

UNIVERSITY OF DETROIT MERCY  
College of Education and Human Services

**Course Title**

EDU 475 Curriculum and Methods of Teaching in Middle and Secondary Schools: Science  
(3 credits): Prerequisites: EDU 432, 469, MBST, junior standing

**Semester/Location**

Winter, 2005            Briggs 230            Tuesday            6:40-9:10 p.m.

**Instructor**

Dr. Giorgianna Simon, Professor of Education  
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**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.

**Purpose of the Course**

The purpose of this course is to provide a foundation of the knowledge and skills needed to teach Science in an effective way. Two critical components of this foundation are: the design, implementation, and evaluation of Science Units and lessons: and the selection and use of teaching strategies to match desired instructional outcomes. Students will continue to develop in both these areas by engaging in the activities in this course.

**General Goals/Outcomes:**

After completing the course, you should be able to:

1. Develop a personal rationale and philosophy (academic, personal, and social) for teaching Science in the Middle or Secondary grades.
2. To develop skills in instruction which promote understanding and positive attitudes among students and youth.
3. Identify basic concepts and generalization of those areas of Science which contribute content and methodology to Science Instruction.
4. Devise teaching and evaluative strategies for us in dealing with specific problems in Science Instruction.
5. Identify strengths, weaknesses, and application of commercially produced instructional materials.
6. Critically examine ideas advanced by authorities in the field of Middle or Secondary Science and the use of inductive and deductive strategies that involve scientific investigation of findings and communication of results.
7. Apply theories of learning and child development to Science Teaching.
8. Perceive interrelationships between Science and other curricular areas, such as Math, Social Studies, Reading etc..
9. Select, design, construct and evaluate original teaching sides for use in Science Instruction. Develop and carry out hands-on-instruction that leads to more meaningful learning, promotes positive attitudes toward Science and enables pupils to solve practical problems.

10. Explore the purpose and activities of the National Council for Science Education, the Michigan Department of Education, (for Michigan Curriculum Framework & the Science Guidebook to accompany the Framework- now completed for computers(electronic version) titled: LinkingWith the Michigan Curriculum Framework) and other organizations and agencies affecting the teaching of Science in schools.
11. Develop a sequence of teaching related field experiences such as classroom observations, and pre-student teaching in which students and Science instructional strategies such as teaching and managing hands-on-investigation.
12. Investigate and explore instructional implications of specific problems affecting the quality of life in the local community.

**Special Note:**

These are formidable goals, aren't they? Before you panic, let me assure you that each of them will be spelled out in specific, understandable terms, to insure that you will be fully appraised of my expectations for your performance in this course. The goals are written as a maximum set of goals. You as a student entering the course are addressed as professional teachers by your instructor and are asked to begin making professional decisions – all goals do not need to be fulfilled. Each student must select a set of goals, as a professional Science Teacher. If need be the instructor or mentor will assist or point out missing goals.

One of the purposes of this course is to have you become involved in Science in the Middle or Secondary Classroom – for your future teaching. You will be provided with experiences that will enable you to become competent and confident in teaching Science to Middle/Secondary age children. Therefore Michigan's Science Goals/Objectives will also be discussed, and are to be implemented in your management kits each week.

The course is designed to explore the content, methodology and the process of Science that are used in classroom teaching. Each of the biological, earth, and physical Sciences will be viewed as integrated disciplines. You will experience a series of independent and group activities to achieve this design.

**Evaluation**

For a grade of "A" – Complete the tasks, demonstrating outstanding performance.

For a grade of "B" – Complete the tasks, demonstrating neatness, clarity, organization, and some degree of creativity.

For a grade of "C" – Complete the tasks in a satisfactory manner.

For a grade of "D" or "F" – Do not complete tasks.

The criteria for grading is based on each of you being a college student as well as taking the necessary steps in becoming a professional teacher.

## Required Text/Materials

1) Becoming A Secondary School Science Teacher, Jazlin V. Ebenezer, Wayne State University, Sharon Haggerty, University of Western Ontario, ISBN: 0-02-331312-9. Publisher: Prentice Hall, copyright: 1999, Format: Cloth; 512 pp .

2) Michigan Department of Education and other web sites.

3) A Science Teacher's manual: obtain from the UD-M library or borrow from a actual classroom teacher.

4) Manila Folders\binder:

Approximately 25 folders are required for your teaching management kit. You are required to bring to each class session three blank folders.

5) Technology Competency folder

Computer application Secondary School Science will be discussed throughout this course. Throughout your certification courses you are expected to progress in your computer/technology background.

(7<sup>th</sup> standard of Michigan Teacher Certification)

## Course Requirements (are mainly included in your assignments).

Weekly to be completed before attending class:

1. Read the text assignment: Level 1 Summary of what you read, Level 2 How will you apply this information to your classroom. Please label each assignment with the chapter number before handing in the assignment.

### **TEST/EXAMS:**

A. Mid-term: DUE March 1st - must be typed

1. Review content of the first six weeks of class
2. Design your own test and take the test.
3. Test must consist of
  - a. 20 fill in blank questions
  - b. 20 matching
  - c. 3 essay questions

B. Final: Part I

1. You a professional teacher. Present how you would explain your curriculum and what expectations you would have of your students

Paper is to be typed, presented to the entire class on \_\_\_\_\_. Paper will not be returned to you.

Although your presentation may be longer than a seven minute presentation - the oral presentation is to be seven minutes.

Your oral presentation will be placed in your portfolio for your future job. Wear professional clothes.

Final: Part II

2. Design a test ( same directions as for mid-term) DUE second to last class.

C. Mandatory attendance required.

## Text Assignments and other weekly assignments

One of the purposes of this course is to have you become involved in Science in the Classroom – for your future teaching. You will be provided with experiences that will enable you to become competent and confident in teaching Science to school age students. Therefore Michigan's Science Goals/Objectives will also be discussed, and are to be implemented in your management binde/folders each week.

The course is designed to explore the content, methodology and the process of Science that are used in teaching a modern course in School Science. Each of the biological, earth, and physical Sciences will be viewed as integrated disciplines. You will experience a series of independent and group activities to achieve this design.

### **Expectations**

1. Attendance is required at all classes.
2. Punctuality for class will be considered as a professional obligation.
3. It is your responsibility to read the text, as well, as other assignments and ask for clarification if help is needed before you leave the class on the days prior to the given assignment.
4. Professional participation is expected in class and with other students.
5. You are expected to submit assignments on time or the assignment will be marked late and points will be deducted each class until the work is turned in, (5pts, - first class; 10 pts., - second class, etc.) Extra credit work does not replace late assignments.
6. If you have been absent, it is common courtesy to communicate with the instructor before the next class. If the instructor can not be reached leave a message on [gsimon@marygrove.edu](mailto:gsimon@marygrove.edu). Also work should be handed at the next class. If a student is late or must leave early, it is common courtesy to verbally communicate with the instructor before leaving the class.
7. Students are expected to submit assignments that conform to the University of Detroit-Mercy policies governing academic dishonesty and misconduct. (See the "Academic conduct policy" in the Catalog .

### **Course Assignments/Lecture Topics**

#### Field Experiences:

Observations begin in the schools the second week of this class. Before starting your observations you are required to have permission slip (given to you in this class) signed by the principal of the school in which you are observing. Your observations must be written up and handed in after each visit (Observation cover sheet must be attached). The observations are to stay in a folder, which is to be labeled School Observations/Lesson Plans. You are required to complete ten observations which will include your teaching two lessons which will require a written evaluation by the home teacher (forms are available the first day of class). (Also see assignment ).

#### **Planning ahead for Clinical/Field Placements**

1. Throughout your placement please note the levels of learning that you will find your students. All students will not be at the level of learning that your course. For example, lacking reading/ study skills, lacking knowledge for your content area, social skills necessary to be in your classroom for which you are being prepared to teach.
2. How will you handle special education and multicultural student populations?
3. How will you utilize placement by collecting, evaluating the use of a variety of assessment and evaluation methods?.

4. In collection data etc. please use journals, videos, tape recordings, take notes in methods class from other students, analysis of your own practices and integrate experiences.

#### Assignment Due

1- 18 Read C1. Windows into Science Education.

C2. Science and Scientific Inquiry for Understanding.

Type a response to: "Why should Science be taught in the schools?" & Why do you wish to become a Science Teacher? (Type *First Draft of my teaching of Science Philosophy* on this paper)

\*Sign out a Science Teacher Manual from the UD-M Library Media Center, or borrow a manual from an actual school teaching Science and type:

1. A response how appropriate this manual is for classroom teaching. How will you select programs, resources, & technology appropriate to the age, developmental level, cultural & linguistic backgrounds & exceptionalities of students?

\*Science Classroom Management (Files or binder) Remember folder requirements (bring 3 blank folders to each class). During the second class you start to organize, categorize and label folders such as Philosophy/Goals. File folders are of two categories. (1.) General Management and (2) Actual Teaching Folders.

*\*Role of Science in Education*

Application of subject matter starts ASAP. Also, you are to show evidence of planning/organization to start subject matter.

#### Observation Experience

This observation Science experience will include written observations, assisting students, and teaching. Be available to assist the teacher. These weekly visits to the schools will need to be written up and handed in each week. Keep in mind urban, suburban, multicultural experiences as you make your field placements.

Observation folder is to be handed in each class: Your folder is to be cumulative, is to be handed in each class and include the following: 1. Permission letter (given to you in this class) signed by the principal of the school where you will be observing/assisting the Science teacher. 2. Cover sheet for observations – this sheet must include the date activity and an attached log of what happened during your time in the school (If handouts are given....these are also to be attached). 3. The two or more typed lessons that you present to the teacher before you teach along with your attached lesson plan and the teacher evaluations. These lessons must also included a science experiment.

1-25

C3. Conceptions and Models of Teaching and Learning.

C4. Developing Learners' Multiple Intelligences.

\*Process Skills: A Foundation for Unit and Lesson Planning (to be discussed in class).

\*Be prepared to discuss all assignments each week. Example: This chapter discusses the developing & carrying out hands-on instruction that leads to more meaningful learning, promotes positive attitudes toward Science & enables pupils to solve practical problems. How do you plan to implement these suggestions? Where have these suggestions in your *Classroom Management System (File or binder)*

\*Hand in one lesson plan (use Teacher Manual to assist you). Point out where theories are applied. What readiness skills are needed prior to the lesson?

**Lesson Plan/Theories: What are yours? To be discussed in class:  
Applications of your Education Psy course to this course.**

2-1

Read II. STRATEGIES FOR SCIENCE DISCOURSE.

C5. Strategies for Scientific Inquiry.

\*Hand in your "Philosophy of Teaching Science" (Type *Second Draft* of my Science Philosophy on this assignment).

\*Hand in one typed lesson plan using an inductive strategy (particular to general) that involves scientific investigation, interpretation of findings & communication of results.

\*Evaluate yourself as a professional Science teacher. (pre-test)

\*Introduce Portfolios: See Text book appendix. Appendix A: Some Ideas for Your Teaching Portfolio. And Appendix B: Your Professional Portfolio.

2/8

\*All students could have signed up to teach a Science lesson.  
(be ready to discuss your first lesson plan draft in class)

II. STRATEGIES FOR SCIENCE DISCOURSE.

C6. Journal Writing and Research Reporting.

\**Computers/technology: write how you are planning to implement technology into your Science Program.*

*See 7<sup>th</sup> standard of Michigan Teacher Certification Requirement.*

*Please note: you are required to met the MDE's computer/technology competencies given in this 7<sup>th</sup> standard. How you have met these competencies is due on March 29th*

\*What is your classroom management system (what have you organized your files or binder...also or what will be placed in your management system (your future directions) – what time lines). What competencies do you have, need to have to become a Science Teacher? Find three sources of information so that you will be able to discuss this topic in class. Label a teaching folder with your information enclosed. Use the internet., Library resources, such as Educational Index, UD-M's Library also receives such magazines for Science Teaching: Example :*Science Education 2. School Science & Mathematics,*

- \*Hand in teaching folders with cover sheet contents of your teaching record. Check to see if you are moving in the right direction.
- 2/15      \*Read C7. Novel Teaching and Learning Ideas  
                   C14. Interactive Phases of Teaching and Learning.  
 \*Hand in one lesson using a deductive strategy (general investigation, interpretation of findings & communication of results.  
 \*Set up your Science Fair. Write out your overall organizational plan-management plan including diagrams, scheduling and storage.  
 \*Hand in your total *Science Classroom Management System* (foldess or binder). Manila file folders or binder with a table of contents are to be included. Many of these folders have already been turned in....thus this assignment is a cumulative review of how you are organized.
- 2/22      \*Read C 8. Explanation, Evidence, Relevance.  
                   C15. Multiple Voices in Unit Planning.
- \*Write and hand in a Outline of your unit on the Human Body – Use a Teacher’s Manual to assist you.  
 \*Discuss – Encouraging Student progress. If possible visit a classroom or interview a teacher and discuss “how does a teacher evaluate Science.”  
**This is a 15 week course and therefore an assignment is given even during Spring break. Therefore two assignments are due after the next class following the Spring break.**
- 3-1      \*Read III. SCIENCE CURRICULAR CONTENT, ISSUES, AND TRENDS.  
                   C9. Contextual Science from a Historical Perspective.  
 \*Teach one Science concept using the chalkboard. Write and hand in your assignment teaching this concept.  
 Note:  
 \*Midterm: The purpose of this test is to give you practice in constructing a test, to check if you are clear on major concepts and skills in Science Education. This test is to be typed. Construct and answer the test before you hand it in this assignment.
- 3-8      \*Read C10. Interactive Learning with Computer Technology.  
                   C13. Authentic-Assessment Practices in Science.  
 \*Hand in a teaching folder. This folder should demonstrate that you have sufficient competency – for actual classroom teaching materials. (Contents of your tracking record in pocket).  
 \*Type letters to curriculum companies requesting information about Science teaching materials. Hand in the letters with stamped addressed envelopes before mailing. Use internet for companies to contact.  
 \*Continue to work on your unit.
- 3/15      \*Read C11. The Science-Technology-Society-Environment Connection.  
 \*Type and hand in a Science Unit( if possible) on the Human Body.

Please use procedure given out in class. For more details

- A. Objectives of unit
  - a. knowledge
  - b. skills
  - c. attitudes/appreciation
- B. Approximately four lessons
- C. Unit must include experiment (s)
- D. Activities reflecting objectives should reflect all subject areas of secondary curriculum when appropriate, and be designated as such in block plan of unit. Michigan core objectives must be keyed into activities to insure their inclusion, AV specifics must also be included.
- E. Block plan of four weeks work must accommodate all activities.
- F. Evaluation scheme must be presented reflecting all objectives including a unit test.

\*Sign up for Part A of final exam which will be 3/22

3/22

\*Read C12. Science for All Students.

\*Hand in a teaching folder (Each student selects title). This folder should demonstrate sufficient information to support your competency to teach this subject area in a classroom.

\*Prepare your final exam.

\*Please plan ahead – your regular assignment is also due on the day of presentation.

Final Exam  
(Part I)

\*Oral presentation to be given in class on 3/22.

You are now a Science teacher. Select a population and place such as a teacher meeting, parent meeting etc., and explain your Science Program to this group. Plan to use Multi-media cart using the software program PowerPoint to present your information. An oral, written outline of your presentation, and presentation saved on a CD are expected to be handed in at time of presentation. You should also prepare handouts for each of your classmates.

3/29 \*Read /review Appendix in your text book.

Also how have you used

“Appendix A: Some Ideas for Your Teaching Portfolio and Appendix B: Your Professional Portfolio”.

\*Hand in teaching folder on Ecology or Energy...following same procedures used for other folders.

\*Note, a teaching folder is due each class. Instruction to be given in class. Beginning a folder with future direction is acceptable.

\*Interview 1, Your decision-making, problem solving abilities are essential in this course. You are addressed as a professional teacher in this course and I hope to hire you at the end of the course. Therefore, keep in mind what questions, evidence you must be prepared to discuss or answer.

\*Ask a principal or teacher to interview you.

\*Submit in Technology file or notebook.

\*Read and demonstrate that you will implement Section 6, "Evaluation" (Oakland Schools).

\*Hand in Technology folder . This folder must also include how to fulfilled the 7<sup>th</sup> competency in teaching Science. **See 2/8 assignment.**

4/5 \*Hand in how you demonstrate your competencies in your portfolio for science Review Appendix A: Some Ideas for Your Teaching Portfolio &.Appendix B: Your Professional Portfolio from your textbook..

\*Evaluate yourself as a professional Science Teacher, (post test) Evaluation must be followed up with a typewritten paper on your strengths as a teacher and the areas that you will still need to improve....what direction are you giving yourself to successfully carry your growth and improvement plans.

\*In Education Psychology you were introduced to the portfolio. During this course Scholastic's Portfolio will be demonstrated along with other portfolio materials. Appendix A: Some Ideas for Your Teaching Portfolio. Appendix B: Your Professional Portfolio.

\*Your entire *Science Classroom Management* (kit) must be handed in this week. In addition to the folders include a typed table of contents.

\*Now that you have completed your kit, what are your future plans for further development of this kit? What long-range plans/studies live productive lives beyond the year 2000? Submit your plan in a typed paper.

\*We will also have an exchange of ideas on your *Classroom Management System* (kits).

Final Test: \*See directions for Mid-Term and follow the same procedure. This test will not be returned.

\*Oral discussion on video and students written evaluations.

\*Portfolio is due. (You may wish to use it on a job interview.)

***Final Exam on same day as class time. (Tuesday)***

Grading:

Daily Assignments, Class Discussion, Daily Tests, Midterm, and Final	70%
Lesson Presentations Science Journal	10%
Final Exam	
Part A – Oral Video Presentation	20%
Part B – Complete Teaching Management file or binder with Table of Contents & written future directions.	
Part C – Written Test	

Assignment Grading will be given on two level:

Both levels are required.

Level 1 – Just reading content

Level 2 – Application to actual classroom use

C1. Windows into Science Education.

C2. Science and Scientific Inquiry for Understanding.

C3. Conceptions and Models of Teaching and Learning.

C4. Developing Learners' Multiple Intelligences.

## II. STRATEGIES FOR SCIENCE DISCOURSE.

C5. Strategies for Scientific Inquiry.

C6. Journal Writing and Research Reporting.

C7. Novel Teaching and Learning Ideas.

C 8. Explanation, Evidence, Relevance.

## III. SCIENCE CURRICULAR CONTENT, ISSUES, AND TRENDS.

C9. Contextual Science from a Historical Perspective.

C10. Interactive Learning with Computer Technology.

C11. The Science-Technology-Society-Environment Connection.

C12. Science for All Students.

C13. Authentic-Assessment Practices in Science.

## IV. Planning for Teaching Science.

C14. Interactive Phases of Teaching and Learning.

C15. Multiple Voices in Unit Planning.

Parting Message: Teacher Transformation.

Appendix A: Some Ideas for Your Teaching Portfolio.

Appendix B: Your Professional Portfolio.