BED/ELED/MSED 4311: Teaching Science in the Dual Language/Elementary/Intermediate Classroom
CRN: 26913, 26914 & 28666

Course Information
Location: Education Building Room 307
Time: Tuesday 5:30 – 8:20 pm

Contact Information
Instructor: William Medina-Jerez, PhD
Phone: 915-747-8608
Office: Education Building 604
E-mail: wjmedinajerez@utep.edu (Through Blackboard)
Office Hours: Tuesday (2:00 - 4:10 pm) and Thursday (12:00 – 2:10 pm)
If you would like to meet at a different time, please email me to set up an appointment.
I will try to answer Blackboard emails within the first day of receiving them (Monday-Friday).
E-mails received after 5:00 PM Friday will be answered by Monday morning.

Purpose

The two major goals of this course are to ***assist preservice teachers' (PSETs—you) in examining their beliefs about science teaching and learning*** and to ***portray science education from a multicultural viewpoint***. In this context, the teacher is an agent of social change, a practitioner who actively contributes toward establishing a pluralistic society by making the classroom one of the most important settings where gender, equity, anti-discriminatory principles and multicultural understanding are modeled and practiced (Rodriguez, 1998).

This course will also assist you in critically examining the theories, research, pedagogical approaches, and materials associated with effective learning and teaching in a K-8, science/dual language classroom. This course will focus on the knowledge and skills you need to design and implement a science learning environment where every student is held to high expectations and encouraged to achieve maximum learning. You will learn to develop instructional strategies using the Texas Essential Knowledge and Skills (TEKS) for science, the Next Generation Science Standards (NGSS), STEM curricular materials, instructional models such as sheltered instruction and the 5E Instructional Model. During the Science Teaching event (See course calendar), you will use concepts from Standards I, III, VI, and V of the Pedagogy and Professional Responsibilities Standards (PPR) with particular emphasis on constructing and implementing instructional strategies, informal and formal assessment, and managing the learning environment. This course is also designed to address the following science standards:
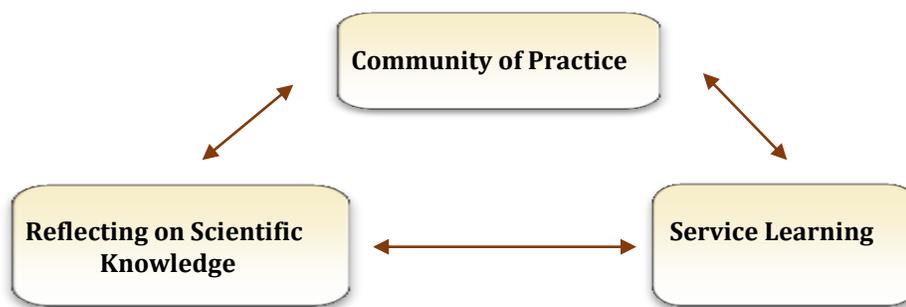
Standard I: The science teacher manages classroom field, and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.

Standard III: The science teacher understands the process of scientific inquiry and its role in science instruction.

Standard IV: The science teacher has theoretical and practical knowledge about teaching science and about how students learn.

Standard V: The science teacher knows the varied and appropriate assessments and assessment practices to monitor science learning.

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Guiding Principles for this Course

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                    ┌──────────────────────┐
                    │ Community of Practice │
                    └──────────────────────┘
          ↗                                      ↖
┌──────────────────────┐          ┌──────────────────────┐
│ Reflecting on Scientific│  ←→   │   Service Learning    │
│      Knowledge        │          └──────────────────────┘
└──────────────────────┘
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This course is organized around the community of practice and service learning principles and strands (Michaels, Shouse, & Schweingruber, 2008):

Principle 1—Community of Practice: is a concept that describes how people work together for their common interests and learn from each other's expertise to develop themselves personally and professionally. To form a community of practice in this course, the science lesson project is designed as a common goal that drives students to prepare themselves, help each other, and collaborate to achieve by the group. This collaboration entails peer- reviewing an Essay and the first draft of the 5E Lesson plan.

Principle 2—Service Learning: is an approach that aims to enrich learning experiences and strengthen communities through services. The Science Teaching event in this course is designed as an opportunity for PSETs to contribute what they learn in this course to elementary school students in the El Paso region.

Principle 3—Reflecting on Scientific Knowledge (Understanding how scientific knowledge is constructed). This strand will be addressed when reviewing the Nature of Science (NOS) topics. Proficient science learners understand that predictions and explanations can be revised on the basis of learning new facts, generating new evidence.

Resources

There is no book for this course. There will be numerous handouts, class notes on lectures, discussions and presentations. I will make articles and other materials available throughout the course as needed. There is also a Blackboard platform to which you will be automatically connected by being registered for this course. The Blackboard tool is intended to be a supplement to this course; there you will be able to access, quizzes, assigned readings and other important resources you may want to review on your own.

Other materials we will be using:
- English Language Proficiency Standards (ELPS)
  http://ritter.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.4
- Science Teachers Association of Texas (STAT)
  http://www.statweb.org/
- Texas Essential Knowledge and Skills (TEKS)
  http://www.tea.state.tx.us/index2.aspx?id=6148
- National Science Teachers Association (NSTA)
  http://www.nsta.org/default.aspx
- Texas Safety Standards
  http://www.utdanacenter.org/sciencetoolkit/safety/
- The New Generation Science Standards (NGSS)
  www.nextgenscience.org/next-generation-science-standards.

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Technology Requirements

- Each participant must be able to use their UTEP Blackboard account. You MUST have both a UTEP email address and password to take this course.
- You must have access to UTEP email and Blackboard prior to the beginning of the second class meeting. If you do not have one yet, you may apply for your UTEP email account, login, and password from a form available online at: https://newaccount.utep.edu

Technical Assistance: The University of Texas at El Paso offers complete technical information and help desk support at: http://issweb.utep.edu/techsupport/.

Professional Expectations of Students

Part of your preparation as a teacher includes following a professional code of behavior and responsibility. Therefore, you are expected to treat all members of the class and your instructor with respect. Consider each class as *a meeting with colleagues in your field* and a great opportunity to exchange ideas. Attending class meetings on time and remaining for the entire scheduled period, being well prepared, and participating in classroom discussions are key parts of professional behavior. It is your responsibility to:

- Examine the Blackboard platform for this class, and inform *your instructor by the second class meeting* if you run into difficulties interacting in this environment.
- Read all the class materials thoroughly and continually consult the course schedule in order to keep up on all information associated with this course.
- Participate fully in all class activities and collaborate closely with your teammates.
- Be actively present in class; stay focused on the learning activities.
- Submit ALL your course assignments via Blackboard and in the prescribed format.
- Be courteous and honest in communicating with others that shows respect and sensitivity to cultural, religious, sexual, and other individual differences among all class members.
- Provide constructive feedback that helps your teammates, class members, and the instructor improve their performance, and appreciate it when they provide you with the same.
- Use the assignment templates in the preparation and submission of your assignments. If you do not follow the directions presented in the templates you will lose points.
- **Set your cell phone into silent mode** before starting the class meeting. As stated above, each class is a meeting with colleagues in your field. Professionals turn off/silence their phones in a meeting with other professionals. A ringing phone disrupts because the sound of a phone attracts attention. Disruptions of the learning process are annoying.
- **iPads, tablets, or laptops in class:** I do not mind you using your iPad, tablet, or laptop in class as a resource for the learning taking place in the class meeting. Using your device in class for a different purpose shows a lack of respect for your teammates and instructor and disinterest in the course that is unprofessional.
- *Be persistent.* If you run into difficulties, do not wait! Contact your instructor (see Contact Information above), or check with one of your classmates through Blackboard email. Most problems are easily solved but we have to hear from you before we can help.
- Inform the instructor if you are going to be absent so that you can get an update on what you missed (i.e., assignments). If you miss class consult the PowerPoint Presentation (PPT) in the Content area/Class Notes of Blackboard.
- Be aware of your absences. It is the student's responsibility to call attention to their presence in the class (and sign the attendance sheet) if they come in after the attendance is taken. Inform your instructor as soon as possible if you have problems submitting your assignments on Blackboard. If the Blackboard system does not allow you to turn in the assignment, you must send it via email to your instructor before the due date. Assignments submitted one week after the due date will not be graded for full credit—see Assignment submission policy on page 8.

Students Expectations of Instructor

You can expect me to be on time, prompt with assignments and feedback, knowledgeable in the topics being covered; create and provide opportunities for you to practice fundamental pedagogical content, and to bring in experts in the areas to augment my background either where needed or simply advantageous. To the best of my ability, I will treat all students equally, fairly, pleasantly, and be readily available for help outside class time.

Student Learning Outcomes

It is expected that by the end of the course, the successful student will be able to:

1. Identify the value of inquiry as an instructional strategy.
2. Develop the ability to assist elementary school students in designing investigations using scientific inquiry.
3. Outline strategies for modifying content area lessons to accommodate English Language Learners (ELLs) according to guiding principles like those in the NGSS, the pertinent TEKS, and the Socio-Transformative-Constructivist (sTc) learning theory.
4. Understand and address the role of underrepresented groups in the science curriculum.
5. Identify and integrate quality Science, Technology, Engineering and Mathematics (STEM) curriculum materials (e.g., Engineering is Elementary [EiE]) into instructional activities relevant to elementary education learning settings.
6. Demonstrate and understand the implementation of different instructional strategies and teaching materials consistent with the goals of the Next Generation Science Standards (NGSS), and the applicable Texas Essential Knowledge and Skills (TEKS).
7. Develop a well-thought-out philosophy of science teaching.
8. Demonstrate proficiency in the use of the 5E Instructional Model as a tool for lesson planning that supports the teaching and learning of basic and integrated inquiry process skills.
9. Collaborate with peers in a scientific investigation to show a willingness to engage in science as a learner.
10. Collaborate with peers in our course in the analysis of effective and teaching methods for teaching elementary science.

Assessment of Student Learning Outcomes

Assignment	Assessment of Learning Outcomes
1. Quizzes	Learning outcomes: 1, 3, 6, and 8
2. Lesson plan and STEM merit presentation	Learning outcomes: 2, 3, 4, 5, 6, and 8
3. Growth essays	Learning outcomes: 1 4, 6, and 7
4. Activities	Learning outcomes: 1, 2, 3, 4, 5, 9, and 10
5. Final exam	Learning outcomes: 1, 2, 3, 4, 5, 6, 7, and 8

Grading Criteria

The course will be assessed based on the following criteria:

Assignment	Points
1. Quizzes: Four Online Quizzes (10 points each) (IA).	40

2. 5E STEM Lesson (GA)
   - First draft for peer review (5 pts)
   - STEM activity delivery during the Merit Presentations, includes PPT (10 pts)
   - Lesson peer-review (5 pts)
   - Final submission (80 pts)
	100

3. Growth Essays(IA)
   • Essay 1: Impressionist tale (10 pts)
   • Essay 2: Philosophy statement draft <u>for peer review </u>(10 pts)
   • Essay 3: Philosophy statement final draft (40 pts)
	60

4. Activities* (5 points each).
   • Activity 1: My views about science education concept map (IA)
   • Activity 2: My STEM Lesson Plan Part 1 (IA)
   • Activity 3: Inquiry Activity Part 1 (GA)
   • Activity 4: Science Activity Analysis (IA)
   • Activity 5: My STEM Lesson Plan Part 2 (IA)
   • Activity 6: Inquiry Activity Part 2 (GA)
   • Activity 7: Delivery of the 5E Lesson during the Science Teaching Event
   • Activity 8: Inquiry Activity Part 3 (GA)
	40

6. Final exam (Online test) (IA)	50
Total Points	**300**

IA: Individual Assignment; GA: Group Assignment
*In the case of the 'in-class' activities, students must be present throughout the entire class meeting to earn the points.

Grades

Overall grading will be A-F, points weighted by percentages. All work is expected to be clearly written (and word-processed), reflect thoughtful response to the assignment guidelines, and be of high quality.

A = 90-100%	C = 70-79.9%	E = Below 60%
B = 80-89.9%	D = 60-90%	

Description of Assignments: Below you will find a description of each assignment for this course. Please do not hesitate to consult with me if you have any questions. Assignment instructions are also available in the Course Content section/Assignments folder of the course platform.

1. Four Online Quizzes (IA): All online quizzes cover the assigned readings to date, and are due by the posted time on the deadline date (See course calendar). The format of the quizzes may include multiple choice and/or short answer questions that you will need to answer completely with supporting evidence from the readings. Please, read the articles before taking the quizzes; I also encourage you to consult the Reading Strategies folder in the navigation menu. Quizzes are also timed **(30 minutes)** so you should be sure to set yourself up in a quiet place to take this **in one attempt**. Be sure to **save your answers** after each response and finally submit the quiz when you have it completed. There will be five (5) online quizzes. In case you complete more than four quizzes, the instructor will use your best four scores in the calculation of your grade for this assignment.

If you run into technical difficulties while completing and/or submitting your online quiz, you will have the opportunity to complete a new quiz in the instructor's office, in a paper-and-pencil format, and for the time

you had left in your first attempt.

2. Lesson Plan (GA): Two or three students work as a group to design a 5E lesson plan that addresses the applicable TEKS and the Engineering by Design Process (EDP). The components should be written clearly in the lesson plan: (a) title, grade, and source (b) learning objectives, (c) Links to TEKS, (d) the phases of the 5E Learning Cycle: Engage, Explore, Explain, Elaborate, and Evaluate, (e) references/bibliography, and (f) supportive documents (i.e., activity guide, hand-out). We will deliver this lesson plan to a group of elementary students during the Science Teaching Event (Apr. 11).

The 5E lesson plan (single-spaced, 2-3 pages long, not including supporting documents [i.e., activity guide]) will be submitted through the BLACKBOARD platform, and will be peer reviewed. Your instructor will assign each group another group's lesson for review. Each student will be expected to complete this review using the checklist and the assignment rubric provided in the Course Content area of the Blackboard platform (Rubric folder). Reviewers will submit their review through the Blackboard Assignments section and by the assigned due date.

3. Growth Essays (Impressionist tale, science teaching philosophy (first draft for peer review), and science teaching philosophy (final draft) (IA)

Growth Essay 1: Impressionist Tale
This is a 1-page long (double-spaced) essay that includes two paragraphs: a science learning episode and a reflection. Impressionist Tales (van Maanen, 1988; Bryan & Tippins, 2005) portray highly personal perspectives of a special moment in time. They are written with the intention of (a) drawing the reader into the image—to make the reader see, hear, smell, feel, and taste what the story teller describes; they also (b) use evocative language that reveals the writer's deepest feeling about the topic. Impressionist Tales are similar to impressionist paintings (e.g., Starry night) which are set out to capture a scene in a special instant or moment of time…*what the painter sees is what the viewer sees.* Impressionist painters (Monet, Van Gogh, and Renoir) attempted to evoke a participatory sense in the viewer by painting everyday, common, more familiar scenes.

- o Think back of your elementary, high school, or college days and write one impressionist tale/paragraph on a science learning episode.
- o The second paragraph will present your brief reflection on the emotions you experienced as a learner on that occasion. It is argued that learning science is an emotional practice. In this paragraph you answer the questions "*What emotions (positive/negative) did you experience in the event described above, and how did (or are still) those emotions impact your engagement in science learning throughout your schooling career?*"

The first goal is for you to take time and reflect on your science learning experiences using a significant learning episode from your elementary, secondary, or tertiary education in science. *The second goal* deals with the concept of Critical Emotional Pedagogy (CEP). As teachers, we need to become aware of and understand not only our students' (including ELLs) social and emotional experiences while engaged in science lessons, but also our own. CEP is defined as the implementation of "strategies for evoking and responding to the variety of emotions students may display as a result of critically engaging with specific subject matter topics" (Rodriguez, 2017, p. 265).

*Find samples of impressionist tales in Blackboard. The instructor will introduce this writing format in class.

Essays 2 & 3: Science Teaching Philosophy statements (first and final drafts)*
There are different reasons for having a "science teaching philosophy." It gives you the chance to situate your science teaching and learning perspectives, revitalize your views and gain confidence to face your profession. It is also highly beneficial for you to have this statement to share with prospective employers as a competitive tool to set yourself above other candidates. You should begin your own philosophy of

[science] teaching even before your placement in a field experience. Expect your thoughts about education to change as you learn and grow professionally. Allow this reflective exercise to show your growth within the profession across time and thus renew your dedication to the field of education. Research has shown that prospective teachers' personal histories with the learning of science (both positive and negative) have a great influence on how they teach science. Remember, this is a **science teaching philosophy statement, not an education philosophy statement.**

In this 1 ½ page (double spaced) statement, you are expected to convey your views about the teaching and learning of science in elementary school classrooms. Make sure to: a) address briefly your essay one—one or two sentences, b) incorporate ideas, concepts, and principles discussed and practiced in class and c) in the final draft, address the comments and questions provided by your peers and the instructor in the revision of the first draft. Statements are cumulative or emergent; they evolve by addressing comments and suggestions from the instructor and including new evidence and ideas from class topics, discussion, and activities.

Note that **essay 2** will be submitted for a blind, peer review exercise—the instructor will give each student a philosophy statement to review. You will earn the points by submitting on time your essay (5 pts) and for reviewing the assigned essay (5 pts). Each student will receive feedback from the instructor classmates on Essay 2. **Essay 3** (final draft of your science teaching philosophy) will be reviewed and graded by the instructor.

Here are some ideas for your essay 2. Remember this essay may change by the final draft—be honest and humble if you are unsure at this point.

1. Your previous experiences as a science learner
2. Your goals, where you want to go professionally
3. Why you decided to enter the teaching profession
4. Your definition of teaching and learning in formal and informal settings
5. Your role in helping students achieve and develop
6. Your style and belief about effective teaching
7. Why you believe science teaching and learning is valuable
8. Your personal characteristics and strengths

See Science Teaching Philosophy samples and rubric in the course platform (Blackboard).

4. Activities (IA & GA): These are both individual and group activities that will take place in class and outside the regular class time. In each class we will engage in activities that illustrate and document exemplary science learning/teaching strategies, and/or exemplify main ideas in the assigned readings.

*See **activities** highlighted in the course calendar (pages 11-13).*

5. Final Exam (IA): This examination will cover readings, class notes, in-class activities, individual and group projects. Sample questions and format will be discussed in class and posted on the Blackboard prior the midterm evaluation. Like in the case of the online quizzes, you need to plan ahead so that you can complete this test in one attempt.

> Find, in the **Reading Strategies** section of the navigation menu, the weekly reading resource (e.g., anticipation guide) that will help you interact with the assigned readings.
>
> Also, in the navigation menu, you will find the **Course Modules.** Each module highlights the main concepts addressed in class. Modules consist of a discussion of ideas, principles, and teaching and learning methodologies. At the end of each module, you will find a set of questions intended to test your knowledge and understanding of the discussed concepts. I highly encourage you to interact with the course content by revising these modules. This is an optional activity.

Academic Policies

Assignment Submission

Your assignments are expected to be submitted online (via Blackboard) using the assignment template on the scheduled day and time; submit them according to the prescribed format (e.g., written report). Late work will not be accepted for full credit unless you have evidence of extenuating circumstances. Unfortunately, sometimes less than excusable circumstances arise even for professionals in the field and you made need an extension. However, I will only agree to grade late work for the first week following a due date, deducting 25% off the total grade. No assignments will be accepted past one week late. Plan carefully to ensure you meet the deadlines. If you wait until the last minute, things that can go wrong often do. Your computer will crash, the internet connection stops working, etc. Please ask if you have questions or concerns about how to do any assignment in this course. You need to check your Blackboard email regularly for communications from your instructor. Once you submit your assignment *make sure it is posted*.

Assignments will be submitted in the Assignments area of the navigation menu, and will need to be posted as Word files or as a PowerPoint (PPT) only (***no rft. or Prezi formats, please***). When submitting a group assignment, your group will designate a member to be responsible for the submission of the project—this is part of the goals your group will set up in class. Please, include in each submission the names of the students [and their responsibilities] that participated in and contributed to the preparation of the group project. Assignments that are labeled "missing" by the Blackboard system **will not** be accepted without the instructor's prior written approval [email communication]. You will not be able to submit your assignments after the due date. It is your responsibility to inform your instructor 'as soon as possible' if you run into technical difficulties while submitting/posting your assignments on Blackboard. If this happens, you need to *send your assignment via email before the due date so that your assignment can be graded for full credit.*

Attendance Policy: Learning in this class is considered a communal endeavor as well as an individual undertaking. Class attendance is crucial for a full understanding of course material, because many of the topics and content will be taught and communicated through class demonstrations, activities, and discussions. If you are absent from a class, contact your instructor or another student to find out what occurred during the class you were absent from. Tardies result from anytime between 8:30 and 8:45 am. Three tardies (and/or leaving early [15 minutes]) will result in an unexcused absence.

- Your 1st absence is excused.
- Your 2nd absence will reduce your final grade 5 %.
- Every absence after your 2nd reduces your final grade 10 % per absence.

UTEP Teacher Education Department Policy on Course Absences

The UTEP Teacher Education Department considers missing two weeks of class excessive. The student may be dropped for lack of attendance. If you miss two weeks of class, contact your instructor immediately.

Communicating Effectively Online: When we talk face-to-face, we expect other people to observe certain rules of behavior. The same is true online. Here are a few pointers to help you communicate more effectively via e-mail and discussion boards:
- Clearly summarize the contents of your message in the subject line of your e-mail AND your discussion board postings.
- Avoid using all capital letters. USING ALL CAPS MAKES IT LOOK LIKE YOU'RE SHOUTING! IT'S ALSO MORE DIFFICULT TO READ.
- Avoid using sarcasm in your postings and e-mail messages. Sarcasm does not translate well in the online world. If you have a dry sense of humor, use smiles :) to defuse what could be constituted as an abrupt message (but don't over use them! :)).

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- More information on Netiquette can be found at: www.albion.com/netiquette

Academic Integrity

Students are expected to uphold the highest standards of academic integrity. Any form of scholastic dishonesty is an affront to the pursuit of knowledge and jeopardizes the quality of the degree awarded to all graduates of UTEP. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are not attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Proven violations of the detailed regulations, as printed in the Handbook of Operating Procedures (HOOP) and available in the Office of the Dean of Students, may result in sanctions ranging from disciplinary probation, to failing grades on the work in question, to failing grades in the course, to suspension or dismissal among others.

Equal Educational Opportunity

In order to create equal educational opportunities in the class, all students are expected to demonstrate respect for the diverse voices and individual differences in the class. Particularly, no person shall be excluded from participation in, denied benefits of, or be subject to discrimination under any program or activity sponsored or conducted by the University of Texas at El Paso on the basis of race, color, national origin, religion, sex, age, veteran status, disability, or sexual orientation. Any member of the University community who engages in discrimination or other conduct in violation of University policy is subject to the full range of disciplinary action, up to and including separation from the University. Complaints regarding discrimination should be reported to the University's Equal Opportunity Office. Inquiries regarding applicable policies should be addressed to the University's Equal Opportunity Office, Kelly Hall, 3rd Floor, 915.747.5662 or eoaa@utep.edu<mailto:eoaa@utep.edu>.

Students with Disabilities Statement

If you have or believe you have a disability, you may wish to self-identify. You can do so by providing documentation to the Office of disabled Student Services located in Union E Room 203. Students who have been designated as disabled must reactivate their standing with the Office of Disabled Student Services on a yearly basis. Failure to report to this office will place a student on the inactive list and nullify benefits received. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the director of Disabled Student Services. You may call 747-5148 for general information about the Americans with Disabilities Act (ADA).

The Disabled Student Services Office can also be reached in the following ways:
Web: http://www.utep.edu/cass/
Phone: (915) 747-5148
Fax: (915) 747-8712

Inclusiveness and Equity

Learning happens only when we feel respected as a whole human being. My top priority in our course is to cultivate relationships of trust and respect and a sense that we see each other as whole, complex human beings. That you experience this in our class is important for the sake of your learning in our course *and* for the sake of your future students' learning, so that you feel able to cultivate such relationships with them. To that end, I want you to know that all of you are welcome in our classroom environment—all the parts of you as a person are welcome in our discussions, our activities, our assignments, and in our assessments. We are all complex people with a variety of perspectives, experiences, challenges, assets, and resources—our gender identities, our sexual orientations, our religions, our races, our ethnicities, our economic statuses, our immigration statuses, our parenthoods, our veteran statuses, our ages, our languages, our abilities and disabilities. All the parts of you are welcome in our learning community to the extent that you feel comfortable bringing them in. I strive to show respect for the variety and wholeness in each of you, and I expect that each of you shows respect for each other as well. If you feel marginalized in our class, and you

feel comfortable discussing it, I would like to know so that I can support you, protect you, and make changes that feel more inclusive and equitable. You can also talk with our Department Chair and/or you can report a complaint of discrimination to the University's Equal Opportunity Office, Kelly Hall, Third Floor, 915-747- 5662 or eoaa@utep.edu.

Course Schedule and/or Assignment Changes

> The course instructor reserves the right to adjust the course syllabus or change assignments as needed. While every effort will be made to adhere to the calendar and the course outlines, there will undoubtedly be changes due to unexpected situations or pacing that may arise during the semester. Every attempt will be made for advance 'warning.' These modifications will be based on the specific needs of all the students in the course, but not to exceed difficulty or the due dates of the originally proposed assignment.

Reading Material: Readings will be assigned and available via Blackboard in the Course Content Area/Course Readings. You will be responsible for reading these materials before class.

Plagiarism: Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper without giving credit to the source of that information or wording: it is also not acceptable. Do not submit work under your name that you did not do yourself. You may not submit work for this class that you did for another class. If you are found to be cheating or plagiarizing, you will be subject to disciplinary action, per UTEP catalog policy. Refer to http://www.utep.edu/dos/acadintg.htm for further information.

Multiple Submissions: When turning in assignments, students may not resubmit work done for other courses. No credit will be given for a resubmission of a project or paper given in another class.

Incomplete Grades: An incomplete may be given if a student provides evidence of a documented illness or family crisis that precludes successful completion of the course.

Format and Submission: All written assignments should be double space (***except lesson plans***), font size 12 with 1 inch margins and **submitted on Blackboard**. Formal written projects are to follow the American Psychology Association (APA) format. *Please ask if you have any questions about using the APA format, I will be happy to help!*

Course Calendar

Week	Date	Topic	Assignments Due
1	Jan. 21	- Introduction and overview - Who is a scientist? Part I - How students learn science? - Science probe **Activity 1** *(Due at the end of class): My views about science education concept map (IA)*	Read the syllabus, and make sure your UTEP email is your primary email or forward your UTEP email to the email you use.

2	Jan. 28	• BirdSleuth Curriculum • Basic and integrated inquiry skills: Popcorn activity • Impressionist Tales Course Module 1: The spirit of inquiry	Read: • Bell, Smetana & Binns: *Simplifying inquiry instruction* • *Finson: Inference vs. Observation* *Submit today, in class* **your student profile form** *(page 15 of the syllabus)* **Online quiz 1** *(due today by 5:30 pm)*
3	Feb. 4	• Inquirize your teaching • Reviewing science education curricula • Science probe Course Module 2: Questions, variables, and hypotheses.	Read: • Scribner-MacLean: *More than just guessing* **Submit Essay 1** **Online quiz 2** *(due today by 5:30 pm)*
4	Feb. 11	• BirdSleuth Curriculum • The Nature of science (NOS) • Science probe Course Module 3: The Nature of Science **Activity 2**: My Lesson Plan Part 1 *[includes video lesson] (IA)*	Read: • Crowther, Lederman, and Lederman: *Understanding the true meaning of the nature of science* **Online quiz 3** *(due today by 5:30 pm)*
5	Feb. 18	• BirdSleuth Curriculum • Practicing with the Art Elements: Communicating through Art	Read: • Porter et al: *The art and science of notebooks*
6	Feb. 25	• Teaching the language of science to ELLs • Measuring with toys • Interactive word walls **Activity 3** *(Due at the end of class): Inquiry investigation Part I (GA)* Course Module 4: Science vocabulary	Read: • *Crowther et al: Academic vocabulary instruction* **Submit the first draft of your essay 2: science teaching philosophy**
7	Mar. 3	• Basic and integrated inquiry skills: Observing, collecting data, predicting, and constructing graphs • Examining student work • BirdSleuth Curriculum • Bird survey on campus Course Module 5: Graphing skills	**Submit Review of Essay 2**

8	Mar. 10	• *Outlining a 5E lesson plan (GA)* Course Module 6: The 5E Model **Activity 4**: *Science Activity Analysis (IA)*	Read: • *Bybee: The 5E Model* **Online quiz 4** (*due today by 5:30 pm*)
9	Mar. 17	Spring Break	
10	Mar. 24	• Literacy connections Activity 5: **My Lesson Plan Part 2**	Read: • Munakata: *Lessons from the little prince* **Online quiz 5** (*due today by 5:30 pm*)
11	Mar. 31	• Lesson Merit and STEM Activity presentation **Activity 6**: *Inquiry Activity Part 2 (GA)*	***Submit your group's lesson plan for peer review (One per group).***
12	Apr. 7	• Preparing for lesson delivery	
Saturday Apr. 11		**Science Teaching Event (Activity 7)** **Place**: TBA **Time**: 12:00 pm – 2:00 pm	
13	Apr. 14	*No class meeting: Class time is fulfilled by the science teaching event on Saturday, April 11*	
14	Apr. 21	• Accommodating ELLs in the science classroom • Writing and speaking in science • Science Journaling Course Module 7: Accommodating ELLs in the science classroom.	Read: • Gomez-Swiep, Straits, & Topps: *5E for ELLs* ***Submit review of lesson plan***
15	Apr. 28	• Art and science grow together (Inquiry Project)	
16	May 5	• Inquiry investigations: In class discussion and project presentations • Discussion on the philosophy of science teaching • Who is a scientist? Part II **Last day of classes** **Activity 8**: *Inquiry Investigation Part 3*	

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May 11-15	*Finals week (No class meeting)*	*Submit your group's lesson plan and Essay3 by Friday, May 15 at 5:00 pm.*
		Take final exam on Blackboard this week between Monday (8:00 am) and Friday (5:00 pm).

References

Bell, R. L., Smetana, L., & Binns, I. (2005). Simplifying inquiry instruction. *The Science Teacher*, *72*(7), 30-33.

Bryan, L. A., & Tippins, D. J. (2005). The Monets, Van Goghs, and Renoirs of science education: Writing impressionist tales as a strategy for facilitating prospective teachers' reflections on science experiences. *Journal of Science Teacher Education*, 16, 227-239.

Bybee, R. W. (2014). The 5E instructional model: Personal reflections and contemporary implications. *Science & Children,* 51(8), 10-13.

Colburn, A. (2000). An inquiry primer. *Science Scope*, 23(6), 42-44.

Crowther, D. T., Lederman, N. G., & Lederman, J. S. (2005). Understanding the true meaning of the nature of science. *Science & Children*, 43(2), 50-52.

Crowther. D. T., Tibbs. E., Wallstrum, R., Storke, E., & Leonis, B. (2011). Academic vocabulary instruction within inquiry science: The Blended/Tiered approach. *AccELLerate!* 3(4), 17-20.

Finson, K. (2010). Inference or observation? *Science & Children*, 48(2), 44-47 Llewellyn, D. (2007). Making the most of concept maps. *Science Scope*, 74-77.

Gomez-Swiep, S., Straits, W., & Topps, J. (2015). 5E for ELLs. *Science & Children,* 53(2), 80-86.

Michaels, S., Shouse, A. & Schweingruber, H. (2008). Ready, Set, Science! Putting Research to Work in K-8 Science Classrooms. National Academy Press.

Munakata, M. (2005). Lessons from the Little Prince. *Science & Children, 40-42.*

Porter, K., Yokoi, C., & Yee, B. (2011). The art and science of notebooks: An interdisciplinary approach to teaching students to record accurately. *Science & Children,* 42-46.

Roriguez, A. J. (1998). Strategies for counterresistance: Toward sociotransformative constructivism and learning to teach science for diversity and for understanding. *Journal of Research in Science Teaching,* 35(6), 589-622.

Scribner-MacLean, M. (2012). More than just guessing: The difference between prediction and hypothesis. Science Scope, 37-40.

Yager, R. E. 1988. Never playing the game. *The Science Teacher,* 55 (6): 77.

Some Trade Books Used in this Course

Anaya, R. (2012). The first tortilla: A bilingual story. University of New Mexico Press

Andrews, K. (2016). *Mira forecasts the future*. New York: Sterling Children's Books.

Andros, C. (2017). Charlotte the scientist is squished. Boston: Clarion Books/Houghton Mifflin Harcourt

Beaty, A. (2007). Iggy Peck, Architect. Abraham Books for Young Readers.

Beaty, A. (2013). Rosie Revere, Engineer. Harry N. Abrahams.

Beaty, A. (2016). Ada Twist, Scientist. Harry N. Abrahams

Chavarria-Chavez, B. (2000). Magda's tortillas. Arte Publico Pr.

Cowley, J. (2002). *Big moon tortilla. Honesdale, PA:* Boyds Mills Press.

Davies, J. (2004). *The boy who drew birds: A story of John James Audubon*. Boston: Houghton Mifflin

DePaola, T. (1978). *The popcorn book*. Holiday House.

De St Exupery, A. (1943). *The little prince*. Reynal & Hitchcock.

Galdone, P., & Galdone, J. C. (1984). *The three little pigs*. Boston: Houghton Mifflin.

Gibbons, G. (1993). *From seed to plant*. Holiday House.

Gibbons, G. (2012). *Ladybugs.* Holiday House*.*

Lionni, L. (1970). *Fish is fish*. New York: Pantheon Books.

Lionni, L. (1963). *Swimmy.* New York: Pantheon Books.

Lowell, S., Bowman, M., & Lobel, M. (1992). *The three little javelinas*. Northland Pub.

Martin, J. (1998). *Snowflake Bentley*. Boston: Houghton Mifflin.

Paulsen, G. (1995). The tortilla factory. Harcourt Brace, San Diego.

McDonnell, P. (2011). *Me...Jane*. New York: Little, Brown and Co. Moreno

Winner, R. (2002). *Lucas and his loco beans.* BrainStorm 3000.

Young, E., & Wong, B. D. (1992). *Seven blind mice*. New York: Philomel Books.

BED/ELED/MSED 4311: Teaching Science in the Dual Lang./Elem/Intermediate Grades – Spring 2020
Spring 2020
Student Profile

Name: _____

Objections to syllabus or what other content do you think this course should cover and why?

_____
_____
_____

Any additional comments you may have (e.g. what you hope to do professionally, health problems, experiences at UTEP) that your instructor should be informed.

_____
_____
_____

If you experience any difficulties with the course—*please do not wait,* contact the instructor as soon as possible—email, phone, or in-person meeting.

 I read and fully understand the requirements and course policies as stated in this course syllabus.

_____   _____
Student Signature   Date

The University of Texas at El Paso (UTEP) College of Education - Spring 2019

BED/ELED/MSED 4311: Teaching Science in the Dual Lang./Elem/Intermediate Grades – Spring 2020
Student Information Form

- Name: _____ Preferred Name: _____

- Major

- Hobbies and interests

- Science courses you have taken in college

- Your favorite subjects

  A. In elementary School
  B. In high school:
  C. In college:

- Please share your views on the following cases.

  Why did you chose to become a teacher?

  Please, describe briefly your experience/es with science and whether they were positive or negative.

  At this stage of your teacher preparation program, would you be able to deliver a [science] lesson? Yes/No? Why?

- Please, provide a definition of the following terms.

  A. Science

  B. STEM

- Indicate on the scale below your knowledge of and previous experience with lesson planning:

Minimal									Extensive
1	2	3	4	5	6	7	8	9	10

The University of Texas at El Paso (UTEP) College of Education - Spring 2019

Assignment Rubrics

Growth Essay 1: My Impressionist Tale

Component	10	5	1
Length	• The essay is 1-page (single-spaced) long.	• The essay is 1 – ½ pages (single-spaced) long.	• The essay is >1 – ½ pages (single-spaced) long.
One science learning episode *[Paragraph 1]*	• Addresses <u>one</u> meaningful science learning experience • Identifies time and location • Describes in detail the episode • Identifies the participants of the episode. • Draws the reader into the episode being described and uses evocative language that reflects what the writer feels about the topic.	• Addresses one science learning episode but fails to highlight its relevance • Identifies either time or space • Partial description of the learning episode • Identifies the participants of the episode • Partially draws the reader into the episode being described; the use of evocative language does not fully reflect what the writer feels about the topic.	• Addresses more than one science learning episode • Missed to identify time and location • Vague description of the episode • Identifies only the main protagonist of the episode • Does not draw the reader into to the episode; the use of evocative language is minimal.
Critical Emotions *[Paragraph 2]*	• Identifies emotions and feelings (positive/negative) associated with the learning episode. • Answers the 2-part question • Cites correctly at least one publication dealing with the concept of emotions; the citation clearly supports a statement of claim	• Provides a list of emotions and feelings (positive/negative) • Answers the 2-part question in a general manner. • Incorrect citation; unclear relationship between the citation and the point being made	• Provides a list of emotions and feelings (positive/negative) • Provides a general answer to the 2-part question; includes an incorrect/unrelated citation
Mechanics of English and Format	• Appropriate expression of concepts, accurate vocabulary, no errors occur with regard to grammar, conventions and spelling. • Document is consistent in format (font type and size).	• Clear expression and vocabulary, some mechanical errors exist but do not get in the way of understanding. • Document has some formatting problems.	• Unclear expression of concepts, mechanical errors exist. Many errors with regard to grammar, spelling and conventions. • There is no formatting structure.

Growth Essay 2: Science Teaching Philosophy Statement

Criteria	Feedback		
	Excellent (5)	Satisfactory (3)	Underperform (1)
1. Philosophy of science teaching statement is 1 – 1 ½ pages and double-spaced; submission uses the assignment template.			
2. Philosophy statement addresses: • *Your beliefs about **science education*** • *Addresses essay one (prior learning experiences in science and L2).*			
3. The tone in your philosophy statement: • *Incorporates science education terminology (e.g., inquiry learning, hypothesis, misconceptions)* • *Personal (in your writing you use the 'I' instead of the third person*			
4. Mechanics of Standard English *Appropriate expression of concepts, varied and accurate vocabulary, no mechanical errors. Make sure to do a spell check before submitting/posting your assignment.*			
5. *Revision of the concept map from Activity 1.* Answer these questions as a separate note at the end of the essay: • Do you have new ideas now that you want to add to your science education map? • What changes/additions would you make? (This concept map is not part of the 1 ½ page philosophy statement). Add a revised copy to your submission.			

Growth essay 3: Science Teaching Philosophy Rubric (Final Draft)

Criteria	Feedback		
	Excellent 5	**Satisfactory** 3	**Underperform** 1
1. Philosophy of science teaching statement is *1 – 1 ½ pages and double-spaced*; submission uses the assignment template.			
2. Philosophy statement: • Is **fully focused** on science teaching and learning in elementary/middle school classrooms. • Briefly addresses the **autobiography** (essay 1) as a science learner. • Clearly **addresses reviewers' comments** on Essay 2. Use bullets or numbers at the end to explain how each comment and suggestion was addressed.* • *Incorporates* **science education terminology** *(e.g., misconceptions, inquiry investigations)*			

• On a separate page (#3).
 	
A. Provide a revision of the concept map constructed on the first class meeting.
   • Insert an updated version of your concept map.
   • What concepts/ideas have become relevant in your concept map? Why?
 	
B. In the drawing/painting done in class (activity 3) you conveyed your views about how to teach and learn science in elementary school classrooms. If today you were to produce a second drawing, would your depiction look different? How?			

C. Mechanics of English • Varied and accurate vocabulary, no mechanical errors. Do a spell-check before submitting/posting your assignment.			

For example:
*Reviewer's comment 1: The statement goes beyond the space limit. I reorganized my statement and was able to put my ideas into a 1 ½ page-document.

5E Lesson Plan

	10-7 pts	6-4 pts	3-1 pt.
Lesson source, title & Connection with Food Pedagogy	-The lesson indicates whether the content is adapted from an existing curriculum, from a classroom teacher, or information source. Credit should be given to the original author/s (Cite!) -The title is intriguing, succinct and represents the lesson plan -The lesson clearly builds on a food-related topic that allows the students to contribute to their own learning.	-The lesson shows some adaptations and identifies the source but fails to cite the author/s. - The title is intriguing and represents the lesson plan -The lesson partially addresses a food-related topic; the connection with students' experiences with the food item/recipe is unclear; it does not built on food as part of the Funds of Knowledge students possess.	-The lesson does not identify the source; the lesson does not cite the author/s [if used from an existing source]. The title is intriguing but does not represent the lesson plan -The lesson does not address a food-related topic.
	10-7 pts	**6-4 pts**	**3-1 pts**
Learning objectives	-Concise description of what learners are expected and able to do by the end of the lesson - Objective statements include a variety of actions verbs (lower and higher order) that address different cognitive levels. - There is evidence in the evaluation section that students' learning is linked to the concepts and skills addressed in the learning objectives. -Objective statements are clear enough that a substitute teacher would not have difficulties delivering the lesson. - Includes at least two objectives from each category (content and language).	- Descriptions of what learners are expected to learn are general. -Most action verbs in the objective statements are from either lower or higher order thinking levels that do not address different cognitive levels. -Fail to show connections with the evaluation section. -Some clarifications are needed; a substitute teacher may have difficulties delivering this lesson. - Includes learning objectives but they are not identified; the action verbs are vague (e.g., to study)	-The description of the learning objectives is vague. -Action verbs in the objective statements do not support meaningful learning. -The lesson needs a great deal of improvement; a substitute teacher will have difficulties delivering this lesson. -Includes learning objectives that do not provide students with opportunities to demonstrate how much and how well they mastered the main concepts of the lesson.
	10-7 pts	**6-4 pts**	**3-11 pt.**
TEKS alignment	-Lists pertinent standards for the target grade level. -There is evidence (i.e., in the evaluation section) that student's learning is linked to the listed standards. The lesson clearly addresses the principles of the Socio Transformative Constructivism learning theory.	-Listed standards do not fully relate to the lesson. -Partial evidence (i.e., in the evaluation section) that student's learning is linked to the listed standards. -The lesson partially addresses the four elements of the Socio Transformative Constructivist learning theory; the elements are not identified.	-Lesson is loosely connected to the standards. -The lesson does not address the four elements of the Socio Transformative Constructivist learning theory.
	20-15 pts	**14-8 pts**	**7-1 pt.**
Vocabulary Instruction	-In this section, the lesson identifies one vocabulary instruction format (i.e., Tiered instruction, frontloading). -Lesson describes the use of the target vocabulary instruction format. The vocabulary instruction format is also addressed in the body of the lesson (5Es). -Vocabulary of the lesson is identified/listed (i.e., Tier 1, Tier 2, and Tier 3 words).	-In this section, the lesson identifies one vocabulary instruction format (i.e., Tiered instruction, frontloading). -Lesson describes the use of the target vocabulary instruction format but it is not addressed in the body of the lesson (5Es). -Vocabulary of the lesson is vaguely identified/listed (i.e., Tier 1, Tier 2, and Tier 3 words). - The assessment strategy identified in the body of	- Lesson does not identify one vocabulary instruction format (i.e., Tiered instruction, frontloading). -Lesson does not describe the use of the target vocabulary instruction format. -The lesson does not address vocabulary instruction in the 5E section. -Vocabulary list is missing major scientific concepts.

	30-20 pts	19-10 pts	9-1 pts
	- Lesson includes at least one assessment strategy focused exclusively on the scientific terminology students encountered in the lesson.	the lesson is not clearly focused on the scientific terminology students encountered in the lesson.	- The lesson does not include an assessment strategy focused on the scientific terminology students encountered in the lesson.
Lesson Body	-Lesson clearly describes what the teacher and the student will do in each stage of the 5E cycle. -**Engagement** (hook/attention grabber): describes one task that creates interest and leads students into exploration. -**Exploration**: describes a STEM-based activity/strategy that encourages students to work together in the solution to the posed problem or challenge; students imagine, plan, test, and improve their designs; students formulate predictions and record observations and most importantly use the Engineering by Design process (EbD). -**Explanation**: includes at least 4 questions the teacher would use to lead a whole class discussion; teacher introduces new terms; [formally] provides definitions; uses students' experiences as basis for explanations; [teacher] asks students for evidence/justification. -**Elaboration**: describes an extension [new] activity that is hands-on/minds-on; there is evidence that students use this activity to apply concepts and skills. -**Evaluation**: includes both formative and summative assessment formats; assessments address the concept and skills stated in the learning objectives.	-General description of what the teacher and the student will do in each stage of the 5E cycle. -**Engagement** (hook/attention grabber): unclear description of a strategy that creates interest. Engagement does not clearly connect with the exploration phase. -**Exploration**: describes an activity that although builds on the EbD process seems unrelated to the previous phase; although students are encouraged to work together they there is no evidence that the students will imagine, plan, test, and improve a design; students practice a few inquiry skills only (e.g., test predictions). -**Explanation**: includes at least 2-3 questions the teacher would use to lead a whole class discussion; teacher introduces some new terms; [formally] provides some definitions; use experiences unrelated to students' own work as basis for explanations; [teacher] fails to ask students for evidence/justification. -**Elaboration**: describes a known activity that is hands-on/minds-on; there is little evidence that students use this activity to apply concepts and skills. -**Evaluation**: includes both formative and summative assessment formats; assessments partially address the concept and skills stated in the learning objectives.	-Vague description of what the teacher and the student will do in each stage of the 5E cycle. -**Engagement** (missing hook/attention grabber): activity or strategy does not create interest in the topic of the lesson. -**Exploration**: students are not encouraged to work together; students do not have the opportunity to practice the EbD process; the activity seems focused on producing an artifact; no inquiry skills (e.g., test and form new predictions, record observations) are practiced. -**Explanation**: does not include questions the teacher would use to lead a whole class discussion; teacher does not introduce new terms; definitions are not provided; students' previous experiences are not used as basis for explanations; students are not questioned for evidence/justification. -**Elaboration**: a new hands/minds-on activity is not described; there is no evidence that students use this activity to apply concepts and skills. -**Evaluation**: includes a vague description of the assessment; does not identify the assessment type.
	5 pts	**3 pts**	**1 pt.**
References and Supporting Documents	-Includes text books and websites references used in the lesson. -Supporting documents are included at the end of the lesson as appendixes.	-Includes some text books and websites references used in the lesson. -Some supporting documents are included at the end of the lesson as appendixes.	-Not included
	5 pts	**3 pts**	**1 pt.**

Comments

Link to TExES Competencies (Science domain)

The content of this course addresses the following Texas Examinations of Educator Standards (TExES) competencies in the domain for the Generalist EC-6 and Bilingual Generalist EC-6 programs.	These standards will be addressed and/or assessed with the following course activities and assignments
Competency: Safe and proper laboratory processes. The beginning teacher: D. Selects and safely uses appropriate tools, technologies, materials for instructional activities……. E. Understands concepts of precision, accuracy and error with regard to reading and recording numerical data from a scientific instrument…………………………………………………………………… F. Understands how to gather, organize, display and communicate data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations)…………………………………… G. Understands the international system of measurement (i.e., metric system) …………………….	• 5E Lesson plan • Inquiry investigation (Parts II, and III) • Bird survey on campus • Popcorn activity • Inquiry activities
Competency: Scientific inquiry The beginning teacher: A. Understands plans and implements instruction that provides opportunities for all students to engage in non-experimental- and experimental-inquiry investigations…………………………………… B. Focuses inquiry-based instruction on questions and issues relevant to students and uses strategies to assist students with generating, refining and focusing scientific questions and hypotheses…… D. Knows how to guide students in making systematic observations and measurements…………… E. Knows how to promote the use of critical-thinking skills, logical reasoning and scientific problem solving to reach conclusions based on evidence…………………………………………………….. F. Knows how to teach students to develop, analyze and evaluate different explanations for a given scientific result…………………………………………………………………………………………………… G. Knows how to teach students to demonstrate an understanding of potential sources of error in inquiry-based investigation…………………………………………………………………………………………… H. Knows how to teach students to demonstrate an understanding of how to communicate and defend the results of an inquiry-based investigation…………………………………………………………… J. Understands the roles that logical reasoning, verifiable evidence, prediction and peer review play in the process of generating and evaluating scientific knowledge…………………………………. K. Understands the historical development of science and the contributions that diverse cultures and individuals of both genders have made to scientific knowledge……………………………………..	• 5E STEM lesson plan, final test, essays 2 and 3, and readings from week 2. • Inquiry investigation (Part I), online quizzes • Science Teaching Event • 5E Lesson and Science Teaching Event • 5E Lesson and Science Teaching Event • Inquiry investigation (II & III) and 5E Lesson • Popcorn activity, inquiry activities, bird survey, activities 3, 6 and 9. • Inquiry investigation (I. II, & III) • Online quizzes, and reading from

	week 4
Competency: Impact on daily life/environment The beginning teacher: A. Understands that decisions about the use of science are based on factors such as ethical standards, economics and personal and societal needs. F. Understands the role science can play in helping resolve personal, societal and global challenges.	• Final test, and online quizzes • Final test, and online quizzes
Competency: Unifying concepts and processes in science The beginning teacher: A. Understands how a unifying, explanatory framework across the science disciplines is provided by the concepts and processes of systems, order and organization; evidence, models and explanation; change, constancy and measurements; and form and function. B. Demonstrates an understanding of how patterns in observations and data can be used to make explanations and predictions. F. Understands how change and constancy occur in systems. G. Understands the complementary nature of form and function in a given system.	• Inquiry investigation (Parts II and III) • In-class inquiry activities, readings from week 2 • Inquiry investigation • Inquiry investigation
Competency: Theory and practice of science teaching The beginning teacher: A. Understands how developmental characteristics, prior knowledge and experience and students' attitudes influence science learning. B. Selects and adapts science curricula, content, instructional materials and activities to meet the levels of interest, knowledge and understanding as well as the abilities, experiences and needs of all students, including English-language learners. C. Understands how to use situations from students' daily lives to develop instructional materials that investigate how science can be used to make informed decisions. D. Understands common misconceptions in science and has effective ways to address those misconceptions. E. Understands developmentally appropriate design and implementation of hands-on learning experiences in science and selects effective, appropriate instructional practices, activities, technologies and materials to promote students' scientific knowledge, skills and inquiry processes.	• 5E STEM lesson (peer review, final draft, and delivery), online test, online quizzes, discussion facilitation, course activities, and reflection.

Competency; Assessment in science learning The beginning teacher: B. Understands the importance of monitoring and assessing students' understanding of science concepts and skills on an ongoing basis, including how to use formal and informal assessments of student performance and how to use products (e.g., projects, lab journals, rubrics, portfolios, student profiles, checklists) to evaluate students' understanding of and participation in the inquiry process. C. Selects — or designs — and administers a variety of appropriate assessment methods (e.g., performance assessment, self-assessment, formal/informal assessment, formative/summative assessment) to monitor students' understanding and progress and to plan for instruction.	• Readings from weeks 6 and 8, 5E STEM lesson plan (design, review, and delivery), and final test.
Competency: Life science The beginning teacher: A. Understands that living systems have different structures that perform different functions. B. Understands and describes stages in the life cycles of common plants and animals. C. Understands that organisms have basic needs.	• Inquiry investigation (I, II, and III)