

Education 364Z: Curriculum and Instruction in Science
Moravian College
Fall 2015

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Course Meets: Wednesdays 5:30-8:30

Course Goals:

- Student will establish a personal science education mission statement that reflects their overall goals and philosophy for teaching science to secondary students
- Student will create a unit plan using the “understanding by design” framework, PA Academic Standards for Science and Technology for Secondary Education, and the PA Keystone Exams Assessment Anchors and Eligible Content
 - Design activities and assessments that show “true understanding”
 - Use critical reading and problem analysis to foster the transfer of skills from basic fact to real knowledge
 - Use student inquiry to guide independent learning in the subject area
- Student will successfully implement the unit and lesson plans for classroom use with modifications for diverse learners, ELL/ESL, and students with disabilities
- Student will design and implement an academic learning environment in which they act as a guide for all students
 - Create a classroom management plan that uses fairness and consistency to enforce clear expectations and allow for all students to be educated
 - Demonstrate the importance of lab-safety in the secondary science classroom
 - Use technology when necessary to convey instruction
 - Reflect often on approaches, activities, and assessments in terms of effectiveness
 - Familiarize oneself with all resources available (fellow educators, professional organizations, journals, etc) to stay up to date on current science practices
- Student will gain confidence and knowledge base for future science teaching assignments (student teaching, interview process) and build a strong teaching core

Textbooks/Readings:

- *Teaching for Conceptual Understanding in Science* by Richard Konicek-Moran and Page Keeley
- Various other readings that I print out for you
- Moravian College Secondary Education Handbook:
http://home.moravian.edu/public/educ/eddept/handbook/SECONDARY_EDUCATION_STAGE1-4_HANDBOOK_F2014.pdf

Academic Honesty Policy:

Please refer to the Student Handbook for the college’s policy.

Accommodations:

"Students who wish to request accommodations in this class for a disability should contact the Academic Support Center, located on the first floor of Monocacy Hall (extension 1401). Accommodations cannot be provided until authorization is received from the Academic Support Center."

Attendance:

Attendance is mandatory as the nature of this class heavily relies on discussion and presentations by you. If you cannot attend class please let me know with an email/call as soon as possible. In the event of bad weather, I will email you.

Grading:

- Lessons & Assignments - 30%
- Unit Plan – 30%
- Field Experience Journal – 25%
- Unit Plan Reflection – 15%

Assignments in Detail:

Lessons

I will be asking you to design five lessons that will be presented to me in class. They must include a lesson plan (in Moravian College Format), which will be turned in before the lesson is presented. Lesson plans for class presentation, field experience, and your unit plan must all follow the design set forth by the Education Department at Moravian College and is explained in its entirety in your Pre-Student Teaching Handbook. It is also good practice to work formative assessments into your lesson to gauge student learning as the lesson progresses. You will need to include three forms of formative assessment in your lesson plans. Here is a general outline of what is expected:

- A. *Unit* (the unit from which this lesson will be taught)
- B. *Students* (expected audience grade level and academic level)
- C. *Objectives* (Upon completion of this lesson students will be able to...)
- D. *Language Objectives* (the type of language the student will need to learn and use to accomplish lesson)
- E. *PA Academic Standards* (from the standards website)
- F. *Instructional Procedures* (A brief summary of opening, body, and closing of lesson including approximate times of each activity with inclusion of any worksheets, websites, direction, powerpoints, etc)
- G. *Strategies for Diverse Learners* (any conditions from 504 plans, IEPs, ESOL or specially designed instruction students)
- H. *Evaluation Procedures* (How you will know student met your objectives)

Ok....now on to the lessons you will be designing for class presentation specifically:

- Classroom Activity Lesson (40 min) – designed around a classroom activity of your choice
- Internet Assisted Lesson (40 min) – designed to use the internet in some way
- Current Event Lesson (40 min) – must use a current event in biology of your choice
- Laboratory Lesson (40 min) – a lesson for a lab day – include the lab write-up that students will follow
- “Snow Day!” Lesson (20 min) – your principal just announced you are leaving after fifth period because of the weather and your students are rejoicing but you still have two periods to

teach! How will you make sure that fourth and fifth period get the same essential knowledge that first through third got? Quick, take one of the lessons you already created and modify it for half the time, being sure to keep it just as effective.

Lesson Plan Critique

After each presented lesson, give yourself a critique. Did you accomplish what you'd hoped? What do you think went particularly well? If you could do it all over again what would you keep and what would you change? You should be asking yourself these questions after every lesson, and it often ends up that the classes at the end of the day get your best version of the lesson you presented in the morning. You can write this up in a few paragraphs and send it to me in an email within a few days of the lesson.

Personal Mission Statement / Philosophy

While you may have a general mission statement written from another course, I'd like you to think about biology specifically. What do you hope to accomplish in this subject area? Why should secondary students study biology? What are your goals in teaching biology? How will you assist students in learning the PA biology standards? How will you assist LD and ELL students in learning biology? Think about all of this and write it up in about a page.

Website Reviews

I will ask you to find three websites that are specific to assisting teachers or students in your subject area. For each website, turn in a paragraph review highlighting specifically how it helps with learning any of the PA standards and how you would specifically use it as a tool in the classroom. Please also attach a print out of the "home" page.

Textbook Review

At some point in your career, you and your department will be asked to choose a new textbook for your students. This can be overwhelming because there are so many choices out there. I want you to keep it simple and choose a biology text (it could be the one from your field experience). First, I will provide you with a rubric to judge the text on and then I want you to conclude with a two page review of what YOU personally think are the strengths and weaknesses of the text. Be sure to explain how the text will help address the PA standards and exactly how you would use this text in your class (and if you wouldn't, why you wouldn't).

Reading Assignments and Prompts

I will also assign some readings from the text and give you prompts to write small, one-page reactions to. These will be assigned during class.

Unit Plan Overview

Throughout this semester you will be creating a unit plan, which is a set of lesson plans that are consciously connected to each other to educate students on a broad theme in your subject area. It is up to you to take the broad goal and decide what the best way is to teach this to a group of students systematically for maximum true understanding. The unit plan should be designed around the Understanding by Design template and should be geared toward your particular students in your field experience. This unit should also be designed around the topic you and your coop decide would

be best for you to begin your pre-student teaching. You will need to teach a minimum of ten lessons to fulfill your field experience and your unit plan must include either 10 block lessons or 15 period lessons. This means that your unit plan may include more lessons than you are required to teach. It also means that your unit plan might include lessons that satisfy your assignment but were not actually taught in class. By all means, teach beyond your minimum ten lessons if you are given the opportunity, it's the best practice you can get!

In order to help you understand what you should be doing during your field experience to assist with this unit plan, consider the following:

Early in the field experience:

- Discuss what topics are upcoming in your coop's class and decide what you will be designated to teach
- You may wish to ask for copies of the summative assessments to help with you plan your lessons
- Observe the students closely and discuss them often with your coop to figure out their diverse learning nature (as well as cultural diversity)
- Discuss and observe the students with IEP's and ask to see their IEP so that you can meet their needs in your lessons (you will be asked to attend an IEP meeting so this is important)
- Explore the school's website to get a sense of the school as a functioning unit; this can include going to lehighvalleylive.com or Wikipedia or simply observing the culture of the school hallways between periods. Observation is key for getting a general feel for how the school presents itself to you!
- Ask your coop anything and everything – they are a wealth of knowledge and are there to help!

What needs to be in a binder held together for the unit plan?

- A. Table of Contents**
- B. Personal mission statement**
- C. Description of the school and community in which you are teaching** – this one-two page description should come from your discussions with your coop, your own observations, and any researching you did online. Please ask yourself how the information about this neighborhood/community will affect your teaching and your subject area.
- D. Description of the students you are teaching** – again, one or two pages about the learning styles of the students. Also think about their reactions and feeling toward your subject area. What is the climate in the classroom? How are they learning? What have you seen works best? How is their reading/writing ability? How will decide to best educate these students based on your observations?
- E. Diversity in the classroom** – one or two pages describing the different learning accommodations in place for students with disabilities, ELL and IEP students. What adaptations have you included in your lessons to meet the needs of these students? Also, include a small summary of the IEP meeting you attended (what happened, how were decisions made, how will the plan be implemented, etc)
- F. Essential Questions (3) and Enduring Understandings (5)** – these are of your creation and should unite the lessons in the unit plan. Be sure to show how your teaching practices are enhancing the student understanding of these broad themes.
- G. Summative Assessment** – you must create a summative assessment that shows how well the students achieved deep understanding of your broad goals. It should require the students to

perform a personal and authentic demonstration of what they learned from your unit plan. You may or may not be allowed to use this assessment on your actual students.

- H. **Individual Lesson Plans** – 10 block lessons or 15 period lessons that convey your essential questions and enduring understandings for the unit. They need to be in the format of the Moravian College Secondary Education Handbook and should include any worksheets, powerpoints, warm-ups, etc you used during the lesson. Each lesson plan should include THREE ways you have used formative assessment during the lesson. Also, be sure that anyone reading your lesson plan can clearly see where you have made modifications for any students with special needs (especially the language objectives for ELL students).
- I. **Understanding by Design** – please share one or two pages of your thoughts on the idea of understanding by design and how it assisted you in shaping your unit plan and the summative assessment. How will you carry out your career with this idea under your belt?
- J. **Technology** – one page about how technology was used in your classroom both before you teaching and during your teaching. How did technology enhance your lessons? How did you specifically employ technology to help your students with your enduring understandings and essential questions?
- K. **Rounding it Out** – If this really was your classroom and your students, and you really were teaching a unit from start to finish, what else would you have done? Would there be more lessons you would have included? Would there be more labs? How could you have rounded this unit out assuming you had more than 10/15 lessons to do it?
- L. **Resources** – include a list of at least ten sources of information that helped you create this unit plan. It can include people, books, websites, articles, etc. It should NOT include the textbook from your coop’s class or the pre-made tests and worksheets that come with the textbook.
- M. **Appendix** – here is where you can include anything else you would want an employer (or me) to see. You can include your observation notes, student work (with the name blacked out), outside research you really liked – anything! Just organize it with letter labels (ex. Appendix A: example of student work)

Field Experience Journal

During your field experience you will be keeping a journal of sorts with one or two entries per week that you can email me. These only needs to be a few paragraphs, though they may be longer if it’s a particularly interesting occurrence! What are some things that could be in a journal entry? This list is meant to inspire you and is not inclusive:

- What is your coop’s teaching structure? What is the daily structure?
- What unique strategies are you seeing in the classroom?
- How is technology being used?
- Do you see anything you learned about from a prior ED class?
- How does your coop use the textbook?
- What is classroom management like? What do you see as being effective?
- How are standards being addressed? How is your coop preparing for the state assessment?
- What are other science teachers in the department doing? (if you can observe them)
- What is the cultural diversity like? How is the learning meeting all students’ needs?
- Discreetly observe any students with special needs and observe their special accommodations – you may want to interview their case manager or ESL teacher
- Feel free to pick any students that interest you throughout your observation
- REFLECT on your lessons (remember you are teaching ten!)

What is the journal NOT doing?

- Critiquing your coop
- Summarizing play-by-plays of your time in the school
- Using real names of students

Unit Plan Reflection

Using your journal entries and your observations and your unit plan, I would like to end it all with a unit plan reflection. Here you will answer how well your students grasped and truly understood your enduring understandings and answered your essential questions. This is where saving student work will be key so that you can analyze the amount of learning that happened. You should have a lot of rich data to pull from with your formative and summative assessments.

- *How well did your students grasp the objectives of your lessons?*
- *How well did ALL of the students learn?*
- *How could my teaching be more effective?*
- *How would I change this in the future?*

Your three to five page critique should include the following:

- A) A brief reintroduction of your unit plan and its major objectives – perhaps a revisit to your enduring understandings and essential questions
- B) A description of the teaching strategies and methods you employed while teaching in your field experiences. Why did you choose these methods? Were they effective? How?
- C) A comprehensive analysis of student learning with data from your observations, student work, etc to demonstrate your teaching's effectiveness to students. This is extremely similar to the new SLO or Student Learning Objectives all PA teachers were required to complete this year. Use this section to prove students had a true understanding of your objectives.
- D) A discussion of any ELL/ESL students and students with IEP's and how you accommodated their learning according to their unique needs. How did you make sure these students learned your objectives? How did attending an IEP meeting change the way you taught that particular student?
- E) A discussion on how technology impacted your lessons and how it hindered/enhanced your lessons. Would you use technology differently in the future? Why? How?
- F) Explain your assessment style (both formative and summative) and tell me how they added to the effectiveness of your teaching. Why did you choose the methods you chose? Did they represent student learning in a way you approve of? Do your assessments truly indicate your teaching success?
- G) Explain what you have learned about understanding by design and its framework. How did you use understanding by design in your unit plan creation? Would you use this method in the future? Why? How?
- H) Did your unit plan reflect your personal philosophy for teaching biology? Did your personal mission statement change as a result of this experience?
- I) A conclusion on this course in general – this is extremely broad and extremely personal to you. You may want to discuss what you will take away from this course or discuss your personal strengths and weaknesses that were highlighted in this experience. Maybe you have a newfound confidence in the classroom! What will you take with you from this course into student teaching?

Class Outline *Subject to change

Date	Topic of Discussion	Assignments Given	Assignments Due
9/2	1. Introduction 2. Personal Philosophy 3. Understanding by Design <ul style="list-style-type: none"> ● <i>What it is and why it works for science</i> 	1. Personal Mission Statement 2. Activity Lesson Plan	
9/9	1. Teaching Biology Today <ul style="list-style-type: none"> ● <i>Biology as a big picture</i> ● <i>Helping students make connections back to the big picture so they see how each topic fits into the larger biology course</i> ● <i>Interconnectedness for understanding</i> 	1. Current Event Lesson Plan 2. Reading Assignment #1	1. Personal Mission Statement 2. Activity Lesson Plan 3. Lesson critique emailed
9/16	1. Teaching Biology Today II <ul style="list-style-type: none"> ● <i>Biology as it connects directly to the student, their family, community, future, and environment (they are the best example for things in class because it's a direct relationship to the "foreign" material)</i> ● <i>Using current events in biology to develop student inquiry and importance of topic</i> 	1. Internet Lesson Plan 2. Reading Assignment #2	1. Current Event Lesson Plan 2. Lesson Critique emailed 3. Reading Assignment #1
9/23	1. Planning and Lesson Creation <ul style="list-style-type: none"> ● <i>Building on what they know – why this is key in biology</i> ● <i>How to teach complicated processes in biology for true student understanding</i> ● <i>Integrating the state standards and anchors</i> 	1. Lab Lesson Plan 2. Website Reviews	1. Internet Lesson Plan 2. Lesson Critique emailed 3. Reading Assignment #2
9/30	1. Laboratory <ul style="list-style-type: none"> ● <i>Safety and management in the lab</i> 	1. Snow Day Lesson Plan 2. Reading Assignment #3	1. Lab Lesson Plan 2. Lesson Critique emailed 3. Website Reviews

	<ul style="list-style-type: none"> ● <i>Creating a lab that requires student independence and self-guided learning</i> ● <i>Why this doesn't have to be a stressful situation – organization!</i> 		
10/7	<p>1. Resources</p> <ul style="list-style-type: none"> ● <i>When is technology necessary? How can it be most useful?</i> ● <i>Graphic organizers for ALL students</i> ● <i>VISUALS!! For ALL types of learners (A picture is really worth a thousand words)</i> ● <i>The textbook and its place in the science classroom</i> 	<p>1. Textbook Review 2. Field Journals</p>	<p>1. Snow Day Lesson Plan 2. Lesson Plan critique 3. Reading Assignment #3</p>
10/14	<p>1. Classroom Management</p> <ul style="list-style-type: none"> ● <i>Why teaching the whole class period is actually not the best idea</i> ● <i>Observation skills – what you can learn by watching your students</i> ● <i>When will most disruptions occur and how to deal with them FAIRLY and CONSISTENTLY, which is what students will be watching for</i> 	<p>1. Field Journals 2. Unit Plan</p>	<p>1. Textbook Review 2. Field Journals</p>
10/21	<p>1. Assessment</p> <ul style="list-style-type: none"> ● <i>The art of creating an assessment that will show what students learned – not always your standard multiple choice</i> ● <i>When to assess – often!</i> ● <i>Formative assessments and Summative assessments in the science classroom</i> ● <i>Using UBD</i> 	<p>1. Field Journals 2. Unit Plan Rough Draft</p>	<p>1. Field Journals</p>
10/28	<p>1. Creating Interest</p> <ul style="list-style-type: none"> ● <i>Getting students “into” science</i> ● <i>Making it about the students – they are biology and EVERY student can relate</i> 	<p>1. Field Journals 2. Work on Unit Plan</p>	<p>1. Field Journals 2. Unit Plan Rough Draft</p>

	<ul style="list-style-type: none"> • <i>Student choice in your lesson/assessment</i> 		
11/4	<p>1. Special Education and English Language Learners</p> <p>2. IEP's</p> <ul style="list-style-type: none"> • <i>How to be sure you are meeting the needs of ALL students</i> • <i>Modifying assessments in science</i> • <i>Visuals, graphic organizers, videos, bi-lingual glossaries, etc</i> • <i>Differentiated Instruction in the science classroom</i> 	<p>1. Field Journals</p> <p>2. Work on Unit Plan</p>	<p>1. Field Journals</p>
11/11	<p>1. Biology Specific Ethics and Concerns</p> <ul style="list-style-type: none"> • <i>Evolution</i> • <i>Animal Dissection</i> • <i>Gene manipulation and biotechnology</i> • <i>Genetic and chromosomal mutations and disorders</i> • <i>How to handle these professionally</i> 	<p>1. Field Journals</p> <p>2. Work on Unit Plan</p>	<p>1. Field Journals</p>
11/18	<p>1. Biology and the rest of the High School</p> <ul style="list-style-type: none"> • <i>Integrating the math curriculum of your students into your science classroom – it will naturally fit</i> • <i>Reading and Writing are not just for English class!</i> • <i>Integrating Health, PE, Psychology, Family and Consumer Science – if you look hard enough you will be able to facilitate almost any topic into biology for a more holistic student learning experience</i> • <i>Asking what your colleagues are doing in difference subject areas to strengthen FULL understanding across the curriculum</i> 	<p>1. Unit Plan Critique</p> <p>2. Field Journals</p>	<p>1. Unit Plan Final Copy</p> <p>2. Field Journals</p>
12/2	<p>1. Planning a Year</p> <ul style="list-style-type: none"> • <i>How to pick and choose a TON of science into easily digestible units</i> 	<p>1. Reading Assignment #4</p> <p>2. Unit Plan Critique</p>	<p>1. Field Journals</p>

	<ul style="list-style-type: none"> ● <i>Macro to micro? Micro to macro? Your choice!</i> ● <i>How do you decide what students really need to know and the best way to plan your teaching</i> 		
12/9	<p>1. Closing and looking ahead to student teaching</p> <ul style="list-style-type: none"> ● <i>Reflecting on your field experience</i> ● <i>Finding your strengths in this subject and using them in your teaching</i> ● <i>Making biology your own – finding your niche</i> 		<p>1. Unit Plan Critique</p> <p>2. Reading Assignment #4</p>