

George Mason University
College of Education and Human Development
Advanced Studies in Teaching and Learning

EDCI 671 001: Innovations in Science Teaching
(3 credits) CRN 20647
Spring 2018
Wednesdays, 7:20-10:00, Thompson 2020



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Prerequisites/Corequisites

None

University Catalog Course Description

Focuses on the development and selection of teaching materials that reflect concepts of technology innovation with an emphasis on middle and secondary school science. Offered by Graduate School of Education. May not be repeated for credit.

Course Delivery Method

This course will be delivered using a hybrid format. During our face-to-face class meeting we will engage in a variety of learning activities, to include lecture, small-group activities, laboratory work, and large group discussion. Online class meetings will mostly meet asynchronously, but we will meet online via Blackboard Collaborate at least once during the semester. During our online class meetings students will be responsible to engage with online technologies and to turn in work via Blackboard and/or the course Google page. Please note that online class meetings are not “weeks off”; there will be readings and/or work required for both face-to-face and online class meetings. Student participation is required in both online and face-to-face classes.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

- Design and modify instruction based on theory, philosophy, educational research, and best practice.
- Incorporate findings from educational literature into instructional strategies to improve student learning.
- Create a learning environment in which all learners feel welcome and can be successful.
- Modify instruction and learning environment based on assessment of student learning problems and successes.
- Seek, implement, and evaluate best pedagogical practice within the context of a specific learning setting.
- Monitor the effects of instructional actions, selection of learning materials, and other instructional decisions on students' learning.
- Design and modify instruction that is responsive to differences among learners.

Professional Standards

EDCI 671 is part of the sequence of Advanced Studies in Teaching and Learning science courses for students seeking an advanced M.Ed. This course is also an Elective option for students in the Secondary Science

Teacher Education The course builds on students’ knowledge of their subject matter and from their current or former teaching experiences. The course focuses on teacher as a reflective practitioner in science teaching and learning and meeting the diverse needs of learners as called for by the *Standards of Learning for Virginia Public Schools* and *National Science Education Standards* and as outlined by the National Council for Accreditation of Teacher Education (NCATE), the National Science Teachers Association (NSTA), and the National Boards for Professional Teaching Standards (NBPTS). EDCI 671 helps teachers develop an inquiry stance on their classroom practice as science teachers through action research adapting inquiry-based lessons, formative and summative assessment and evaluation techniques, and a targeted focus on meeting the diverse needs of students. Additionally, this course was designed with a vision for accomplished teaching, as indicated by NBPTS Science Standards for Early Adolescence (http://www.nbpts.org/userfiles/File/ea_science_standards.pdf) and Adolescence and Young Adulthood (http://www.nbpts.org/userfiles/File/aya_science_standards.pdf) the Five Core Propositions of the National Board for Professional Science Teaching:

- Proposition 1: Teachers are Committed to Students and Their Learning
- Proposition 2: Teachers Know the Subjects They Teach and How to Teach Those Subjects to Students
- Proposition 3: Teachers are Responsible for Managing and Monitoring Student Learning.
- Proposition 4: Teachers Think Systematically about Their Practice and Learn from Experience.
- Proposition 5: Teachers are Members of Learning Communities.

Required Texts

All resources will be available through Blackboard or the course Google site.

Full citations in APA format are required for all assignments in course.

Course Performance Evaluation

Students are expected to submit all assignments on time via Blackboard.

Assignments

	Points
Participation and Professionalism	20
Article/Resource Review	10
Teaching and Assessment with Technology	10
Development of Grant Proposal <i>Donors Choose Set-up & Initial Project (5 pts)</i> <i>2 Journals (5 pts each)</i> <i>Final Proposal, including budget (15 pts)</i>	30
Lead-a-lab with technology activity <i>Lesson Plan Draft Submitted for peer review</i> <i>Instruction delivered in class</i>	20
Final Reflection	10
Total Points	100

Participation and Professionalism

This course operates with the assumption that knowledge is socially constructed and the most meaningful learning opportunities are those where you have the opportunity to offer and explore diverse perspectives with peers. To do this, you are expected to regularly contribute to classroom discussions and online discussion forums, as well as to genuinely ‘listen’ to peers as they do the same. Agreement is not mandatory; consideration and respect are. This means that you must be “present” throughout all discussions and activities. It is expected that you connect, question, and extend the discussion in class and in blackboard discussion posts by citing readings, weekly content, and your personal experiences. In addition to being present in each class, participation and professionalism also includes quality participation in class discussions and/or discussion forums.

We will use Blackboard to communicate regularly in this class. You will be asked to post assignments and responses, read classmates’ postings, and actively participate in discussions. Blackboard serves as an important vehicle for discussing ongoing work on your major project with group members.

Please note that the Participation and Professionalism portion of your grade is scored at the end of the semester, but is

Article/Resource Review

A valuable skill for an innovative science teacher is to be able to access information from the current science practitioner publications for use in the classroom. This assignment is given to develop your skills in locating and analyzing new technologies and/or instructional strategies to use in the classroom. For this assignment, you will identify an article in a practitioner publication (e.g. NSTA Publications: *Science & Children*, *Science Scope*, *The Science Teacher*; OR a subject specific publication like *The Biology Teacher* or *Physics Teacher*.) You will write a 2-3 page critique of the article and provide a 1-2 minute video review in our Blackboard course.

Teaching and Assessment with Technology

Technology should be integrated purposefully in your classroom—not added in just so you can say you teach with technology. For this assignment you will identify a technology that can be used *by students* in your classroom, then create a formative assessment of student learning. You will create a 2-3 minute video in which you present the technology AND the formative assessment on Blackboard. You will also review and critique some of your class members’ assessment. (Note: you are strongly encouraged to identify technologies that are not currently in use in your classroom, as you may be able to link this assignment to the grant proposal.

Development of Grant Proposal

We will explore multiple ways in which you might fund innovative technologies or activities for your class, including grant opportunities and crowd-sourcing like donors choose. There are three distinct components of the grant proposal:

1. All students will create a donorschoose project—though you are NOT required to go “live” with it. If you are not able to create a donorschoose account, then we will set up a template to use that is similar to it. You may put anything on this project, as long as it is somehow related to your science teaching. You will share the project (or a pdf printout of the fake project) on blackboard.
2. During the semester you will write two short journal entries in which you identify something you would like to have in your classroom, and write about how it would impact your teaching and your students’ learning.
3. With guidance, each student will identify a potential source from a list of teacher grant opportunities and write a short grant proposal that could be submitted for funding.

Lead-a-Lab with Technology:

You are required to, individually, lead a lab activity with the class. Imagine a class that has almost no science materials but is rich with computer technology and network accessibility. Students will use online or computer-based technology, and may use lab technology (only that which is available in our lab in TH 2020). Using free and accessible technology (much of which you will be introduced to in class), you will design and develop a “lab” experience where students learn the desired science content that they might have learned if they didn’t have access to technology. This lab activity should be appropriate for a particular grade level and subject for students in grades PK through 12. The lab must focus on an objective from the Virginia Standards of Learning for science in elementary, middle, or high school.

- The lab is to last between 15 and 30 minutes.
- You must include a lesson plan to be given to your instructor before the lab begins.
- Before the lab begins, you must state the grade level and/or course in which this lab would appropriately be conducted.

Evaluation criteria include (rubric will be provided):

- Evidence of appropriate planning
- Evidence of appropriate preparation
- Classroom arranged for optimal learning
- Clear purpose for learning was evident
- Appropriate safety measures were demonstrated and applied
- Thought provoking questions were used
- The teacher circulated and assisted students
- The activity facilitated the learning of science process skills
- Smooth transitions between activities were evident
- Selected activities were appropriate for the objective
- Assessment was appropriate and corresponded to the learning objective

Final Reflection

Your final assignment for this class will be a final reflection. The prompt will be provided in class later in the semester.

General Requirements

- A. Class attendance is both important and **required**. If, due to an emergency, you will not be in class, you must *contact your instructor prior to class time*. Learners with more than two absences may drop a letter grade or lose course credit.
- B. All assignments are either **due by class-time** OR no later than **11:59 PM EDT** of the date indicated in each week’s assignments published in the **COURSE SCHEDULE AND TOPICS** section of this Syllabus. Due dates are also posted on our Bb course site.
 - a. **Grades for assignments date-stamped in Blackboard after the due date will be reduced by 10%, unless prior approval from instructor has been granted. No late submissions will be accepted after the course end date.**
 - b. Assignments earning less than a passing grade may be rewritten and resubmitted so that the assignment is satisfactorily completed. In fact, because learning is the goal, I may *require* you to redo an assignment that is far below expectations.
- C. Please adhere to the assignment submission instructions listed in this syllabus. Only assignments submitted as indicated will be graded; incorrect submissions will result in a grade of zero for those assignments.

- a. All assignments submitted should have the filename format LASTNAME-ASSIGNMENT TITLE. Please do not upload written assignments in PDF format. Other editable formats are acceptable (i.e., .doc, .docx, .rtf, .ppt, .pptx, .xlsx, .xls). Supporting documents for assignments can be in PDF format.
- D. *All written work* should be carefully edited for standard grammar and punctuation, as well as clarity of thought. All submitted work should be prepared through word processing and reflect APA style (6th edition), as well as double-spaced, with 1” margins, and 12-point font (Times New Roman, Calibri, or Arial).

GRADING SCALE

| 95-100 =A | 90-94 =A- | 86-89=B+ | 83-85=B | 80-82= B- | 70-79=C |Below 70=F |

PROFESSIONAL DISPOSITIONS

Students are expected to exhibit professional behaviors and dispositions at all times. See <https://cehd.gmu.edu/students/policies-procedures/>

Tentative Class Schedule

DATE	Topic & Readings	READINGS & ASSIGNMENTS DUE
Week 1 JAN 23 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:30	General introduction, what is innovative	No readings assigned for class
Week 2 JAN 31 ASYNCHRONOUS ONLINE CLASS MEETING	Online module introduces science lab technologies	WORK POSTED IN MODULE DUE by 11:59 pm: “What I would buy for my classroom” Grant proposal Journal Entry 1
Week 3 FEB 7 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Lab technologies & Policy issues with sustainability of change Intro to donorschoose	Readings posted to Blackboard
Week 4 FEB 14 ASYNCHRONOUS ONLINE CLASS MEETING	Online module examines online games and simulations	WORK POSTED IN MODULE DUE by 11:59 pm: Article/Resource Review
Week 5 FEB 21 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Games and general teaching tools	Readings posted to Blackboard
Week 6 FEB 28 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Maker-spaces & the maker movement	Readings posted to Blackboard
Week 7 MARCH 7	Examining technology resources; set up donors choose account	WORK POSTED IN MODULE DUE by 11:59 pm: Donorschoose account set-up

ASYNCHRONOUS ONLINE CLASS MEETING		
Week 8 MARCH 14	NO CLASS MEETING, NO ASSIGNMENTS DUE	
WEEK 9 MARCH 21 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Looking at teacher grants, Grants 101	Readings posted to Blackboard
Week 10 MARCH 28 ASYNCHRONOUS ONLINE CLASS MEETING	Focus on teaching and assessment with technology assignment	WORK POSTED IN MODULE DUE by 11:59 pm: Teaching and Assessment with Technology
Week 11 APRIL 4 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Focus in on content: innovation within science content areas	Readings posted to Blackboard DUE for classtime: Bring draft of lesson plan for lead-a-lab with technology
Week 12 APRIL 11 ASYNCHRONOUS ONLINE CLASS MEETING	Focus on your content area	WORK POSTED IN MODULE DUE by 11:59 pm: "What I would buy for my classroom" Grant proposal Journal Entry 2
Week 13 APRIL 18 FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	PBL, PBL, CCL, and all the others....	Readings posted to Blackboard DUE for classtime: Lead-a-Lab with Technology (3 people)
Week 14 APRIL 25 ASYNCHRONOUS ONLINE CLASS MEETING	Focus on completing your final grant proposal	WORK POSTED IN MODULE DUE by 11:59 pm: <i>Final grant Proposal, including budget</i>
Week 15 MAY 2 FINAL FACE-TO-FACE (F2F) CLASS TH 2020 7:30-9:45	Summarizing course, final labs	Readings posted to Blackboard DUE for classtime: Lead-a-Lab with Technology (4 people)
Week 16 Final Exam Week	Final Reflection Due to Blackboard by Wed 5/9, 11:59 pm NO CLASS MEETING	

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see <https://catalog.gmu.edu/policies/honor-code-system/> <http://oai.gmu.edu/the-mason-honor-code/>).
- Students must follow the university policy for Responsible Use of Computing (see <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <http://ods.gmu.edu/>).
- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or <https://cehd.gmu.edu/aero/tk20>. Questions or concerns regarding use of Blackboard should be directed to <http://coursesupport.gmu.edu/>.
- For information on student support resources on campus, see <https://ctfe.gmu.edu/teaching/student-support-resources-on-campus>

For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/students/> .

Rubrics:

Participation and Professionalism

Distinguished	Competent	Unsatisfactory
<p>The student is engaged in all classes; is on time; is prepared; follows outlined procedures in case of absence; the student actively participates in small and/or whole group class meetings; student discusses and references course readings in thoughtful, relevant & meaningful ways; Quality work/questions provided for discussion; Thoughtfully considers other perspectives raised by classmates; Meaningful, detailed, and constructive feedback provided to classmates. <i>10 pts.</i></p>	<p>The student is engaged in all classes; is usually on time; is usually prepared; follows outlined procedures in case of absence; the student makes active contributions to the learning group and class; student discusses course readings in relevant ways. Provides meaningful, detailed, and constructive feedback OR consistently participates in groups but feedback is not meaningful, detailed, and constructive; there is no evidence that classmates' perspectives have been considered <i>8-9 pts.</i></p>	<p>The student is chronically late for class; absences are not documented by following the procedures outlined in the syllabus; The student is not prepared for class; and does not actively participate in discussions. Feedback to peers is not meaningful, detailed, and constructive. Discounts classmates' perspectives and questions <i>0-7 pts.</i></p>

Additional rubrics will be provided