the semester.
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CLASS CALENDAR AND LIST OF TOPICS:

Date	**Topic calendar**	**Topics**
WK1	Introduction and syllabus review Neuromyths What is a theory in the context of education research?	Reflect on personal experiences on how you best learn chemistry Brainstorm your chemistry topic of interest (e.g., research, teaching assistant duties, etc.)
WK2	Cognitive theories of learning contextualized in chemistry education research	Assimilation vs. Accommodation Constructivism **Finalize selection of chemistry topic**
WK3	Refinement of cognitive learning theories and application to chemistry teaching	Information Processing Theory Cognitive Learning Model Johnstone's Triangle **HW 1 due**

WK4	Effects of cognitive learning theories on chemistry education research	Misconceptions vs. P-Prims **Journal Summary 1 due**
WK5	**Individual Presentations**	Using a cognitive learning model, present how you would teach, research, and characterize students' ideas about your selected chemistry topic of interest.
WK6	Social theories of learning contextualized in chemistry education research	Social Constructivism Situated Cognition
WK7	Refinement of social learning theories and application to chemistry teaching	Communities of Practice Peer-Led Team Learning, Problem-Based Learning, and Course-Based Undergraduate Research **HW 2 due**
WK8	Effects of social learning theories on chemistry education research	Scientific practices (NGSS, digital badging of laboratory techniques, and argument-driven inquiry) **Journal Summary 2 due**
SPRING BREAK		

WK9	**Individual Presentations**	Using a social learning model, present how you would teach, research, and characterize students' ideas and practices about your selected chemistry topic of interest.
WK10	Affective theories of learning contextualized in chemistry education research	Self-efficacy Self-regulation
WK11	Refinement of affective learning theories and application to chemistry teaching	Theory of Meaningful Learning Growth Mindset **HW 3 due**
WK12	Effects of social learning theories on chemistry education research	Confidence Chemistry identity Sense of belonging **Journal summary 3 due**
WK13	Importing, refining, and translating current learning theories into chemistry education research	Funds of knowledge Culturally relevant/responsive/sustaining pedagogy Problem-posing model of education

WK14	Pick your own theory! Identify and transform an undiscussed learning theory to analyze students' ideas, practices, and/or beliefs about your chemistry topic of interest	**In-class activity due**
Finals Week	**Final Exam**	**Journal Summary 4 due**

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(4) Organize, prepare, and facilitate scholarly presentations and discussions (individually and as a team) by choosing the appropriate research method to test specific hypotheses, ethical guidelines, and how to collect data.

(5) Curate an annotated bibliography of chemistry education research literature with a citation manager of your choice (e.g., Zotero, Mendeley, etc.)

(6) Presentation of the results (including both a verbal and written presentation).

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WK2	How to get an experimental idea. Basic Methods	
WK3	Ethics in chemistry education research	Reading the literature
WK4	Data Collection & Research Designs	Library research assignment due Ethics

WK5	**Reviewing for Exam** **Exam 1**	Journal Summary 1 due Observational research
WK6	Sampling	APA paper correction
WK7	Describing the Results	APA organizing and formatting IV & DV exercise
WK8	Presenting results: How to write an APA style manuscript	Journal Summary 2 due
	SPRING BREAK	
WK9	Designing experiments. Control & Factorial designs	
WK10	Review of Experimental Designs **Exam 2**	Pilot group projects

WK11	Non Experimental Designs: Survey & Correlational designs	First draft of class exp paper due Survey research exercise
WK12	Non Experimental Designs: Quasi-experiments and specialized designs	Run group projects
WK13	Basic statistics and Interpreting results	Descriptive statistics
WK14	Basic statistics and Interpreting results	Inferential statistics
WK15	Review of semester	Posters Sessions Final Papers Due
Finals Week	**Final Exam**	