**MATERIALS AND METHODS OF SCIENCE TEACHING**
**Techniques in Secondary Education – Science**
Education 337
Fall – 2018 Room 206/208 CPS Bldg.
Tuesdays & Thursdays 11:00 am - 12:15 pm
Practicum: 50 hour minimum – PJ Jacob's/ BF J.H. SPASH or ???

Instructor: Dr. Perry Cook Office: Room 452 CPS Phone: 346-3263
Office Hours: Tuesdays 1:30 - 3 pm (1st 8 weeks) or any available time by appointment

## *Course Philosophy*

Welcome to an exciting semester of learning how to teach science in a secondary classroom! Throughout this semester you will be involved in cooperative and independent activities, both on campus and in a field setting, that will enable you to become a confident, competent, and motivating teacher of high school or junior high/middle school science.

> Science is my passion;
> Politics my duty!
>
> *Thomas Jefferson*

> Tell me and I forget;
> Teach me and I may remember;
> Involve me and I learn!
>
> *Ben Franklin*

## *Course Materials*

Required:

Trowbridge, Bybee and Powell, 2007. Teaching Secondary School Science: Strategies for Developing Scientific Literacy. 9th edition. Merril/Prentice Hall, Columbus, OH
Additional readings on reserve in the LRC or Resource Room or D2L - TBA
One journal notebook identified with your name and course number.

**Major Course Goals & Learner Outcomes**
**Students will:**

1. Develop and increase confidence in teaching science.
2. Develop and demonstrate enthusiasm for teaching science.
3. Investigate basic science concepts that are appropriate for secondary students.
4. Become familiar with and implement DPI guidelines for science instruction.
5. Explore and practice strategies to use in the science classroom including: cooperative learning, conceptual change, problem solving, critical thinking, learning cycles and classroom management.
6. Plan and teach a hands-on science lesson in a secondary classroom.
7. Develop a deeper understanding of the nature of science: it's attitudes, processes, and products.
8. Begin to develop a philosophy of teaching secondary science (learner's role, teacher's role, and learning environment).

9. Become more knowledgeable about science resources, including technology, to enhance classroom teaching.
10. Gain experience in evaluating student conceptual development and performance in secondary science.
11. Become aware of and learn strategies to provide for equity and safety in the science classroom.
12. Become familiar with national and state standards in science.
13. Become familiar with the InTASC, Wisconsin Teacher Standards, NGSS and edTPA.
14. Value the importance of utilizing learning activities, resources and assessments that are effective/appropriate (best practice) for students with diverse backgrounds (male and female, multi-cultural, socio-economic), needs and learning styles.

Although all INTASC and Wisconsin Teacher Standards will be addressed to some degree the following list identifies those that will be the major focus of this course. Please refer to pages 65 and 66 of the following link for comparison of the INTASC and WTS:
http://www.uwsp.edu/education/Documents/fieldExp/STHandbook.pdf

## *InTASC & WISCONSIN TEACHER STANDARDS*

This course will focus on the following InTASC and WTS:

**InTASC #8 Instructional Strategies.** The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

**WTS #4 Instructional Strategies**. The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

*Knowledge*

The teacher can identify multiple approaches of instruction to encourage student learning with respect to a wide variety of content concepts.

The teacher matches appropriate instructional strategies to specific content learning goals.

*Skills*

The teacher designs lesson plans that reflect their understanding of appropriate instructional strategies.

The teacher can model the selection of appropriate instructional strategies to specific content learning goals.

*Dispositions*

The teacher recognizes there are multiple valid instructional strategies that encourage and foster student learning in science.

The teacher values the creative use of demonstration and laboratory instruction when teaching various science concepts.

**InTASC #5 Application of Content.** The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues. (In this case directly aligned with WTS #6)

**WTS #6 Inquiry, Collaboration.** The teacher uses knowledge of effective verbal, nonverbal and medial communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. (part of Black Box, Nature of Science, Unit Plan, Q&A, LAMP lecture)

*Knowledge*

The teacher applies collaborative learning strategies to problem solve in the Black Box and Three P's (Problem Posing, Problem Solving, Peer Persuasion) activities.

The teacher is able to critically evaluate the advantages and disadvantages of various communication techniques within the context of the classroom setting.

The teacher is able to apply current understandings of inquiry discussion techniques to specific lessons based upon conceptual cognitive demand.

*Skills*

The teacher is able to demonstrate pedagogical savvy within microteaching and lesson planning contexts by carefully creating discussions that appropriately foster conceptual learning.

The teacher is able to effectively conduct discussions on specific science concepts.

The teacher is able to encourage collaboration within laboratory team settings.

*Dispositions*

The teacher is able to value and model appropriate science attitudes such as open mindedness, curiosity, tenacity in problem solving and creativity in thinking.

**InTASC #7 Planning for Instruction.** The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

**WTS #7 Methodology.** The teacher plans and delivers instruction based upon knowledge of subject matter, students, the community, and curriculum goals. (Microteaching)

*Knowledge*

The teacher is able to identify the major components within the body of an effective lesson plan format.

The teacher is able to distinguish between levels of quality within the evaluation of rationales, objectives, procedures and other lesson components.

Teacher is able to construct and evaluate practical lesson plans.

*Skills*

The teacher is able to effectively instruct using a lesson plan they constructed.

The teacher is able to appraise their knowledge of subject matter, students, the community, and curriculum goals while teaching (planning and instruction).

*Dispositions*

The teacher values the implementation of multiple instructional strategies based on knowledge of subject matter, students, the community, and curriculum goals.

**InTASC #6 Assessment.** The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

**WTS #8 Assessment.** The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner. (Unit Plan III)

*Knowledge*

The teacher recognizes the advantages and disadvantages to using various current assessment tools and strategies in science.

The teacher is able to compare and contrast formal and informal assessment measures.

The teacher is able to judge the validity of types and quality of construction of various assessment questions and instruments.

*Skills*

The teacher is able to construct valid assessment instruments in both a content rich (lecture material) and performance-based (laboratory) context.

The teacher is able to construct both quiz and test level assessment instruments.

The teacher is able to create and utilize effective informal assessment strategies within the body of their instruction.

*Dispositions*

The teacher is able to clearly communicate to parents the strengths and weaknesses as well as justify the use of their chosen assessment strategies.

The teacher will value the use of both personally and professionally developed assessment tools.

**NOTE:**
All Education 337 students are now required to post evidence of satisfactory/exemplary performance with respect to the 10 WTS to their portfolios. Education 337 student performance tasks include the Unit Plan as well as any other project/assignment that meets the teacher standards.

**Common Core Standards and RtI**

Wisconsin has adopted the common core standards in several subject areas. However, the Department of Public Instruction has not adopted the Next Generation of Science Standards that was recently released. Here is a link to the NGSS: http://www.nextgenscience.org/next-generation-science-standards. The NGSS breaks down the science content for each grade level. We will continue to use the Wisconsin Model Academic Standards to guide our curriculum and learning until a change is made at the state level. Here is a link to the WMAS in Science: http://standards.dpi.wi.gov/stn_sciintro. The WMAS is more general in that it only breaks the content into by grades 4, 8 and 12.

Please refer to the link attached if you want to find the common core standards in other curricular areas. http://standards.dpi.wi.gov/stn_ccss

Wisconsin has a unique vision for the implementation of the framework for RtI. The attached link provides you that framework as well as additional links to PBIS and SIMS. You are strongly encouraged to use this framework when thinking about instructional design. There is also a wealth of resources for understanding Wisconsin RtI located at the Wisconsin RtI Center website that is also included. http://rti.dpi.wi.gov/ http://www.wisconsinrticenter.org/

**UWSP Community Bill of Rights and Responsibilities**
UWSP values a safe, honest, respectful and inviting learning environment. In order to ensure that each student has the opportunity to succeed, a set of expectations have been developed for all students and instructors. This set of expectations is known as the Rights and Responsibilities document, and it is intended to help establish a positive living and learning environment at UWSP. For information go to: http://www.uwsp.edu/stuaffairs/Pages/rightsandresponsibilities.aspx
The rights and responsibilities document also includes the policies regarding academic misconduct, which can be found in Chapter 14. A direct link can be found here:
http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SSR-2010/rightsChapter14.pdf
**American with Disabilities Act**
The American Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities. For more information about UWSP's policies, check here:
http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/ADAPolicyinfo.pdf
If you have a disability and require classroom and/or exam accommodations, please register with the Disability and Assistive Technology Center and then contact me at the beginning of the course. I am happy to help in any way I can. For more information, please visit the Disability and Assistive Technology Center located on the 6th floor of the Learning Resource Center (Library). You can also find more information here:
http://www.4.uwsp.edu/special/disability/
Again, any special circumstances that are unique to you as a student learner can be discussed at any time. Please make special arrangements to meet privately during my office hours.

## *INTRODUCTION*

*How can science teachers effectively plan and teach in ways that promote meaningful science learning in their students?*

This question is the central focus of our course. Besides providing you with an introduction to the traditional materials and methods used in science education, this course will challenge you to reflect on past experiences, the nature of science, issues of learning and instruction, and the practice of science teaching. The components making up a science teacher's knowledge base for teaching will be explored as you continue to develop your own foundation for teaching. You will participate in a variety of tasks, assignments and experiences designed to assist you in this growing process.

## *COURSE FORMAT*

This course includes the following graded components. Assignments C, D, E and G must be completed in an acceptable manner in order to receive a passing grade for the course and be recommended for a student teaching placement.

| | Task | Percent of Grade | WTS |
|---|---|---|---|
| A. | Class Participation | 10 | All |
| B. | Peer Teaching | 10 | 1, 3, 4, 6, 7, 8, 9 |
| C. | Unit Plan I: Curricular Planning Tasks | 16 | 1, 4, 7, 9 |
| D. | Unit Plan II: Instructional Tasks | 25 | 4, 5, 6, 7 |
| E. | Unit Plan III: Assessment | 9 | 1, 3, 8 |
| F. | Student Choice | 10 | Variable |
| G. | Practicum Reflections and Assessments | 5 | 9, 10 |
| H. | edTPA Preparation | 15 | All or most |

Final course grades will be determined using the proportion of total points earned during the semester according to the following scale:

## *Grading Scale*

| Points | Grade |
|---|---|
| 100-95 | A |
| 94-93 | A- |
| 92-91 | B+ |
| 90-87 | B |
| 86-85 | B- |
| 84-83 | C+ |
| 82-78 | C |
| 77-76 | C- |
| 75-68 | D |
| Below 68 | F |

## *A. CLASS PARTICIPATION - 10 pts*

Your active participation is a crucial aspect of this course. If you do not regularly attend class or visit your high school, you will be unable to share in the many activities and experiences that will be undertaken during this semester. Remember that school administrators are seldom understanding of unexcused absences or chronic lateness. Now is the time in your professional development to work on your attendance and promptness. Participation and class activities **CANNOT** be made up and **NO** extra credit/supplementary work will be provided. In case of an emergency which will require you to be absent from class, call me at my office and leave a voice mail. One excused absence will be allowed with no point deduction **IF** arranged prior to absence. Each additional lack of attendance and therefore, participation will result in a five (5) point reduction in the participation grade.

***NOTE:*** Attendance requirements for the practicum experience at a local field site must be met. Students who meet the on campus expectations for this class yet exhibit excessive tardiness, unexcused absences, poor or unsatisfactory performance in their practicum field experience with respect to the Wisconsin Teaching Standards will receive one of the following:
A. a **failing grade in this class** with or without the option of repeating the entire experience,
B. an **incomplete grade earned in this class**, the *disqualification* of student teaching the following semester and the requirement of successfully completing an additional practicum experience prior to student teaching. The field experiences office will coordinate this placement.

## *B. PEER TEACHING - 10 pts*

In addition to an initial peer teaching experience and a science concept demonstration, you will sign up for a 30 minute period of classroom time to practice teaching with a science lesson to your peers. You will address the Ed 337 students as both colleagues as well as high school students during this action packed time segment. More details will be given in class. Please review the assessment forms in found in D2L prior to your actual teaching time. Plan to have a colleague video record both your instruction and interaction with student learners. You may choose to use this video recorded instruction as the video segment you reflect on and write your faux edTPA Task 2 commentary about.

## *C. UNIT PLAN I - 10 pts*

As you begin to plan for instruction it is important for you to develop certain skills. Each science educator must create their own Unit Plan. Unit Plan I is designed to help you think about how we plan for and select concepts/curriculum for the science classroom.

The unit plan should start with an introduction in essay or paragraph form. This introductory essay should include the following four components with appropriate use of Academic Language when applicable (please incorporate theory and key best practice research findings throughout):

A. **A central problem or question** that would serve as the focus of the unit. A good unit should have only one such problem or question. This central question is the real world, out of school goal for your science unit.

B. An explanation of **why** it is important for students to learn how to answer that problem or question if they are to function as scientifically literate adults.

C. A description of the solution to this problem or question from the point of view of a scientifically literate adult, explaining the knowledge that such an adult would use and the skills or procedures that he or she should be able to accomplish in real world settings. The reason for thinking about the solution from the standpoint of an adult rather than a student reflects the terminal nature of most high school students' science experiences. The majority of students will NOT take additional science classes in college or other daily life experiences. This is a judgment that you might alter based on the characteristics of a particular group of students.

D. A description of the problems that students encounter (or that you expect them to encounter) in solving the problem or question. These problems could be presented as misconceptions, incomplete strategies, etc. One good example of an organizing strategy is the pre–conception – goal conception chart. It is not sufficient to state only that the students don't know whatever is listed in Part C. You can gather information for this section from course readings, interviews with students, teachers, and from tests or quizzes as available. Although you may draw on your own experience as a student, do not just speculate about learning problems. Support your assertions with examples and evidence.

Concept Map

A second major part of Unit Plan I is a concept map analyzing and representing the disciplinary knowledge and skills needed to answer the central question. The map should be prepared in sufficient detail to include all the content that you would expect the students to understand (note that this is much different from what you understand...). It is essential that you clearly label the lines linking the concepts.

The map should also include appropriate examples, analogies, and other items that would help a student bridge gaps between his/her understanding and the relevant concept or rule. These might be added in a different color to distinguish them from the actual science content. Identifying these will help you develop your repertoire of "pedagogical content knowledge."

Text Analysis

Research on classroom teaching practices suggests that over 95 percent of all science teachers use some form of prepared curriculum about 90 percent of the time. While I am not advocating that you follow such a pattern, you should realize that your textbook or other content rich resource will serve as a primary source of information for students. Thus, it is important for you to know how your topic is treated in this resource if you are to be successful in designing instruction that will result in meaningful learning.

Find a textbook passage or prepared curriculum resource which outlines this topic from a middle or high school text (you can use the texts in the science resource center at UWSP, texts from the IMC on campus, resources from PJ Jacobs JH, SPASH, or some other online source...make effort to ensure the resource is no more than five years old).

1.Make hard copies of relevant pages or curricular content resources and cite the source. PDF’s and content rich presentation resources (PPT or PREZI) may serve as acceptable alternatives.

2.Define the following terms, discuss how they are similar/different, find and describe examples of these terms in your text. Indicate if there are no examples of any. You may find it helpful to remember that some ideas are likely to fit into more than one category:

a. science facts and science generalizations;
b. concepts, laws, and theories;
c. empirical and theoretical entities.

3.Identify an important question asked in the resource which can be explored by conducting an experiment or other lab activity. If no questions are asked explicitly in your content resource, write one which fits appropriately with the content/context of the passage.

4.Use your analysis from 2 and 3 above to critique your content resource and topic you chose. In doing so, you should comment with appropriate examples on the completeness and appropriateness of the content of this passage with respect to the nature and structure of science as it is communicated to students.

5.Explain in detail how you would help students to use the text or resource to develop meaningful understanding of the content and of the nature of science.

6.Complete first section of the SOE Lesson Plan template.

Unit Plan I should be no more than ten pages in length, not including charts and the concept map. Include references and ACADEMIC LANGUAGE as appropriate. It is strongly suggested that each educator work on the parallel edTPA Task I assignment simultaneously. **Unit Plan I is due at 11:00 a.m. on Tuesday, October 9th, 2018. edTPA Task I write up is due Thursday October 11th, 2018.**

## *D. UNIT PLAN II - 15 pts*

The second part of your overall unit plan is to design instruction that will enable you to help your students through the process of conceptual change. The lessons will be the product of refining and extending the structure you established in Unit Plan I to include (a) specific goals and outcomes for the unit, and (b) a series of lessons which will enable students to achieve the outcomes. These are described in more detail below.

### A. Intended Learning Outcomes

This section should include a list of specific intended learning outcomes (ILO's), (sometimes referred to as subgoals, or objectives). It should clearly be a product of the analysis of the content, related inquiry skills, and affective goals you developed in Unit Plan I. There is no set minimum number of outcomes for a unit. Typically, units extending over two weeks will address 20 – 30 specific outcomes. Some of the outcomes will focus on specific science content, others will address specific cognitive skills such as problem analysis, observation, measurement, data analysis, or research design. There may be some psychomotor skills that need to be developed to accomplish laboratory activities. Finally, each unit should reflect some specific affective goals designed to spark students' interest in scientific issues.

You should include as many content–oriented outcomes as are appropriate. Remember that these are not necessarily behavioral, but should reflect what the learner should understand at the end of the unit. Do keep in mind, though, that they will need to be assessed (in Unit Plan III). Thus, each outcome will need to be very specific with respect to the desired outcome. You must include outcomes that emphasize higher cognitive levels (analysis, evaluation and synthesis...) as well as lower cognitive levels (recall, knowledge, comprehension, application...). **Indicate the cognitive level for each outcome.** Labeling the levels in a color coding format in the margin seems to work well.

In addition to the content outcomes, you must include at least **two** that address specific cognitive skills and two affective outcomes that are specific to the unit. These are not just the usual skill and affective goals that would be repeatedly addressed throughout the year. These are goals that are more unique and specific to the unit central question.

## B. Teaching strategies

This section should contain specific lesson plans that will help your students through the process of conceptual change. Please apply the theories discussed and explored throughout prior introductory education classes. Academic language is an integral component as you justify the choices you have made for instructional methodology. These lesson plans should be built around the central question for your unit and the analysis of the unit content and students' thinking that were completed in Unit Plan I. The lesson plans should make use of the teaching strategies and techniques developed in methods. Follow the School of Education Lesson Plan Template as you develop the context and demographics of the learning environment and write UbD/edTPA formatted Lesson Plans.

The overall unit plan must include **five detailed lessons** (*excluding* reviews and full–period tests). **You may choose to develop 10-15 lessons to practice what science teachers in the field do when teaching units.** These other lessons can be represented in outline/activity form as discussed in class.

There is nothing special about 10-15 lessons, other than the idea that it reflects an extended period and in many cases is similar to the time frame used by experienced teachers in semester and yearly planning. If you find that your unit extends beyond ten lessons, that's fine. Prepare outlines for as many lessons as you feel appropriate. The key is to develop skill in thinking about how much can be accomplished in a given time rather than stuffing everything you want students to learn into an arbitrary time frame. The edTPA Task 1 requires planning for and writing 3-5 consecutive lessons that are part of a science unit. However, it also requires a much more detailed, theoretical framework and evidence based commentary.

Each lesson plan must clearly identify both teaching and management strategies, including at least:

–the outcomes addressed by each segment of the lesson and the corresponding Wisconsin Model Academic Standard AND **NGSS**

–the materials needed to conduct the lesson (those items that require special preparation or gathering...)

–the sequence of teaching modes and strategies used

–the tasks that students will be required to complete during each lesson segment

–questions, anticipated student responses, and appropriate responses

–specific strategies for collecting and using feedback from students, and for giving feedback to the students

–clearly identified transition points within the lesson

–time estimates for each part of the lesson

-a plan for differentiation for students that are GT and students with special needs

–use appropriate **academic language** throughout the lesson plan

-UPII must include instructional delivery tools such as PPT or Prezi or Google Drive slides or even flipped classroom video such as screencast o matic or Khan academy style.

**NOTE:** In addition to the above format, your unit plan should have at least one lesson that includes a technology component and still follows the above format description. Unit plans that include additional lesson plans beyond the five LP's may be more likely to receive a higher grade. Additionally, **a table of contents** clearly helps organize your UP.

**Unit Plan II is due at 11:00 a.m. on Tuesday, October 30th, 2018. edTPA Task 2 is due at 11:00 a.m. on Thursday, November 1st, 2018.**

## *E. UNIT PLAN III - 10 pts*

Assessing Student Learning

Although you will constantly assess students' progress using various formative evaluation strategies and the feedback you get during instruction, at some point you will need to formally assess students' understanding and clearly measure how well they have met the planned outcomes. The purpose of this assignment is to develop formative assessment strategies and prepare a formal summative instrument that assesses students' understanding of the unit you have designed during Unit Plan I and Unit Plan II.

## Written Assessment

The written assessment portion of the assignment consists of three parts:

1. A unit test that you think adequately measures students' understanding of the unit. It should contain a variety of different kinds of test items (multiple choice, completion, prediction and explanation combinations, short answer...). The length is up to you, but it will be determined by the number of learning outcomes in your unit, and the ways that individual test items apply to each outcome. Keep in mind that unit tests are not marathons...nor are they 5 minute writing exercises. Students should not be confronted with a test that appears impossible to complete, which requires them to rush and thus not think carefully, or one that may appear trivial.

The test should include an appropriate heading section which identifies the test (will you have more than one version?) containing places for students to record identifying information, and directions for completing the test.

The layout of pages should help you deal with grading tasks. Point values for each section or individual item should be included in the body of the test. Use **bold facing**, underlining, and *italics* (or whatever you choose) to emphasize key words, directions, exceptions. It is important, though, to use them consistently. Students will quickly recognize patterns in the way you do things; deviations from those patterns are often the source of problems or confusion.

2. A table of specifications that identifies the relationships between test items and the unit learning outcomes. It should follow the format modeled in class, although you may use some other way to identify the level of complexity of each test item.

3. A key that identifies what you consider to be important components of appropriate responses and how partial credit (if appropriate) will be awarded. You can do this using a copy of the test. It is also a good way to determine if you've left enough space between items for students to write responses.

## Formative Assessment Strategies

For outcomes that are not appropriately measured using written tests, describe in detail how you will collect evidence that students have successfully achieved them (i.e. lab skills...). The point is that you should:

(a) clearly identify what you are assessing,
(b) identify what you will accept as evidence of success, and what evidence you will look for to monitor alternative views or continuing learning problems,
(c) describe how you will translate your judgments about students' learning into a form that would be acceptable within current school practices. That is, how will you report it to students and parents? How will it get translated into a letter or numerical grade if that is the standard for a school? How will you use this student learning data to improve or change your future instruction?

You need to develop formative assessment strategies for **at least three** learning outcomes identified in Unit Plans I and II. Please use appropriate ACADEMIC LANGUAGE as you describe both the formative and summative assessments in UP III.

**Unit Plan III is due at 11:00 a.m. on Tuesday, December 4th, 2018. edTPA Task 3 is due at 11:00 a.m. on Thursday, December 6th, 2018.**

**NOTE**: The Unit Plan that you create must be handed in using a hard copy format (on paper). In addition, I am requesting that you format your Unit Plan into a single, well organized, document. Please post your Unit Plan to the appropriate dropbox in D2L and share with your colleagues in the discussions dropbox, too. *If you choose to share your plan in the discussions dropbox you are giving me permission to place your UP on an SOE web page or use as a model in D2L so please make sure it is presentable*. A subjective assessment sheet will be handed back to students during the finals week with comments and grades. All written assignments to be handed in must be **proof read**, spelling and grammar checked, double spaced, 10–12 font. They must be turned in on time. Late assignments will receive reduced points. **Unit Plans and edTPA Task write ups are both individual assignments...** Collaboration with a colleague to proof read, edit and make suggestions is strongly suggested as this experience may help prepare you for working with other science educators in your future place of employment.

**YOUR UNIT PLAN ASSESSMENT**

You will be expected to justify the activities and teaching strategies in at least terms of the model of conceptual change learning developed in class, and the overall structure of tasks described in your syllabus. I will provide you with feedback about the unit, and help you find ways to improve it.

Please keep in mind that the experience is one of reflection and improvement. The experience of deconstructing and defending your work is often very personal and potentially intimidating. You may have to defend your curriculum choices when you begin your new position as a science teacher so this will be good practice. My goal is that you see for yourself that you can plan and teach using a theoretical framework as a guide, and that you can also use that framework to critique your own ideas and practices.

**Please use academic language throughout your entire unit plan but especially in your introductions and reflections. This will help prepare you for the upcoming PDP (Professional Development Plan) and edTPA (Teacher Performance Assessment).**

## *F. STUDENT CHOICE - 10 pts. Each student must complete one.*

1. Field Trip Plan. Develop a detailed plan for a class field trip. Think of unique places you might take a group of students where they would have opportunities to learn science concepts and utilize process skills that they might be studying in class. Include objectives, relevance to classroom work, grade level, logistical considerations, parental permission forms, at least three student activities, and follow-up.

2. Interview on Science Ideas. You will interview a student of your choice on his/her ideas about a secondary science concept. Plan to have props/hands–on materials for your interview so the student has something to touch or look at. Your purpose will be to probe their thinking in a **non-threatening** way by continuing to ask them **what** they know and **why** they think the way they do. Prepare a written **summary/analysis** of the student's thoughts, your reflections on the student's responses in terms of implications for classroom instruction and a brief presentation of your findings to be given to this class. Your written summary should include a list of materials used in the interview, a list of possible questions prepared prior to the interview, an analysis of the student's scientific understandings and your personal reflections on how this analysis would drive your instruction and curricular decision making.

3. Attend a professional science conference or workshop. Dates and times of some possible events can be found in the WCEE or Science Department Office Bulletin Boards. Submit a 3-5 page summary of your experience including the title of the conference, sponsoring organization, workshops attended, presenter's name, a rough outline of the presentation, and a description of how you plan to utilize what you learned as you teach high school science. Attach copies of any handouts received in the sessions. Professional journals and newsletters often list scheduled conferences. PRIOR APPROVAL REQUIRED for this option.

4. Set up and maintain a terrarium or freshwater aquarium in this classroom. You should:

   a. Collect information on how to prepare and maintain the center, where and how to collect specimens, as well as safety and ethical concerns related to having plants and animals in the classroom (I'll provide you with sources to use).
   b. Construct at least one activity you would have students participate in (two pages each). Each activity should include learning objectives, science concepts and/or processes being explored, materials list and description of the activity itself.

   PARTNERS are strongly encouraged for this student choice.

5. Instructional Technology Project. Using available technology resources, develop a technology based module on a secondary or middle level science topic. Possible projects include developing a complete and robust webquest that includes assessment; designing a MOODLE project for secondary students; designing a detailed SMARTBOARD presentation; developing a set of PODCASTS with teacher and student participation; create a VERNIER probe lab for a science class; develop a set of science demo's and video tape using digital camera for classroom use, create livescribe pencasts for classroom topics. Each of these technology based projects must start with a written proposal to Dr. Cook. PRIOR APPROVAL REQUIRED for this option.

6. *Science Activities Resource Account*

   Students must create and maintain a social bookmarking (Delicious/Diigo/Pinterest) account for organizing web resources in science teaching and learning. You must subscribe to your peers' bookmark accounts so you can reference them in the future. Please plan to make your social bookmark account available to your peers and professor without the need of a password. Students should add 5-10 online resources each week that include different science experiments/demonstrations/activities that illustrate specific secondary science concepts. The science disciplines that may be selected from include Biology/Life Science (plant and/or animal but not EE), Chemistry, Physics, Earth Science (geology, climatology, etc.), Astronomy and General Science. As you add bookmarks to your account find and try at least five of the activities or experiments on your own or with a peer. Please use the self-assessment sheet to document and describe the five activities you completed.

   For an examples, visit my delicious or my diigo http://www.diigo.com/user/perrycook or any appropriate secondary level Pinterest account.

7. *Personal Science Research Project*

   Develop a specific research question/problem, design a scientific experiment to answer the question or solve the problem, form a hypothesis, do the experiment/observations, collect data, organize and analyze the data, form a conclusion. This project gives you a unique opportunity to refresh your memory as to what doing a long or short term research project/lab in the secondary science classroom was like and the problems you are most likely to encounter as a teacher of secondary science. The write up should be in a research paper format.

8. *Other?*

If you have other ideas or activities which you feel would be more beneficial to your development as a science educator please make an appointment with me to discuss your idea with me. Perhaps building your own set of Black Boxes to investigate the Nature of Science with your future students would interest you. I would love to do some science education research with several students, write a paper together and present at a conference. We could even try to have the paper published in a respected journal. Do not assume that an alternative activity will be accepted without my prior approval.

**STUDENT CHOICE write-ups must be handed in *PRIOR* to Thanksgiving Break.**

## *G. PRACTICUM REFLECTIONS - 5 pts*

Throughout your practicum experience at PJ Jacobs or Ben Franklin JH or SPASH you will reflect on various learning and instructional aspects. This will document both the robust nature of your placement and the length of your practicum. Fill out the documentation log sheet as you go and take notes while in the field that describe both what you observe or participate in as well as personal reflections. You must include the **assessment** of your performance with respect to the 10 Wisconsin Teacher Standards and INTASC Standards to complete the practicum requirements. Please use the form found in D2L for this purpose. We will share our reflective journals, hours logs and two assessments on the last day of class to earn the 5 points.

## *H. edTPA PREPARATION – 15 pts*

To complete the requirements for this portion of the course you must prepare a mock edTPA Task 1, 2 & 3. You may be placed with a cooperating teacher who will welcome your teaching of 3-5 sequential lessons and give you permission to video record all related classroom interactions. You may be allowed to use sample student work as evidence.
However, a more likely scenario is you will need to use the Unit Plan you have developed for EDUC 337, the Instructional Demonstration you have video recorded and your own creativity to write about a fictional sample classroom environment, students, and sample student work - evidence of learning. Each task includes a written commentary and evidence. The whole purpose of this project is to prepare you best for the semester you student teach and will be required to complete the edTPA for certification purposes. Additional information will be provided for you in class. Students will self-assess using the edTPA assessment rubrics. Each task self-assessment rubric will be worth up to 5 points for a total of 15 possible points. Students must submit a completed edTPA commentary and self-assessments in the D2L dropbox to complete the assignment.