George Mason University
College of Education and Human Development
Early Childhood Education

ECED 516.001 Science for Diverse Young Learners
3 Credits, Summer 2024, Online Bichronous
5/13/2024-7/9/2024, Thursdays/ 4:30 pm-7:10 pm

Faculty

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Prerequisites
ECED 401 or 501 and ECED 403 or 503
Prerequisites require a minimum grade of C for undergraduate courses and B- for graduate courses.

University Catalog Course Description
Examines ways to foster development of science in preschool to third-grade children. Covers construction of science lessons and hands-on experiences that promote learning in children with diverse abilities and cultural and linguistic backgrounds.

Course Delivery Method
This course will be delivered online (76% or more) using a synchronous format via Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @masonlive.gmu.edu) and email password. The course site will be available on May 13, 2024.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supported-browsers
  To get a list of supported operation systems on different devices see

https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems

- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students will need a headset microphone for use with the Blackboard Collaborate web conferencing tool.
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
- The following software plug-ins for PCs and Macs, respectively, are available for free download:
    - Adobe Acrobat Reader: https://get.adobe.com/reader/
    - Windows Media Player: https://support.microsoft.com/en-us/help/14209/get-windows-media-player
    - Apple Quick Time Player: www.apple.com/quicktime/download/

Expectations

- Course Week: Our course week will start on Monday and finish on Sunday.
- Log-in Frequency: Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least 4 times per week.
- Participation: Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- Technical Competence: Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
- Technical Issues: Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
- Workload: Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- Instructor Support: Students may schedule a one-on-one meeting to discuss course requirements, content, or other course-related issues. Those unable to come to a Mason campus can meet with the instructor via telephone or web conference. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.
- Netiquette: The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.

- Accommodations: Online learners who require effective accommodations to ensure accessibility must be registered with George Mason University Disability Services.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

1. Explain how knowledge, skills, and practices in the four core science disciplines (i.e., Earth sciences, biology, chemistry, and physics), as defined in *Virginia's Early Learning and Development Standards* and the *Virginia Science Standards of Learning,* provide a sound foundation for teaching science in prekindergarten through third grade.
2. Describe the nature of science and scientific inquiry, including the function of research design and experimentation, and the role of science in explaining and predicting events and phenomena.
3. Describe the practices required to provide empirical answers to research questions, including data collection and analysis, modeling, argumentation with evidence, and contracting explanations.
4. Discuss the reliability of scientific knowledge and its constant scrutiny and refinement; self-checking mechanisms used by science to increase objectivity, including peer review; and assumptions, influencing conditions, and limits of empirical knowledge.
5. Describe and organize key science content in Earth science, biology, chemistry, and physics content into meaningful units of instruction that actively engage students in learning; integrate processes and crosscutting concepts into planning and implementing in the interdisciplinary context; and promote the application of key science principles to solve practical problems and develops a "systems" understanding of the natural world.
6. Describe the role of family and community knowledge, experience, and resources in planning and implementing science content in the curriculum.
7. Plan instruction on Earth science, biology, chemistry, and physics that (a) uses a variety of instructional techniques to meet the needs of diverse young learners; (b) incorporates instructional technology to enhance learner performance; (c) ensures learner competence in science; and (d) is informed by the *Virginia's Early Learning and Development Standards*, the *Virginia Standards of Learning for Science*, and the *New Generation Science Standards*.
8. Evaluate, select, and adapt a variety of instructional materials, technologies, and teaching strategies to engage diverse young learners in science.
9. Identify fiction and nonfiction texts to develop key science concepts in diverse young children.
10. Develop science activities for young children using the scientific process with an emphasis on describing, analyzing, and quantitatively presenting findings.
11. Conduct formative and summative assessments of students' learning of science concepts.
12. Describe and use the knowledge, skills, and practices to implement classroom, field, and laboratory safety rules and procedures and ensure students take appropriate safety precautions.
13. Describe and use the knowledge, skills, and practices needed to conduct research projects and experiments, including applications of design process and technology, and systematic field investigations using the school grounds, the community, and regional resources.
14. Explain the contribution and significance of science, including (a) its social, cultural, and economic significance; (b) the relationship of science to mathematics, the design process, and technology; and (c) the historical development of scientific concepts and scientific reasoning.

15. Exhibit standards of professionalism, ethical standards, and personal integrity with children, families, and professionals in the field and in interactions with classmates, the instructor, and others.
16. Use writing as an instructional and assessment tool to generate, gather, plan, organize, and to communicate for a variety of purposes; integrate correct written conventions (i.e., grammar, usage, mechanics, and spelling); and format using current APA style.

Professional Standards

Interstate Teacher Assessment and Support Consortium (InTASC) Teaching Standards, Division of Early Childhood (DEC) Initial Practice-Based Professional Preparation Standards for Early Interventionists/Early Childhood Special Educators (EI/ECSE), National Association for the Education of Young Children (NAEYC) Professional Standards and Competencies for Early Childhood Educators, Virginia Professional Studies Endorsement Competencies, and Virginia Early/Primary Education PreK-3 Endorsement Competencies

Upon completion of this course, students will have met the following professional standards:

Virginia Early/Primary Education PreK-3 Endorsement Competencies

Methods
Knowledge and Skills: Science

Required Texts

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). Author. ISBN: 9781433832161

Achieve Inc. (2013). *Next generation science standards*. Author. http://www.nextgenscience.org

Peters, J. M., & Stout, D. L. (2011). *Science in elementary education: Methods, concepts, and Inquiries* (11th ed.). Pearson. ISBN: 9780135031506

Shillady, A. (ed.) (2013). *Spotlight on young children: Exploring science*. National Association for the Education of Young Children. ISBN: 9781928896944

Virginia Department of Education. (2010). Science standards of learning. https://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml

Virginia Department of Education. (2010). Science curriculum framework. https://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml

Access Blackboard for required and optional class readings.

Additional Readings

Childers, G., Watson, K., Jones, M. G., Williamson, K. & Hoette, V. (2015). Toughing the stars: Making astronomy accessible for students with visual impairments. *Science Scope*, 20-26.

Clevinger, C., Lange, A. & Schock, E. (2022). Moon, math, and literacy: Interdisciplinary connections through a space science study in preschool. *Science and Children, 60*(2).

Davis, M. E., Cunningham, C. M. & Lachapelle, C. P. (2017). They Can't Spell "Engineering" but They Can Do It: Designing an Engineering Curriculum for the Preschool Classroom. *Zero to Three, 37*(5), 4-11.

Ehsan, H., Rehmat, A. P. & Cardella, M. E. (2019). Computer science unplugged: Second-grade students design a puppy playground using computational thinking. *Science and Children, 57*(3).
Fast, D. & Wild, T. (2018). Traveling with science: Working with orientation and mobility specialists to make science accessible for kindergarten students with visual impairments. *Science and Children*, 54-59.
Flynn, L. (2008). Performance-based assessments in science: A teacher's outlook on testing is changed after students are assessed through hands-on tasks. *Science and Children*, 32-35.
Frazier, W. M. & Sterling, D. R. (2007). Weather tamers. *Science Scope*, 26-31.
Gilbert, A. & Byers, C. (2017). Wonder as a tool to engage preservice elementary teachers in science learning and teaching: GILBERT and BYERS. *Science Education, 10*(1). DOI:10.1002/sce.21300
Kurson, R. (2016). Learning about plants with STEAM. National Science Teaching Association.
Lott, K., Lott, A. & Ence, H. (2018). Sounds of science: Accommodating students who are deaf or hard of hearing in a unit on sound. *Science and Children*, 42-47.
National Research Council. 2015. Identifying and Supporting Productive STEM Programs in Out-of-School Settings. *Washington, DC: The National Academies Press*. https://doi.org/10.17226/21740
Maeda, J. (2013, July 11). Artists and Scientists: More Alike Than Different. *Scientific American*. https://blogs.scientificamerican.com/guest-blog/artists-and-scientists-more-alike-than-different/
Mesa, J. (2018). Bring back our bayou chico: Using the universal design for learning framework to support all learners. *Science and Children*, 36-41.
Miller, B., Satsangi, R. (2018). Ramps, balls, and measuring distance—for all: Ensuring meaningful access to science curriculum for students with physical disabilities. *Science and Children*, 48-53.
Parks, M. (2017). Teaching with Play: An Introduction to Environmental Stewardship for Preschoolers. *Science and Children, 54*(6), 36-41.
Steele, M. M. (2007). Science success for students with special needs: Strategies for helping all students master science standards. *Science and Children*. https://files.nwesd.org/depts/tnl/Science/2014-15/Arguing%20from%20Evidence%20Series/Session%202%20January%202015/Handouts%20and%20Resources/S38c%20Methods%20and%20Strategies%20for%20Student%20with%20special%20needs%20Science%20and%20Children.pdf
Trundle, K. C., Troland, T. H. & Pritchard, T. G. (2008). Representations of the Moon in children's literature: An analysis of written and visual text. *Journal of Elementary Science Education, 20*(1), 17-28.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, VIA, hard copy).

Assignments	Due Dates	Points
Attendance and Participation • Self-Evaluation	Ongoing July 7	**25**
Personal Journal		**10**

• Part 1 • Part 2	May 19 July 7	5 5
Science Activity Share	Variable	**15**
Enriching Science Inquiry with Literature • Literature Chart • Google Share: Pairing non-fiction and fiction science texts (Present in Class)	 May 23 May 23	**5** 3 2
6E/PBL Lesson Plan • Rough Draft • Final Draft	 May 30 June 2	**15**
Family Science Night Lesson Implementation and Reflection • Part 1: Planning the Lesson • Part 2: Collecting Data • Part 3: Reflecting on the Lesson	 June 9 June 9 June 23	**20** 5 5 10
Children's Science Center Volunteer Experience Reflection	June 30	**10**
TOTAL		**100**

- **Assignments and/or Examinations**

NOTE: With exclusion of the personal journal, each of the major assignments for this course should focus on a <u>different</u> science area: physical science, life science, earth/space science, or engineering (i.e., no two assignments should focus on the same area.)

Personal Journal (10 points; *Part 1=5 points, Part 2=5 points)*
Part 1: To initiate class experiences, students will write a critical reflection on their personal experiences as a learner of science (2 pages). They will use the following prompts to help guide their reflection process.

- Begin with your earliest memories (give examples) and reflect until the present as a graduate student in a teacher preparation program.
- Reflect on your experiences in school, out of school, in the context of your family, etc.
- How do you think your social, cultural, and economic background played a role on your experiences as a science learner?
- How do you see yourself as a science learner?
- Why do you think you feel that way?
- How do you think these experiences will shape you as a teacher of science? In other words, what positive impacts or challenges on your teaching practice do you foresee from your prior experiences or self-conception?

Part 2: At the conclusion of the course, students will revisit their initial thoughts in their first journal entry and reflect on how their thoughts and/or self-conception have changed, if at all (2 pages). They will use the following prompts to help guide their reflection process.

- What have you learned in the course?
- Do you view yourself as a science learner differently than you did before?

- Is there a concept you learned in the course that really stuck out for you? (Include references to course readings, as necessary.)
- Is there a particular reading, handout, or material from class that you found particularly helpful or eye-opening? (Include references to course readings, as necessary.)
- Articulate the kind of early childhood science teacher you plan to be. Will something you learned in the course be included in your guiding principles?

Science Activity Share (15 points)
Students will choose a science content area from the four core science areas (Earth sciences, biology, chemistry, and physics) during the first class in which to present an activity. Three students will sign up per content area: one person will focus on PreK, one on K-Grade 1, and one on Grades 2-3. Individual students will prepare a lesson plan using the template provided and lead a 15-minute informative and interactive activity that actively engages students in learning in their science content area.

Before the science activity share, students will post all share materials (lesson plan, resources) on Blackboard under Discussion Board. Students should prepare seven PPT slides to organize and guide the presentation:

1. Introduction/Overview of Topic
2. Standards
3. Instructions for Activity/List of Materials
4. Classroom Management Recommendations, Differentiation Strategies for a Range of Learners
5. Direct Instruction of Science Concept
6. Takeaways from Practitioner Journal (NSTA'S *Science and Children* Article
7. Additional Resources (picture books, websites, manipulatives, games, etc.).

Additionally, the required components of the Activity Share must include:

- An overview of the topic, including the key ideas or content and the importance of the topic to students' science learning;
- An overview of relevant state and national content standards at the appropriate grade level(s), noting consistencies (or inconsistencies, if the case may be);
- Materials appropriate to the activity (use items that you can readily find around a home; list alternative materials in case students do not have certain materials at home; as much as possible, materials should be visually attractive and engaging for young learners);
- A description of classroom and behavior management strategies that would increase the effectiveness of the implementation of the activity and contribute to creating and maintaining a safe environment;
- Preparation for how to adapt the activity for a range of learners;
- Model and explain the science concept (picture books are good to integrate; please do not use a video to teach for you; videos can be listed as additional resources); it should be evident that the student has read the course materials (i.e., relevant chapters in course textbooks, articles and presentations on Blackboard) on the science topic;
- Modeling how to engage in the activity chosen for science concept. Science activity should be in-line with the type of teaching practices we are learning about in the course (e.g., hands-on with materials, NOT a worksheet)

- Modeling of the science concept and activity should be role played as if student is the teacher and classmates are young learners in the class; and
- A list of at least *three resources* related to teaching the topic that could include children's literature, websites, manipulatives or materials, or other teacher resources (at least one must be a relevant developmentally appropriate picture book (a hard or electronic copy of the book is fine) and one must be an article from a practitioner journal (e.g., NSTA's *Science and Children*) on the topic.

Enriching Science Inquiry with Literature: A Focus on Reading and Writing (5 points)

- ***Literature Chart (3 points)***
  To place the core scientific disciplines of Earth science, biology, chemistry, and physics in an appropriate interdisciplinary context, students will identify a focused science topic (e.g., ecosystems or weather) and compile a chart of at least 5 literature resources that could be used for a unit on that topic, including fiction, non-fiction, digital, and non-digital forms, that promote children's engagement in the science concept. The chart will provide a picture of the cover of the book, a brief summary of the text, identify possible literacy experience(s) for the resource (e.g., read aloud, guided reading, exploration center, research text, independent reading, as a resource to promote writing, etc.), and identify and explain possible 6E entry points for the resource (i.e., engage, explore, explain, elaborate, evaluate, e-learning). A template of the chart is available on Blackboard.

- ***Google Share: Pairing Non-Fiction and Fiction Science Texts (2 points)***
  Similar to the NSTA *Picture Perfect Science Series*, students will select a pair of texts (one non-fiction and one fiction) not already included in their literature chart to contribute to a Google share site to serve as a reference for peers in the class. The Google chart will require students to include the APA citations for each text, a brief description of each text, grade-level connections, scientific discipline connection (e.g., Earth science, biology, chemistry, and physics), and a discussion of why the texts complement each other in a unit of inquiry.

6E/PBL Lesson Planning (15 points)

Students will use both an **inquiry-based** (6E model) and a **problem-based** (PBL) approach to develop a detailed 6E (engage, explore, explain, extend, evaluate, e-learning/incorporate technology) lesson plan for one of the following science areas: physical science, life science, chemistry, Earth/space science, or engineering as defined by *Virginia's Early Learning and Development Standards,* the *Virginia Science Standards of Learning*, and the *Next Generation Science Standards*. They will develop a creative and engaging PBL challenge that they will integrate throughout the lesson plan (examples will be shared during class). Students will integrate questioning, curiosity, and active engagement with real materials in the lesson whenever possible. Students will include plans for classroom and behavior management and building community. They also will include how they will create and maintain a safe environment. They will use the lesson plan format provided by the instructor. In addition, students will develop the student sheets and any other supporting materials needed for their lesson. Students will create an assessment of student learning for their lesson and a teacher's checklist or rubric for the assessment.

Family Science Night Activity Implementation and Reflection (20 points)
In two-person partnerships, students will choose a developmentally appropriate, hands-on science activity in one of the four core science areas as defined by Virginia's Early Learning Development Standards, the Virginia Science Standards of Learning, and the Next Generation Science Standards from a variety of professional resources discussed in class. They will implement the activity during a Family Science Night at one of the local Child Development Centers (CDC) during regularly scheduled class time to multiple groups of young children and their families, making necessary modifications and taking reflective notes ***(date TBD)***. Students will bring any necessary materials for the activity (i.e., students should not ask the CDC to provide materials, even paper, scissors, or glue, with the exception of water). If a student is absent on the day of implementation, he/she will need to make arrangements with the CDC to visit during his/her own time to fulfill the assignment. Both partners should plan to lead the activity, provide support, and take anecdotal notes during multiple iterations of the activity. Students will submit a written reflection individually in three parts.

- ***Planning the Activity (5 points).*** The first part of the reflection will be due before the experience and will include how the activity was selected; how course readings support the selection of the lesson plan; what adaptations were made, if any, to the lesson plan and why; and how the students prepared to implement the activity. Students will include plans for materials selection and preparation, classroom and behavior management, building community, and creating and maintaining a safe environment. In addition, they will create a one-page handout to give to family members at the Family Science Night that includes 1) A summary of the math topic, 2) Relevant pre-K standards, and 3) An activity that students and family members can do at home to practice the math concept. For this part, students will be assessed on their discussion of preparation and selection of all of the necessary materials (materials should be visually attractive and enticing for young learners) for the lesson, including being prepared to implement the lesson upon arrival at the CDC and the home-school connections handout. Partners will write and submit this reflection individually. (2 to 3 double-spaced pages)

- ***Collecting Data (5 points).*** The second part of the reflection will be due before the experience and will include (a) a statement about their ethical considerations as they planned for the data collection and (b) a plan for collecting quantitative and qualitative data. Partners will develop an observational tool (a teacher's checklist) to use to collect data about the children's participation in the activity (e.g., behavior, participation, understanding). They will also identify artifacts (may be photos) they will collect and how they will be assessed using a scoring rubric (must be submitted) and analyzed to determine children's learning of the concept. Partners will write and submit this reflection individually, but are encouraged to collaborate and provide feedback for one another.

- ***Reflecting on the Experience (10 points).*** The third part will be due after the experience and will include an analysis of the qualitative and quantitative data collected as well as a reflection on how the activity went (what went well, what could have been done differently/better for next time), key learnings, and "aha" moments. Students will use the

analyzed data and their own observations to reflect on both teacher learning (themselves) and children and family learning during the experience. Students also will reflect on their classroom and behavior management and how they fostered a sense of community and "welcomeness." Students will provide specific linkages to course readings and research examined for the inquiry into evidence-based practices. Students are encouraged to attach photos (without children's faces), artifacts, and a filled out teacher's assessment checklist. They will conclude the reflection by posing a compelling question about next steps for supporting children's understandings. Partners will engage in reflective discussions about their analysis of the data and the implementation of the activity, but will submit written reflections independently. (3 double-spaced pages)

Children's Science Center Volunteer Experience Reflection (10 points)
Over the course of the semester, students will have the opportunity to volunteer at the Children's Science Center (CSC) Lab at the Fair Oaks Mall for 2 sessions (approximately 6 hours). During this time students will observe and assist CSC STEM educators to learn how to teach science in in an inquiry-based manner. Students will explore what they learned about pedagogy (teaching), materials management and use, classroom management, and how informal science settings can be integrated into (and used to enhance) children's formal education (i.e., school) experience. Students will turn in a log of their volunteer hours (screenshot is acceptable). Specific linkages to course readings should be included in the reflection. (3 double-spaced pages)

- **Other Requirements**

Attendance and Participation (25 points)

1. Attendance is taken when the class is scheduled to start, and a student will be considered late once attendance is taken. If a student leaves more than 10 minutes before the end of the class, then it is considered an early departure. Two late arrivals or early departures, or a combination of both, equals one absence.
2. Students who are registered for the course at the start of the semester must attend the first class session to continue in the course. If the student is registered for the course and unable to attend the first class session, they should drop the course and plan to take it in a subsequent semester.
3. Course length:
    a. For undergraduate students: In 15-week semester-long courses, more than 2 class absences will result in one full letter grade (10%) deduction. For example, if a student has a 92% in a 15-week course, after more than 2 absences their grade will automatically change to an 82%. In a course that is less than a full 15-week semester length, inclusive of 7.5-week and 10-week courses, more than 1 class absence will result in one full letter grade (10%) deduction. For example, if a student has a 92% in a 7.5-week course or a 10-week course, after more than 1 absence their grade will automatically change to an 82%.
    b. For graduate students: In 15-week semester-long courses, more than 2 class absences will result in one letter grade (5%) deduction. For example, if a student has 92% in a 15-week course, after more than 2 absences their grade will automatically change to an 87%. In a course that is less than a full 15-week semester length, inclusive of 7.5-week and 10-week courses, more than 1 class

absence will result in one letter grade deduction. For example, if a student has a 92% in a 7.5-week course or a 10-week course, after more than 1 absence their grade will automatically change to an 82%.

4. Per the catalog (AP.1.6.1), excused absences, to observe religious holidays or to participate in university-sponsored activities (e.g., intercollegiate athletics, forensics team, dance company, etc.) must be communicated to each faculty, within the first two weeks of the semester, with the dates of major religious holidays on which the student will be absent, and the dates for which they are requesting an excused absence for participation in any university-sponsored activity scheduled prior to the start of the semester, and as soon as possible otherwise. Absence from classes or exams for these reasons does not relieve students from responsibility for any part of the course work required during the absence. Students who miss classes, exams, or other assignments because of their religious observance or for participation in a university activity will be provided a reasonable alternative opportunity, consistent with class attendance policies stated in the syllabus, to make up the missed work. Students are obligated to provide their instructor with a letter from a university official stating the dates and times that participation in the University-sponsored activity would result in the student missing class.
5. Inclusive ECE program participation policy:
    a. In accordance with the GMU Attendance Policies (University Catalog, 2023-2024), "Students are expected to attend the class periods of the courses for which they are registered. In-class participation is important not only to the individual student, but also to the class as a whole. Because class participation is a factor in grading, instructors may use absence, tardiness, early departure, or failure to engage in online classes as de facto evidence of nonparticipation." See https://catalog.gmu.edu/policies/academic/registration-attendance/#ap-1-6.

Online participation in synchronous sessions requires students to remain engaged and active learners. Therefore, students must keep their camera on throughout the entire class session. Students must attend the entire class session without distractions and participate in small group and whole group activities. If cameras are off and engagement is not evidenced the student will be marked as absent.

If you must be absent, late, or leave early from class, or have your camera off, inform the instructor prior to the beginning of the class session, at least 24-48 hours.

Missed Class Reflection: *In the case of an absence, students will review the class presentation and submit a 2-3-page written reflection of the content covered* (including course readings, content on Blackboard, and student activity shares that were missed on the day of the absence). Reflection is due within 1 week after an absence.

Written Assignments

All formal written assignments will be evaluated for content and presentation. The American Psychological Association, Seventh Edition (APA) style will be followed for all written work. All written work unless otherwise noted must be completed on a word processor and should be proofread carefully (use spell check). If students are not confident of their own ability to catch

errors, they should have another person proofread their work. When in doubt, they should check the APA manual. Students may consult the Writing Center for additional writing support.

Students will do the following:

1. Present ideas in a clear, concise, and organized manner. (Avoid wordiness and redundancy.)
2. Develop points coherently, definitively, and thoroughly.
3. Refer to appropriate authorities, studies, and examples to document where appropriate. (Avoid meaningless generalizations, unwarranted assumptions, and unsupported opinions.)
4. Use correct capitalization, punctuation, spelling, and grammar.
5. Type the paper with double spacing (unless otherwise directed for a specific assignment), indented paragraphs, 1-inch margins all around, and 12-point Times New Roman font.

- **Grading**

A = 95-100 A- = 90-94 B+ = 87-89 B = 80-86 C = 70-79 F = <70
Incomplete (IN): This grade may be given to students who are passing a course but who may be unable to complete scheduled coursework for a cause beyond reasonable control.

All CEHD students are held to the university grading policies as described in the Academic Policies section of the current catalog, which can be accessed at http://catalog.gmu.edu. Those students enrolled in a CEHD Licensure Graduate Certificate program, however, must earn a B- or better in all graduate licensure coursework. A degree-seeking graduate student will be dismissed after accumulating grades of F in two courses or 9 credits of unsatisfactory grades (C or F) in graduate courses. A 3.0 grade point average is required for completion of the graduate degree.

Professional Dispositions
Students are expected to exhibit professional behaviors and dispositions at all times. See https://cehd.gmu.edu/students/policies-procedures/.

Class Schedule

Date	Topics	Readings & Assignments
Week 1 May 13-19 **Sync Class** May 16 4:30-7:10 pm	Four Core Science Disciplines • Earth sciences, biology, chemistry, physics • Understanding of the nature of science and scientific inquiry Foundations for Teaching Science in Early Childhood Education for Diverse Young Learners Classroom, Field, and Laboratory Safety • Rules and procedures • Ensuring students take appropriate safety precautions Children's Science Center Volunteer Experience and Requirements Role and Nature of Theory • Explaining events and phenomena, including learning theories undergirding pedagogical approaches for teaching science Contribution and Significance of Science • Social, cultural, and economic significance Role of Family and Community Knowledge, Experience, and Resources in Planning and Implementing Science Content Inquiry-Based Approach to Teaching Science 5E/6E model	Peters & Stout, Chapter 1-2 Spotlight on Science, pp. 2-10 <u>Readings on Blackboard:</u> *Wonder as a Tool to Engage PSE Teachers in Science Learning and Teaching* *Identifying and Supporting STEM Programs in Out-of-School Settings* **Due to Bb May 19: Personal Journal Part 1**

Date	Topics	Readings & Assignments
Week 2 May 20-26 **Sync Class** May 23 4:30-7:10 pm	Historical Development of Scientific Concepts and Scientific Reasoning Knowledge, Skills, and Practices for Conducting an Active Early Childhood Science Program Application of Key Science Principles to Solve Practical Problems • Problem-based learning (PBL) Standards • Virginia standards *(Virginia's Early Learning and Development Standards, Virginia Science Standards of Learning)* • National standards (*Next Generation Science Standards*) Integrating the Four Core Scientific Disciplines Across Content Areas • Integrate processes and crosscutting concepts in an appropriate interdisciplinary context Disciplines Across Content Areas • Relationship of science to mathematics, design process, and technology	Peters & Stout, Chapter 3 Spotlight on Science, pp. 48-54, 55-60 <u>Readings on Blackboard:</u> *Weather Tamers* *Learning About Plants with STEAM* *Artists and Scientists: More Alike Than Different* **Due to Bb May 23: Enriching Science Inquiry with Literature Chart & Google Share (BRING TO CLASS)**

Date	Topics	Readings & Assignments
Week 3 May 28-June 2 **Sync Class** May 30 4:30-7:10 pm	Formative and Summative Assessments of Student Learning Practices Required for Empirical Answers to Research Questions data collection and analysis, modeling, argumentation with evidence, contracting explanations Application of Key Science Principles to Solve Practical Problems Reliability of Scientific Knowledge • scrutiny, refinement, and self-checking mechanisms • objectivity, such as peer review, assumptions, influencing conditions, limits of empirical knowledge **Science Activity Shares: Physical Science** Plan Instruction on Earth Science, Biology, Chemistry, and Physics • Using the goals of the *Virginia Standards of Learning* and the *Next Generation Science Standards* • Using variety of instructional technology to support learner competence	Peters & Stout, Chapter 4-5, Inquiry Unit 1: Physical Science Spotlight on Science, pp. 72-73 <u>On Blackboard</u>: Review Physical Science PowerPoint presentations <u>Reading on Blackboard:</u> *Performance-Based Assessments in Science* **Due to Bb May 30: Physical Science Activity Share Materials (also post materials to Discussion Board)** **Due to Bb May 30: 6E/PBL Lesson Plan Rough Draft (bring hard copy to class)** **Due to Bb June 2: Final 6E/PBL Lesson Plan**
Week 4 June 3-9 **Sync Class** June 6 4:30-7:10 pm	Core Science Discipline: Biology, Life Science Engaging Diverse Young Learners in Science Experiences • Field investigations using school grounds and community resources • Science activities using scientific process: describing, analyzing, using quantitative methods for findings	Peters & Stout, Inquiry Unit 2: Life Science Spotlight on Science, pp. 29-35, 41-47 <u>On Blackboard:</u> Review Life Science PowerPoint presentations

Date	Topics	Readings & Assignments
	• Knowledge, skills, practices to conduct research projects and experiments **Science Activity Shares: Life Science**	**Due to Bb June 6: Life Science Activity Share Materials (also post materials to Discussion Board)** **Due to Bb June 16: Family Science Night Lesson Implementation and Reflection (Parts 1 & 2)**
Week 5 June 10-16 **Sync Class** June 13 4:30-7:10 pm	Evaluate, Select, and Adapt Instruction and Materials to Meet the Needs of Diverse Learners Science Inquiry Invitations for Family Explorations Engineering Design Process Building Challenges Engineering Core Science Discipline: Earth Science Evaluating Instructional Materials, Technologies, and Teaching Practices Environmental Education and Conservation **Science Activity Shares: Earth Science**	Peters & Stout, Chapter 6-7, Inquiry Unit 3: Earth and Space Science <u>On Blackboard:</u> Review Engineering PowerPoint presentations <u>Readings on Blackboard:</u> *They Can't Spell Engineering but They Can Do It* *Teaching with Play-An Introduction to Environmental Stewardship for Preschoolers* *Science Success for Students with Special Needs* **Due to Bb June 13: Earth Science Activity Share Materials (also post materials to Discussion Board)**

Date	Topics	Readings & Assignments
Week 6 June 17-23 **Sync Class** June 20 4:30-7:10 pm	Core Science Discipline: Space Science Professional Development in Support of Inquiry **Science Activity Shares: Space Science**	Spotlight on Science, pp. 68-71, pp. 17-22 Peters & Stout, Inquiry Unit 3: Earth and Space Science <u>On Blackboard:</u> Review Space Science PowerPoint presentations <u>Readings on Blackboard</u>: *Moon, Math, and Literacy: Interdisciplinary Connections through a Space Science Study in Preschool* *Representation of the Moon in Children's Literature* **Due to Bb June 20: Space Science Activity Share Materials (also post materials to Discussion Board)** **Due to Bb June 23: Family Science Night Lesson Implementation and Reflection (Part 3)**
Week 7 June 24-30 **Sync Class** June 27 4:30-7:10 pm	Coding Computational Thinking Data Science Evaluating Instructional Materials, Technologies, and Teaching Practices Self-Reflections on Filling the Role of Science teacher for Diverse Young Learners	<u>Reading on Blackboard</u>: *Computer Science Unplugged: Second Grade Students Design a Puppy Playground Using Computational Thinking* **Due to Bb June 30: Children's Science Center Volunteer Experience Reflection**

Date	Topics	Readings & Assignments
Week 8 **July 1-7** **No Class July 4**		
Exams **July 8-9**		**Due to Bb February July 7: Attendance and Participation Self Evaluation** **Due to Bb July 7: Personal Journal Part 2**

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

Core Values Commitment
The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: http://cehd.gmu.edu/values/.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).
- Students must follow the university policy for Responsible Use of Computing (see https://universitypolicy.gmu.edu/policies/responsible-use-of-computing/).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see http://ds.gmu.edu/).
- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to VIA should be directed to viahelp@gmu.edu or https://cehd.gmu.edu/aero/assessments. Questions or concerns regarding use of Blackboard should be directed to https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/.
- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus.

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Non-Confidential Employee" and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730 or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website: http://cehd.gmu.edu.