UNIVERSITY OF THE PEOPLE

Syllabus for Advanced Practices for Teaching the STEM Fields at the Elementary and Middle School Levels

EDUC 5272

Credits: 3

Prerequisites: EDUC 5270

Course Description:

This course focuses on the mathematical and scientific concepts taught in the elementary and middle school, with an emphasis on research on the teaching and learning of mathematics and the theoretical and empirical foundations of the teaching and learning of science. Attention will be given to how students acquire mathematical understandings and to how different groups experience mathematics instruction. Methods for teaching the scientific method, doing laboratory work as inquiry-based learning, and exploring the relationship of science, technology and society will be discussed. Use of technology in teaching discrete areas of science (life, physical, earth) as well as in an integrated science approach will be covered.

Required Textbook and Materials: UoPeople courses use open educational resources (OER) and other materials specifically donated to the University with free permissions for educational use. Therefore, students are not required to purchase any textbooks or sign up for any websites that have a cost associated with them. The main required textbooks for this course are listed below, and can be readily accessed using the provided links. There may be additional required/recommended readings, supplemental materials, or other resources and websites necessary for lessons; these will be provided for you in the course's General Information and Forums area, and throughout the term via the weekly course Unit areas and the Learning Guides.

- This course does not contain a main textbook; resources to all required reading will be provided in the course Learning Guide for each week.

Software Requirements/Installation: No special requirements.

Learning Objectives and Outcomes:

By the end of this course students will be able to:

1. Analyze ways in which the developmental needs of students and the classroom environment impact mathematics and science learning.
2. Apply research-based curriculum, assessment, and differentiated instruction to a diverse elementary and middle school mathematics and science classroom environment.
3. Analyzes the advantages of using a developmentally appropriate, active learning approach for teaching STEM at various age levels.

4. Apply a problem-solving, critical thinking, active learning, and the scientific method to teaching STEM.
5. Integrate technology into mathematics, science, and engineering teaching and learning.
6. Engage in ongoing development as a teacher of STEM.

Course Schedule and Topics: This course will cover the following topics in eight learning sessions, with one Unit per week.

Week 1: Unit 1 - Setting the Stage for Mathematics and Science Learning

Week 2: Unit 2 - Creating a Critical Thinking Frame for Learning

Week 3: Unit 3 - STEM Curriculum in Elementary and Middle Schools

Week 4: Unit 4 - Authentic Assessment of STEM Learning

Week 5: Unit 5 - STEM Instruction in Early Elementary School

Week 6: Unit 6 - STEM Instruction in Upper Elementary School

Week 7: Unit 7 - STEM Instruction in the Middle School

Week 8: Unit 8 - Developing as a STEM Professional

Learning Guide: The following is an outline of how this course will be conducted, with suggested best practices for students**. The Learning Guides for all units open on the first day of class. Please review all Learning Guides to access the readings, review assignments, etc.**

Unit 1: Setting the Stage for Mathematics and Science Learning

- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Written Assignment
- Complete the Reflective Portfolio Assignment

Unit 2: Creating a Critical Thinking Frame for Learning

- Peer assess Unit 1 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Written Assignment

- Complete the Reflective Portfolio Assignment

Unit 3: STEM Curriculum in Elementary and Middle Schools

- Peer assess Unit 2 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Written Assignment
- Begin and participate in the Group Activity (Due Unit 7)

Unit 4: Authentic Assessment of STEM Learning

- Peer assess Unit 3 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Written Assignment
- Continue to participate in the Group Activity
- Complete the Reflective Portfolio Assignment

Unit 5: STEM Instruction in Early Elementary School

- Peer assess Unit 4 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Continue to participate in the Group Activity
- Complete and submit the Written Assignment

Unit 6: STEM Instruction in Upper Elementary School

- Peer assess Unit 5 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Portfolio Activity
- Continue to participate in the Group Activity

Unit 7: STEM Instruction in the Middle School

- Peer assess Unit 6 Written Assignment
- Read the Learning Guide and Reading Assignments

- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete and submit the Written Assignment
- Post finalized Group Activity

Unit 8: Developing as a STEM Professional

- Peer assess Unit 7 Written Assignment
- Read the Learning Guide and Reading Assignments
- Participate in the Discussion Assignment (post, comment, and rate in the Discussion Forum)
- Complete the Reflective Portfolio Assignment
- Complete and submit the anonymous Course Evaluation

Course Requirements:

Discussion Assignments & Response Posts/Ratings

Some units in this course require that you complete a Discussion Assignment. You are required to develop and post a substantive response to the Discussion Assignment in the Discussion Forum. A substantive response is one that fully answers the question that has been posed by the instructor. In addition, you must extend the discussion by responding to at least three (3) of your peers' postings in the Discussion Forum and by rating their posts. Instructions for proper posting and rating (out of a 10 point scale) are provided inside the Discussion Forum for each week. Discussion Forums are only active for each current and relevant learning week, so it is not possible to contribute to the forum once the learning week has come to an end. Failure to participate in the Discussion Assignment by posting in the Discussion Forum and responding to peers as required may result in failure of the course.

Written Assignments & Assessment Forms

Most units in this course require that you complete a Written Assignment, which may come in many forms (case study, research paper, etc.). You are required to submit your assignments by the indicated deadlines and, in addition, to peer assess three (3) of your classmates' assignments according to the instructions found in the Assessment Form, which is provided to you during the following week. During this peer assessment period, you are expected to provide details in the feedback section of the Assessment Form, indicating why you awarded the grade that you did to your peer. Please note that each assignment grade is comprised of a combination of your submission (90%) and your peer assessments (10%). Failure to submit Written Assignments and/or Assessment Forms may result in failure of the course.

Group Activities

During this course, you will be required to complete work as part of a small group. Group work is an important component of your coursework, as it allows you to deepen relationships with classmates, and gain a more thorough understanding of the topics presented in this course. Further, group work mimics the business environment in which projects are often conducted in small teams across different departments. You will be randomly assigned to your groups and are expected to work with your teammates throughout the term for all group activities.

Reflective Portfolio Activities

Portfolio Activities are tools for self-reflection and evaluation within the context of the course. These activities are designed as a means to document and critically reflect upon your learning process. Activities you develop for this course will be kept in your Research and Practice Portfolio and will be important as you progress towards the final courses in your program, particularly the Advanced Practice and Capstone courses. Ideally, you will draw from your coursework and experiences, as well as what you've learned in other courses, and your own current teaching practice to showcase your overall growth and examine ways in which you can continue to develop and sharpen your research interests and expand your cadre of instructional methods.

The Research and Practice Portfolio

Throughout the M.Ed. Program, you will be building a portfolio of instructional strategies and materials, and acquiring knowledge and skills for advanced professional practice. Students begin building their portfolio right from start. It serves as a repository for research findings and sample units and lessons. Students use it to archive ideas and resources related to instructional methods, classroom management, and assessment. The portfolio supports your own self-reflection on changes that demonstrate growth in professional knowledge, skills, and attitudes that is part of the Capstone experience. The component parts of the Research and Practice Portfolio include:

- Reflective Portfolio Activities
- Research
- Teaching and Learning Resources

Course Forum

The Course Forum is the place to raise issues and questions relating to the course. It is regularly monitored by the instructors and is a good place to meet fellow students taking the same course. While it is not required to participate in the Course Forum, it is highly recommended.

Course Policies:

Grading Components and Weights

Each graded component of the course will contribute some percentage to the final grading scale, as indicated here:

Discussion Assignments	20%
Written Assignments	30%
Group Activities	25%
Reflective Portfolio Activities	25%
TOTAL	**100%**

Grading Scale

This course will follow the standard 100-point grading scale defined by the University of the People, as indicated here:

Letter Grade	Grade Scale	Grade Points
A+	98-100	4.00
A	93-97	4.00
A-	90-92	3.67
B+	88-89	3.33
B	83-87	3.00
B-	80-82	2.67
C+	78-79	2.33
C	73-77	2.00
C-	70-72	0.00
D+	68-69	0.00
D	63-67	0.00
D-	60-62	0.00
F	Under 60	0.00
CR	N/A	N/A
NC	N/A	N/A
NF	N/A	N/A
W	N/A	N/A

Grade Appeal

If you believe that the final grade you received for a course is erroneous, unjust, or unfair, please contact your course instructor. This must be done within seven days of the posted final grade. For more information on this topic, please review the Grade Appeal Procedure in the University Catalog.

Participation

Non-participation is characterized by lack of any assignment submissions, inadequate contributions to the Discussion Forums, and/or lack of peer feedback to Discussion/Written Assignments. Also, please note the following important points about course participation:

- Assignments must be submitted on or before the specified deadline. A course timeline is provided in the course schedule, and the instructor will specify deadlines for each assignment.
- Any student showing non-participation for two weeks (consecutive or non-consecutive) is likely to automatically fail the course.
- Occasionally there may be a legitimate reason for submitting an assignment late. Most of the time, late assignments will not be accepted and there will be no make-up assignments.
- All students are obligated to inform their instructor in advance of any known absences which may result in their non-participation.

Academic Honesty and Integrity

When you submit any work that requires research and writing, it is essential to cite and reference all source material. Failure to properly acknowledge your sources is known as “plagiarism” – which is effectively passing off an individual’s words or ideas as your own.

University of the People adheres to a strict policy of academic honesty and integrity. Failure to comply with these guidelines may result in sanctions by the University, including dismissal from the University or course failure. For more information on this topic, please review the Academic Integrity Policy in the University Catalog.

Any materials cited in this course should be referenced using the style guidelines established by the American Psychological Association (APA). The APA format is widely used in colleges and universities across the world and is one of several styles and citation formats required for publication in professional and academic journals. Purdue University's Online Writing LAB (OWL) is a free website that provides excellent information and resources for understanding and using the APA format and style. The OWL website can be accessed here: https://owl.purdue.edu/owl/purdue_owl.html

Code of Conduct

University of the People expects that students conduct themselves in a respectful, collaborative, and honest manner at all times. Harassment, threatening behavior, or deliberate embarrassment of others will not be permitted. Any conduct that interferes with the quality of the educational experience is not allowed and may result in disciplinary action, such as course failure, probation, suspension, or dismissal. For more information on this topic, please review the Code of Conduct Policy in the University Catalog.