

**University of Detroit Mercy**  
**EDU 475- Curriculum and Methods of Teaching Secondary Science (Undergraduate and Graduate)**  
**Winter 2008**

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<b>Course Website:</b>	<a href="http://knowledge.udmercy.edu/">http://knowledge.udmercy.edu/</a>
<b>Office location/hours:</b>	231 Reno; Tuesday 4:00 – 6:15 pm; other times by appointment
<b>Class Meeting:</b>	Tuesdays 6:40 – 9:10 pm

**Course Description**

Objectives and curricular organization of middle and secondary school Science; content, sequence, and methods to accomplish these objectives; measurement, evaluation, and reporting to parents; preparation of plans with class demonstrations. University of Detroit-Mercy Catalog.

**Course Purpose**

The purpose of this course is to engage you in the foundational theory and practice of teaching science to diverse students. To teach science so that all students learn science well, teachers need a strong **professional knowledge base** on which to rely when making pedagogical decisions. However, no course can provide teachers with everything that they need to know in order to teach science. Therefore, this course will help you begin building the professional knowledge base necessary for teaching science and will engage you in a **professional learning cycle** so that you can continue to build your science teaching professional knowledge throughout your teaching career.

Students will be expected to begin to develop skills necessary for successful teaching and demonstrate critical teaching competencies. Some of the competencies are to develop:

- a personal rationale of and for teaching science
- understanding and use of the Michigan Curriculum Framework for science
- critical review of science teaching in the classroom
- appropriate classroom management skills and expectation that will facilitate program goals
- demonstrate understanding of basic content, processes and attitudes of science education
- integration of science and other content areas such as social studies, math and reading
- understanding multiple ways of assessing students and related reporting of achievement
- understanding and conduct scientific inquiry activities
- understand and demonstrate the use of technology to support science
- plan effective lessons that will engage learners
- review child development research and implications for teaching science
- demonstrate the ability to critique science related materials and equipment

(Course prerequisite: successful completion of EDU 432)

## Course Philosophy

One way to think about teaching science is to understand science as a *culture*. People who are scientifically literate can talk, think, act, and identify within the discourse of science. They understand the beliefs, ways of knowing, and central assumptions that constitute science. They understand how science is constructed, communicated, and used. The teachers' job is to open the borders of the culture of science for students so that students can become participants in the culture of science.

Teachers should be able to rely on curriculum materials and other resources to help them select instructional sequences that will open the borders to science for students from diverse backgrounds. However, the reality is that many curriculum materials are not constructed to effectively help students learn science. The traditional response in science methods courses has been to teach teachers how to build their own instructional sequences. However teachers should be teachers, not curriculum developers. Most teachers do not have the time, experience, or background knowledge to create their own materials for every topic that they teach. Moreover, teachers are often given specific curriculum and curriculum materials from which they are expected to teach. Therefore, a more reasonable role for teachers is to critique and modify curriculum materials and instructional approaches to meet the learning needs of their students.

It is the philosophy of this course that teachers should be able to select, evaluate, and modify curriculum materials to build instructional sequences that meet the diverse learning needs of the students. The teacher works together with the curriculum materials to construct what happens in the classroom (the enacted curriculum). Accomplishing these tasks requires that teachers become critical users of curriculum materials. Teachers must understand the design and intent of the curriculum materials, the subject matter, their students' learning needs, basic science learning theory and pedagogy, and the basics of the culture of science. These understandings constitute the science teaching professional knowledge base. This course will help you lay the groundwork for building a professional knowledge base and continuing to develop this knowledge base throughout your teaching career.

## Course Organization

**Central Questions:** This course is organized around three central groups of questions that represent the course philosophy.

1. What is science? How is science a culture? How is this culture similar or different from my background and my students' background culture?
2. What do we know about how students learn science? What does this mean about how we should teach science?
3. How do I plan and teach science so that all of my students learn science? How do we critically use curriculum materials to teach science? How do I continue to grow and learn in my practice of teaching science?
4. How do I assess what my students have learned?

**Class Time:** During class time, we will use several different science content areas to structure our explorations into teaching science. We will develop some of the subject matter knowledge and pedagogical content knowledge necessary to teach these topics and evaluate and modify curriculum materials designed to teach these topics.

**Technology Requirement:** A demonstration lesson incorporating the use of technology is required for the class. Details will be provided in class. Beginning with week 2, regular participation on the Discussion Board is required. Details of topics will be provided. *All assignments must be submitted using Knowledge/Blackboard.*

**Field Work:** 12 hours of field work are required for successful completion of EDU 475. Several options for field work will be given in class. Instructor approval is required for field work at a site other than those options given in class.

All students must complete a Michigan State Police Criminal History search and provide written documentation prior to beginning field work. Visit the website <http://www.michigan.gov> for more information on completing an *Internet Criminal History Access Tool* (ICHAT).

**Example lessons to be explored during class time:**

Topic	Age Range	Curriculum Material
Human Biology	Grades 9-12	Digestive System
Nuclear Chemistry	Grades 11-12	Inquiry Unit – Nuclear Chemistry
Earth Science	Grades 7-8	Earthquakes and Plate Tectonics

**Course Goals**

During this course students will learn to

1. Understand science as inquiry and the social construction of knowledge.
2. Consider how science represents a culture and learning the culture involves crossing cultural borders. Be able to apply these ideas to planning and teaching science.
3. Use science benchmarks, learning goals and objectives, and the Michigan Content Expectations in planning and teaching science.
4. Apply some of the theories about student learning in science to planning and teaching science, including constructivism, conceptual change, and learning communities.
5. Understand the differences among didactic, discovery, conceptual change, and guided inquiry instructional perspectives as reflected in curriculum materials and classroom practice.
6. Select, evaluate, and modify curriculum materials, in light of the above understandings of learning theory, instructional approaches, and science content goals to plan and teach instructional sequences that meet the diverse learning needs of students.
7. Develop confidence and enthusiasm for teaching science.
8. Understand the relationship between effective teaching practice, effective classroom management and maintaining a healthy, safe environment for self and students.
9. Become students of their own teaching and be able to use a professional learning cycle to continue building a science teaching professional knowledge base.
10. It is essential for educators to speak and write professionally. Throughout the semester, writing will be emphasized with time spent on peer review/editing of assignments. Any assignment that is not written at an acceptable professional level will be returned to the student for revision and re-submission.

**Summary of Assignments**

5% Reflection Paper

10% Documentation of Field Work (5 hours must be working directly with students)

30% Field Journal (3 entries = 10% each)

10% Lesson Plans (2 plans, 1 turned in at each class presentation = 5% each)

20% Class Presentation (2 presentations = 10% each)

10% Lesson presentation reflection (2 reflections, 1 turned in after each class presentation = 5% each)

15% Unit Plan

**Graduate Requirement:** Graduate students are required to write an 8-10 page research paper on current trends in science education. This paper is in addition to the above requirements and is worth 10% of the final grade. The percentage for each area will be modified to apply this 10%.

### Readings & Resources

Course Pack for EDU 475 – will be available the first class meeting

*Inquiry and the National Science Education Standards.* Washington, D.C.: National Academies Press. (2000) ISBN: 0-309-06476-7

*Classroom Assessment and the National Science Education Standards.* Washington, D.C.: National Academies Press. (2001) ISBN: 0-309-06990-X

Additional readings and websites will be posted on the course Knowledge/Blackboard site and/or distributed during class

### Course Schedule

The schedule below is tentative and may be adjusted to better meet the needs of the class.

Date	Topics and Assignments	Readings to be completed by the following class meeting	Due Dates
1/8/08	What is science? How do we learn and teach science?  Writing Center Help  Self-Reflection Paper: What is Science and How Do I Learn Science?	<i>Choosing Content Worth Knowing</i>  <i>What Do Kids Know and Misunderstand About Science?</i>  <u>Inquiry &amp; the National Science Ed Standards</u> pg xi-xviii; 1-12	1/18/08
1/15/08	Science Literacy  Gender disparity/multiculturalism/ including all students in science education  Field Work arrangements	<i>A Definition of Constructivism</i>  <i>Constructivist Views in Learning Mathematics and Science</i>  <i>Embracing Controversy in the Classroom</i>  <i>No Conflict Between Science and Religion Editorial</i>	1/25/08
1/22/08	Constructivism/inquiry learning  Select Unit Topic	<i>Using Concept Maps in the Science Classroom</i>  <i>The Crime Lab Project</i>  <u>Inquiry &amp; the NSES</u> pg 13-74	2/1/08
1/29/08	Review of Curriculum Materials: <i>The Celebration and Renters Beware</i>  Designing an inquiry lesson  Prepare for Peer Review	<i>Reforming Cookbook Labs</i>	Peer Review- 2/8/08

2/5/08	Peer Review of Science lesson and unit outline  Designing an inquiry lesson; sequencing		1 <sup>st</sup> journal entry due 2/12/08
2/12/08	Safety in the Science Classroom  Health practices for working with students  ½ of students will teach first lesson  Demonstration of Council of State Science Supervisors (CSSS) resources <a href="http://www.csss-science.org/safety.shtml">http://www.csss-science.org/safety.shtml</a>	<i>Cognitive Science and Assessment</i>  <i>Assessing Reading in the Science Classroom</i>  <i>Making Our Way Through the Assessment and Accountability Maze</i>  <u>Classroom Assessment &amp; the NSES</u> pg 1-21 <u>Inquiry &amp; the NSES</u> pg 75-85	2 <sup>nd</sup> journal entry due 2/19/08
2/19/08	Assessment  ½ of students will teach first lesson	<i>Testing and Assessment in Science Education</i>  <u>Classroom Assessment &amp; the NSES</u> pg 23-58; 59-77  <u>Inquiry &amp; the NSES</u> pg 87-141	3 <sup>rd</sup> journal entry due 3/4/08
2/26/08	Assessment - Formative and Summative		
3/4/08	No class – Mid-Winter Break	<i>Connecting Science and Mathematics Instruction</i>  <i>Fundamental Skills in Science: Measurement</i>	
3/11/08	Inquiry exercises: Earthquakes and Plate Tectonics & Nuclear Chemistry  Peer Review of Unit  <b>Meet in Education Computer Lab</b>		
3/18/08	Integrating Technology  Evaluating online textbooks  <b>Meet in Education Computer Lab</b>		
3/25/08		<b>Field work documentation due 4/8/08</b>	

4/1/08	2 <sup>nd</sup> lesson presentation <b>Meet in Education Computer Lab</b>		Unit Plan due 4/15/08
4/8/08	2 <sup>nd</sup> lesson presentation <b>Meet in Education Computer Lab</b>		
4/15/08	2 <sup>nd</sup> lesson presentation (if required) <b>Meet in Education Computer Lab</b>	<i>NBTS: The Highest Form of Certification</i>	
4/22/08	Final Exam		

### Course Policies

**Attendance** - Dependability and punctuality are critical qualities in the profession of teaching. This course is designed to be interactive. Your regular attendance and punctuality are important to your participation in class. **Three absences will result in failure of EDU 475. Tardiness of 30 minutes is considered an absence.**

**Participation** – In order to get the most out this course, your active participation is required. As you know, learning involves more than merely your physical presence in the classroom. Learning requires your engagement in the course content and activities. Furthermore, much of the learning you will do in this course is constructed during small group activities. Your participation benefits not only you, but your group members as well.

If you are absent from class, you should make arrangements with a classmate to gather handouts and take notes for you. You are responsible for catching up on any missed material.

**Writing** - Teachers are models and coaches of writing for their students. Teachers must be able to communicate effectively both in speaking and in writing with colleagues, parents and others. For those reasons, teacher candidates are expected to write effectively and conventionally. If a paper is returned to you for revision, you must revise, complete and return the piece to receive credit for the assignment. For students who experience difficulty in meeting writing expectations, seek help! There are resources available to you – me, your other instructors, your classmates, or anyone else whom you wish to ask for help.

All of your work must be your own and referenced according to APA style. You may wish to purchase the most recent edition of the APA Manual or use the web for a selection of sites which offer abbreviated versions of the manual. There is also an *APA Tutor* available on the course Knowledge/Blackboard site.

Do not copy work from other students, from texts, computer based sources or any other source. Failure to appropriately reference other people’s ideas and words constitutes plagiarism, which can result in no credit for the course.

**Written Assignments & Email** - These should be typed, double-spaced, one-inch margins, using a standard 12-point font. Do not make a cover sheet. At the top of the first page, include your name and title of paper. Submit all work via the course Knowledge/Blackboard website, using the appropriate “assignment.” All assignments should be submitted as attachments. When submitting your document save

it with your initials followed by the name of the assignment. I will make comments using track changes and return your work to you also via Knowledge/Blackboard.

Email will be used during this course and everyone is expected to have and use it. Your UD-Mercy email address will be used for all email communication. Please read your email between class sessions, as I may contact you with information that pertains to the next session.

**Scholarly Work** – Scholarly work goes beyond opinion and the simple description of readings. It involves reflection and inquiry, citing readings and the literature as evidence to support your position(s).

The University's Policy and Academic Integrity follows:

“As members of an academic community engaged in the pursuit of truth and with a special concern for values, students are expected to conform to a high standard of honesty and integrity in their academic work. The fundamental assumption under which the University operates is that work submitted by a student is a product of his/her own efforts.

Among the most serious academic offenses is plagiarism, submitting the style of another author or source without acknowledgment or formal documentation. Plagiarism occurs when specific phrases or entire passages, whether a sentence, paragraph or longer excerpt, are incorporated into one's own writing without quotation marks or documentation. One also plagiarizes by paraphrasing the work of another that is, retaining another writer's ideas and structure without documentation.

Students who purchase essays from other students or agencies or who copy from one another or from prohibited sources, commit the most serious type of academic dishonesty. The consequences of plagiarism, or any act of academic dishonesty, may range from failure on an assignment or in a course to dismissal from the University.”

**Deadlines** - All assignments must be completed successfully in order to pass EDU 475. All assignments must be turned in on the due date indicated in the syllabus. Late submissions will be considered only in the case of a personal emergency (extra-curricular activities do not constitute an emergency). Notify your instructor as soon as possible (preferably before an assignment is due) if any assignment will be late.

**Revisions** – For selected projects, if your grade is less than 80%, you may re-write and re-submit it the next class session with the aim of bringing the grade up to 80%. However, resubmissions for any assignment that had an initial score of 80% or more will be accepted for feedback only, not an increase in grade. The aim of evaluation and feedback is to help you meet the standards and goals for this course.

**Evaluation and Grading:**

The College of Education faculty members strive to implement assessment measures that reflect a variety of strategies in order to evaluate a student’s performance in a course. For graduate students, B grades will be awarded for satisfactory completion of all assignments and A grades will be reserved for outstanding performance. Please note there is a distribution of grades A to E in the College of Education, including pluses and minuses. The grading scale is outlined below:

<b>Average:</b>	<b>Grade:</b>
95-100	A
90-94	A-
85-89	B+
80-84	B
75-79	C+
70-74	C
69-65	D
65 or below	E

A detailed rubric will be provided before each assignment is due to assist students in turning in their best work.

**Student Course Evaluation:**

Student course evaluations are an important source of information for curricular and teaching improvement in the College of Liberal Arts and Education. As such, all students enrolled in CLAE courses are required to complete an online course evaluation. You will receive emails explaining how to complete the evaluation requirement and you will be reminded by me of the deadline for completing this course requirement.

**Classroom Management Presentation for Student Teachers  
University of Detroit Mercy**

New to Teaching?  
Don’t just survive – *Thrive!*

Before School Starts, Do Some Reconnaissance

- Introduce yourself to the:
  - School Secretary
  - Custodian
  - Hall monitors/security
  - Any other staff members

More Reconnaissance

- Locate:
  - Restrooms – staff and students
  - Cafeteria
  - Staff Lounge

–Copy machines

Learn the Procedures

- Signing in
- Obtaining textbooks
- Obtaining supplies
- Making copies
- Reserving AV equipment
- Reserving the library
- Reserving the computer lab

Become familiar with the community

- Take a drive around the area
- Walk through the local grocery store
- Locate
  - Local library
  - Local parks
  - Student ‘hang outs’

Write a Letter of Introduction to the Parents

Write a Letter of Welcome to Each Student

Sounds like lots of work, right?

- Knowing your school community and letting them know you is the single most important thing you can do to start the year off well

Let’s get to Discipline

- Classroom management **is not** discipline
- Discipline **is not** punishment

Classroom Management is

- Planning ahead for
  - Students entering and exiting the room
  - Seating arrangements
  - Procedures to distribute and collect supplies
  - Procedures for assigning and collecting homework
  - Transitions between subjects or topics
  - Fire drills

Discipline is

- Clear and **reasonable** expectations for students
- Never a surprise
- Consistent

- Fair
- Non-punitive

#### Characteristics of a Good Discipline Plan

- School administration is fully informed
- The plan is consistent with what your administration expects
- Students are involved
- Parents are aware and in agreement

#### To Develop Your Plan

- Decide what is really important and non-negotiable
  - Gum chewing drive you crazy? Then walk around the room with the wastebasket rather than yelling.
  - Do ‘tattle-tales’ push you over the top? Listen, then tell the student to sit down. If it is important, deal with it, if not, let it go.
  - Is tardiness really that big of an issue? Have a sign in sheet for late students. They sign in and sit down.
  - Does it really matter if students have a pencil? Pick up pencils and pens in the hallway and have them ready to give to students.

#### Safe Practices for You and Your Students

- First aid considerations
- Medications
- Blood-borne Pathogens and Universal Precautions
- Food and/or beverages in the classroom and field trips
- Hand-washing
- Just plain common-sense