

LSC Use Only Date:	No:	LSC Action-	UWUCC USE Only No. Senate Action Date:	UWUCC Action-Date:
			09-236	AP-10/13/09 App-12/1/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

New Course       Course Prefix Change       Course Deletion

Course Revision       Course Number and/or Title Change       Catalog Description Change

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MIDL 312 - Science Instruction and Assessment in Grades 4-8

Current Course prefix, number and full title      Proposed course prefix, number and full title, if changing

2. Additional Course Designations: check if appropriate

This course is also proposed as a Liberal Studies Course.       Other: (e.g., Women's Studies, Pan-African)

This course is also proposed as an Honors College Course.

3. Program Proposals

New Degree Program       Program Title Change       Other

New Minor Program       New Track       Catalog Description Change       Program Revision

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Middle Level Education for Grades 4-8

Current program name      Proposed program name, if changing

4. Approvals		Date
Department Curriculum Committee Chair(s)	<i>Mary Anne Hensel</i>	7-22-09
Department Chair(s)	<i>Jennifer T. Rotgill</i>	7-15-09
College Curriculum Committee Chair	<i>Jacqui Domarachi</i>	7-22-09
College Dean	<i>Mary Ann Rafferty</i>	7-24-09
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	<i>Carl Schust</i>	Received SEP 11/4/09

Received  
NOV 04 2009

Received  
OCT 07 2009

Liberal Studies

Liberal Studies

Received  
SEP 11/4/09  
Liberal Studies

**MIDL 312**  
**Science Instruction and Assessment**  
**in Grades 4-8**

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**I. Catalog Description:**

**MIDL 312 Science Instruction and Assessment in Grades 4-8**

**Prerequisites:** Acceptance into Teacher Education Step 1; BIO 103, GEOS 101/102, SCI 105 all strongly recommended.

Emphasizes science as it relates to Middle School students and curriculum, planning for teaching science, and recent innovations in science teaching.

**II. Course Outcomes :**

All students will:

**MIDL 312 COURSE OUTCOME 1:** apply their knowledge of established local, Pennsylvania and national standards and incorporate those standards into their planning and teaching of earth and space sciences, life sciences, physical sciences and ecology (PDE Standard C 2,3,4,5 and 6).

**MIDL 312 COURSE OUTCOME 2:** teach a series of innovative, activity-oriented lessons that integrate science with other subjects, using the science processes and a variety of instructional techniques including lab use, and computer technology for the designated level of teaching specialization. (PDE Standard C.1.m)

**MIDL 312 COURSE OUTCOME 3:** work cooperatively with middle school students and teachers in a school setting and will adapt instruction to the existing knowledge and conceptual development while fostering the students' natural curiosity. (PDE Standard C.1 b,d,r)

**MIDL312 COURSE OUTCOME 4:** test ideas through experimentation and use and interpret scientific explanations. (PDE Standard C.1, e, n, o, p, q, s, t, u, v)

**MIDL 312 COURSE OUTCOME 5:** teach science as a process of inquiry by having students think critically, explore various investigative strategies and defend results of a scientific investigation (PDE Standard C.7, a,b,d,f,g,h)

**MIDL 312 COURSE OUTCOME 6:** evaluate the relative merits of teaching strategies and methodologies by examining unifying themes incorporated into the science content, and by implementing pedagogy for concepts that students find most difficult. (PDE Standard C.1, a, h, i, k)

**MIDL 312 COURSE OUTCOME 7:** categorize conceptions and preconceptions of scientific knowledge and identify common misconceptions, student reasoning patterns and problematic explanation for observed phenomena (PDE Standard C.1 w,x and y).

**MIDL 312 COURSE OUTCOME 8:** understand the nature and development of scientific knowledge by recognizing the contributions individual scientists have made and design methods

of sharing this information to capitalize on the human aspects of science. ( PDE Standard C.1, g, C.7, c, e)

MIDL 312 COURSE OUTCOME 9: implement research-based instruction to develop professional knowledge by using current research in science and science education journals to expand their knowledge and understanding of teaching and learning science. (PDE Standard C.1, l)

MIDL 312 COURSE OUTCOME 10: assess students’ knowledge in multiple ways and be actively involved in the learning process and will periodically reflect on their own learning and teaching; (PDE Standard C.7 c, j)

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**Alignment of Course Content with Established Standards for Teacher Preparation**

The PDE (Pennsylvania Department of Education—Chapter 354, Program requirements Compliance) delineates standards for teacher preparation. ). Following each Outcome in the syllabus, you will find references to the alignment of the Outcome with PDE standard. This information will prove helpful to you as you develop your electronic portfolio requiring demonstration of competencies. Also, the assessments you are required to complete in relationship to this course align with the Outcomes/standards and you may wish to evaluate and then consider inclusion of these assessments within the context of your electronic portfolio requirements. Also, note that the first reference is made to a specific standard, key words have been provided to connect the Outcome with the standard. These clarifying words/phrases only appear the first time a reference is made to the standard.

**Student Outcomes and Assessment Matrix**

COE-ET Conceptual Framework	PDE Standards	Course Outcome	Assessment Technique
Planning and Preparation	C 2,3,4,5 and 6	1	Science Unit Plan, Lesson Presentation, Lesson Reflection
Classroom Environment	C.1.m	2	Science Unit Plan, Lesson Presentation
Classroom Environment	C.1 b,d,r	3	Final Exam, Participation, Lesson Reflection
Planning and Preparation	C.1, e, n, o, p, q, s, t, u, v	4	Science Unit Plan
Planning and Preparation	C.7, a,b,d,f,g,h	5	Midterm

Planning and Preparation	C.1, a, h, i, k	6	Midterm and Final Exam
Planning and Preparation	C.1 w,x and y	7	Midterm and Final Exam
Planning and Preparation	C.1, g, C.7, c, e	8	Lesson Presentation
Professional Responsibilities	C.1, l	9	Article Summaries
Professional Responsibilities	C.7 c, j	10	Participation and Lesson Presentation

## COURSE OVERVIEW

The purpose of this course is to provide all students with the tools needed to be outstanding teachers of science in grades 4-8. Outstanding middle school teachers all have a number of specific qualities common across their classrooms. First, they understand the fluid nature of science, what science is and what it can and cannot do. They have a broad background of science content from the four science disciplines. Third, outstanding middle school teachers understand the cognitive, social and physical characteristics of adolescent children and can relate to them and teach them using the most age-appropriate methods. Most importantly, outstanding teachers of Grades 4-8 are curious about the world around them and are enthusiastic about learning the how and why of what they observe in their environments. They have a positive attitude toward learning and are enthusiastic about teaching this unique group of students. They are not afraid to face their own misconceptions or to say "I don't know". The outstanding science teacher is a teacher who draws a crowd of eager learners in and out of the classroom. This course is designed to help students meet these specifications and become confident teachers of science.

## Course Outline

Session	Date	Topics	Assignments Due that Day
1		Course Overview; Student and Professor Introductory Experiences; Discussion of Assignments; The Nature of Science	
2		Teaching through Inquiry, Relating science meet the needs of middle school children; the process skills of science	Read Chapter 2 and 3 Observation and Inference in Science
3		Designing labs and using the tools of technology	Read Ch. 4 Humor is in the Mind of the Beholder
4		The environment of invention; meet the scientists	Read Ch. 5, The "proof" is in the Cookie
6		Environmental Education Resources	Be prepared to run around outside

7		Environmental Education, Trip to the College Lodge	Meet at the College Lodge and be prepared to run around
8		Designing Experiments, Science Fairs	Read Ch. 14, Experiencing Experiments
9		Presenting Experiment Results	Be prepared to finish your experiment and present results to the class
10		Midterm Exam	Use notes, readings and the text to be prepared for the exam
11		Conducting Experiments	Article Summary 2 due
12		Brain-based Science	Read Chapters 16, perception and Conception: Two sides of the same coin,
13		Misconceptions and the Learner	Read Ch. 18, Science as a way of knowing
14		Lab Safety and Precautions, Use of animals in the Classroom	Read provided articles
15		Assessment in Middle School Science	Read Chapter 19, Assessment and the Nature of Science
16		Lesson Presentations	Plan for lesson presentation due (on the day you are teaching)
17		Lesson Presentations	
18		Lesson Presentations	Science Unit Plans due
19		Lesson Presentations	
20		Wrap up, Professionalism	
21-28		Classroom Teaching Experience	Teaching reflections due the last week of the field experience

#### IV. EVALUATION METHODS:

##### KEY ASSESSMENT: Science Unit Plan

**One of the major assignments in this course is the Science Unit Plan. You will construct a science unit plan on the topic assigned to you by your cooperating teacher or professor. This unit must contain a minimum of five instructional days and follow the format contained within the Professional Sequence Two Handbook. You must also include both electronic and print resources in the completion of this unit. Your unit should show how you will be identifying student's prior knowledge and misconceptions, how you will be building new concepts using multiple methods of instruction, and how you will be promoting positive attitudes among your students. It is expected that this unit will become a part of your electronic portfolio. The skills you learned in previous courses regarding lesson planning and unit planning should be utilized.**

##### **Class Participation:**

Many of the skills required by the outcomes can only be learned by active participation in class discussions, activities, investigations, and teaching situations. Students will be expected to demonstrate enthusiasm when learning how to become professional educators.

##### **Written Tests:**

The two written exams, the midterm and final, will be given in class and each will take the entire class time. Exams will be comprehensive and will utilize all the notes, readings and textbook assignments that have been given in class. Format will be multiple choice, true/false, short answer and essay.

**Article Summaries:**

The purpose of this assignment is to become familiar with two journals that will help you immensely over your lifetime of teaching. Evaluate one article from *Science Scope (2008 - 2010)* first. Choose an article of interest and summarize it well enough to know that the article was about. Then give your professional reflections on the article and think about how you could use this information or activity in your classroom. Please turn in this 3-5-page paper, with the bibliographical information using APA style; in on the day it is due.

The second article summary will be chosen from *Discover (2008-2010)*. Choose an article of interest that you think would be helpful to you in your future teaching, summarize the article and then describe how you might integrate the lesson into your future teaching. The 3-5-page paper should demonstrate your creativity in integrating relevant information into your science teaching. Use APA style to reference your article.

**Lesson Presentation**

You will have the opportunity to teach a lesson to your peers before you begin your teaching in the schools. It is recommended that this lesson be from your unit that you will be designing. You will be responsible for twenty minutes of teaching and will teach to 1/2 of the class. Lesson plans for all the students in your group will need to be provided. Criteria for this assignment will include: Creativity/Motivation, Preparation/Organization, Written Communication, Enthusiasm/Positive Reinforcement, Professional Appearance, Oral Communication, Appropriateness to Grade level, Knowledge of the Topic, Assessment, and Overall Presentation.

**Lesson Reflection**

Each student will complete a reflection of each lesson taught in the middle school classroom during the field experience. Reflections for each day will include a self evaluation of what went well, what went wrong and what modifications need to be made. Notations on perceptions of one's own teaching will also be explored.

**V. GRADING SCALE**

Assignments and Grading for MIDL 312 (Point totals are approximate)

Item	Total Points (predicted)	Total Points (actual)	My Score
1. Midterm Exam	100 points	_____	_____
2. Final Exam	100 points	_____	_____
3. Lesson Presentation	50 points	_____	_____
4. Science Unit Plan	100 points	_____	_____
5. Article Summaries	50 points	_____	_____
6. Participation	25 points	_____	_____
7. Lesson Reflection	50 points	_____	_____



Grades will be assigned at 10% intervals.

90-100% = A

80-89% = B

70-79% = C

60-69% = D

59 and below = F

Please keep a written record of the number of points you have earned and the number of points that were possible. Some quick division of the two running totals will give you your grade percentage in class so you will know what your grade is at all times.

**PLEASE NOTE:** Written assignments must be turned in at the beginning of class on the day they are due. A 10% penalty will be assessed for every late day. No exceptions.

## **VI. UNDERGRADUATE POLICIES**

### **ATTENDANCE POLICY:**

Students are expected to each class. If an emergency or illness arises, please notify the instructor so that consequences can be discussed.

### **STUDENTS WITH SPECIAL NEEDS:**

If there are special needs or special circumstances you feel the instructor should be aware of, please schedule an appointment early in the semester to discuss these needs and the ways in which instruction might be adapted. Special accommodations must be documented by the University's Advising and Testing Center.

### **ACADEMIC INTEGRITY POLICY:**

This course will follow the letter and the spirit of IUP's Academic Integrity Policy. The complete policy can be found in your undergraduate catalog.

**VII. REQUIRED TEXTBOOK:** Bell, R. ((2008). *Teaching the nature of science through process skills—activities for grades 3-8*. New York: Pearson.

### **VIII. SPECIAL RESOURCE REQUIREMENTS:**

**Professional Membership with Journal:** Membership to at least one professional science teaching association is required. Choose from the following:

National Science Teachers Association Membership \$32.00 / Choose *Science Scope* as your journal. Join online at <http://www.nsta.org/> . Membership confirmation is required and must be printed out to turn in by *November 1<sup>st</sup>* .

Pennsylvania Science Teachers Association \$15.00 / PSTA Exchange . Membership information at <http://pascience.org/>.

## IX. BIBLIOGRAPHY

- Bass, J., Carin, A., & Contant, T. (2005). *Activities For Teaching Science As Inquiry- 6<sup>th</sup> Edition*. Upper Saddle River: Pearson.
- Buxton, C.& Provenzo, E. (2007). *Teaching science in Elementary &Middle School*. \*  
Los Angeles: New York: Sage.
- Franklin, T, Gerlovich, Martin, R. & Sexton, C.  
(2005). *Teaching Science for All Children-3<sup>rd</sup> Edition*. Upper Saddle River:  
Pearson . \*
- Hammerman, E. (2006). *8 Essentials of Inquiry-Based Science, K-8*. Thousand Oaks: Corwin Press.