CHEM 5599: Special Topics in Chemical Education Research  
Discipline-based Education Research:  
Current research trends and applications to university-level instruction  
2:30 – 5:15 W E224 CB

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Course Description: Discipline-based education research (DBER) examines challenges faced by learners in university-level STEM courses and the ways in which intellectual and instructional resources can be designed to improve student learning. This course will examine the nature of DBER relative to other areas of inquiry into teaching and learning, (e.g. Scholarship of Teaching and Learning), and will examine current research trends in DBER fields such as chemistry, biological sciences, and physics. Students will have opportunities to develop and receive feedback on instructional units designed to translate DBER research into practice. The course is appropriate for both students engaged in discipline-based education research as part of a graduate degree and those interested in pursuing academic careers.

Course Learning Goals:

Upon completion of the course each student will have demonstrated knowledge of:

1. The history and relationship of DBER to other fields of inquiry into teaching and learning
2. Key theoretical perspectives underpinning discipline-based education research
3. The generative promise of different paradigms of discipline-based education research, including qualitative, quantitative, and mixed methods research
4. The use of construct-centered design approaches for facilitating assessment design and alignment between learning theory, curricular goals, and assessment
5. Applications of DBER to classroom practice

This course is designed to:

- Increase awareness among graduate students of current issues and research in Discipline-based Education Research
- Provide graduate students an opportunity to engage in professional activities by critiquing and discussing colleagues’ work
Textbook and Other Resources:
No textbook will be required for this course. Readings will be made available on the course website, ICON.

For those interested in supplementary reading, see the list of resources and journals at http://www.divched.org/CER/resources

Course website:
Assignments, readings and other resources will be made available on the course website: http://icon.uiowa.edu. You will be required to submit assignments on this site.

Course assignments:

Preparation for and participation in class discussions. Each week we will discuss readings that address various aspects of discipline-based education research. Students are expected to come to class prepared and ready to participate actively in class discussions, having carefully and critically read the assigned text(s).

Reflective journal. Students will be expected to write written reflections on the assigned readings, which will be periodically reviewed. Some reading assignments will have guiding questions to reflect on in your journal.

Lead discussant. Students will be asked to facilitate (with partners) a discussion and follow-up activity related to one of the course readings/topics.

Final project. Students will select one of the following options:

   Option 1: Course portfolio. Students will develop 1) a lesson plan for a curricular activity, 2) example assessments for knowledge and skills addressed, and 3) a statement of teaching philosophy. For the lesson plan, students will conduct an analysis of the content domain, which will include a brief review of research literature on how students understand the relevant concept and skills. Course activities will be developed around design features that align with learning theories and key research findings from DBER.

   Option 2: Research paper. Students will write a research paper on an emerging DBER theme of their choice. Students will need to identify a researchable question and conduct a review of the literature to answer your question.

Final presentation: Students will present a 15-minute presentation on their final project during the last week of the course.

Assessments
Preparation and engagement in class discussion 20%
Lead discussant 20%
Reflective journal 30%
Final project 20%
Final presentation 10%
Grading scale:  
90-100% = A  
80-89% = B  
70-79% = C  
60-69% = D  
59% or lower = F  

+/- grades will be assigned.

List of course topics (subject to change)
• History and context of discipline-based education research
• Learning theories in DBER
• Research paradigms within DBER
• Research trends in DBER, including:
  o Representational competence
  o Epistemological beliefs
  o Diversity and inclusivity
  o Affect, motivation, and identity
  o Engagement in science practices (e.g. model-based reasoning, argumentation)
  o Faculty’s teaching beliefs and practices
• Translating research to practice: Evidence-based instructional practices in the post-secondary classroom
• Design of learning environments and assessments
• Scaling up instructional innovation
**College of Liberal Arts and Sciences Teaching Policies & Resources**

**Administrative Home**
The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at https://clas.uiowa.edu/students/handbook.

**Electronic Communication**
University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2).

**Accommodations for Disabilities**
The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See https://sds.studentlife.uiowa.edu/ for information.

**Nondiscrimination in the Classroom**
The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

**Academic Honesty**
All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

**CLAS Final Examination Policies**
The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date,
time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint
Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Office of the Sexual Misconduct Response Coordinator for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather
In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.