



Integrating STEAM into your Curriculum Online Participant Syllabus

Course Description

Participants will learn to develop, create, implement, and assess a STEAM (Science, Technology, Engineering, Arts, and Mathematics) program, lessons and units. A variety of frameworks will be reviewed and discussed to allow for easy replication of STEAM units and activities. Inquiry-based lessons for instruction and assessment will be explored to help gain a better understanding of possible classroom applications and projects. Educators will leave the course with a roadmap to better implement STEAM into their classroom, promote STEAM questioning, and develop STEAM PBL (Project Based Learning) units.

Course Prerequisites

Participant must hold a baccalaureate degree.

System Requirements

This is specific for technology or online course.

- Computer with word processing software
- Internet access connection
- Software capable of reading PDF files
- Software capable of viewing PowerPoint presentations

Text Books/Supplemental Reading

No textbook is required for this course. Critical reading of assigned articles and supplementary materials is embedded throughout the course. Assigned and recommended readings are listed in each milestone.

Global Goals of the Course

To deepen and/or apply the content and skills of the teacher's existing professional knowledge base by meeting the following global goals of the course:

1. To design and develop 21st century skills across curriculums (NBPTS 1, 2 5; ISTE (International Standards for Technology in Education standards) 5;10; InTasc 1-6, 8, 10)

2. To appraise resources for STEAM integration into classroom lessons (NBPTS 1-5; ISTE 5;10; InTasc 6-8, 10)
3. To employ the STEAM content areas across all curriculums and examine reasons for utilizing STEAM lessons in the classroom (NBPTS 1-5; ISTE 5;10; InTasc 6-8, 10)
4. To identify clear learning strategies to develop inquiry based questions involving STEAM lessons that improve student learning (NBPTS 5; ISTE 5;10; InTasc 1-6)
5. To demonstrate proficient knowledge of STEAM lessons, activities, and Inquiry based learning to create learning experiences and assessments for students (NBPTS 1-5; ISTE 1-4; 5, 6; InTasc 1-10)

Instructional Objectives

By the conclusion of the course, each participant should be able to do the following:

1. Examine the history of STEM and STEAM Education
 - 1.1 Understand the difference between STEM and STEAM education
 - 1.2 Explore the benefits of STEAM education
 - 1.3 Explore basic STEAM lessons in the classroom
 - 1.4 Identify personal classroom use of possible STEAM lessons
2. Understand the process to integrate STEAM into your classroom:
 - 2.1 Explore models of integrating STEAM into the classroom
 - 2.2 Explore STEAM integrated schools
 - 2.3 Examine and explore each foundational element of STEAM
 - 2.4 Review real-world applications of STEAM and their importance to students
3. Examine and explore the fundamentals of STEAM and blended learning in your classroom
 - 3.1 Explore the concept of blended learning structures
 - 3.2 Organizing a STEAM lesson using blended learning
 - 3.3 Understand the difference between STEAM lessons and STEAM classrooms
4. Explore methods and concepts to Implement STEAM projects into your classroom
 - 4.1 Explore project based learning mediums
 - 4.2 Explore pre-made STEAM lessons
 - 4.3 Explore and create a STEAM project based learning activity and use multi-discipline questioning techniques
5. Examine and utilize online resources for STEAM lessons and integration
 - 5.1 Learn about websites and organizations that can help with STEAM lessons
 - 5.2 Appraise technology and apps that can help with STEAM integration
 - 5.3 Use backward design to help plan steam lessons and units
6. Devise a classroom unit based on STEAM principles
 - 6.1 Explore and evaluate STEAM units
 - 6.2 Reflect and refine your own personal STEAM goals

- 6.3 Identify and explain strategies for your STEAM unit
- 6.4 Develop assessment questions and techniques for STEAM unit
- 7. Explore the Pedagogy of consistently being a STEAM teacher
 - 7.1 Reflect on your classroom teaching without STEAM
 - 7.2 Explore how to adapt your teaching to become more STEAM integrated throughout the school-year
 - 7.3 Synthesize possible barriers of STEAM integration
- 8. Explore STEAM advocacy and professional development opportunities
 - 8.1 Explore, evaluate, and review organizations that promote STEAM education
 - 8.2 Develop a professional network of STEAM educators and resources
 - 8.3 Reflect on new teaching habits
 - 8.4 Devise a professional development activity for teachers to learn about STEAM

Teaching Methodology and Delivery Model

Teaching methodologies used in this course are specifically designed to maximize learning in a guided, graduate-level, online distance-learning model. Each course facilitator is trained and/or experienced in facilitating graduate-level online courses as well as the specific content and skills of this course.

1. Online methodologies include instructor/expert presentations, directed skill practice, asynchronous class and group discussions using threaded discussion questions, peer evaluation, self-evaluation, portfolio development, and the synthesis of new knowledge and skills in designing grade-specific lesson plans or other educational applications of knowledge and skills.
2. The course is taught in a supportive learning environment with teacher-participant interaction and feedback. Class participants interact with other professionals via the Forum by replying to existing posts as well as creating new threads on topics of their choice.
3. Content focuses on the presentation of advanced concepts linked to instructional strategies which accommodate learning needs of a diverse student population.
4. Course content, activities, and assignments are organized into "milestones" that participants complete during the 8-week span of the course. Course content is intended to cover material equal to 45 seat hours of instructional time.
5. Class participants actively construct their own learning and make it personally relevant by acquiring and applying course knowledge/skills to their own teaching situation.

Learning Assessment

Formative assessment of learning objectives for this course is conducted informally throughout the course via discussion, critiques, peer- and self-evaluations, journal entries, instructor feedback, small-group sharing and activities requiring participants to make sense of new knowledge and/or skills within their realm of teaching. Additionally,

three formative assessments are embedded within the course. Summative assessment for the course occurs in the form of a final project which requires each participant to synthesize class content and apply it within the teacher's specific teaching environment.

Final Projects

In keeping with best instructional and assessment practices, this course requires participants to demonstrate synthesis and application of course knowledge in an applied final project linked to the instructional objectives of this course. Assessment of the project should not be limited to the quantity of work submitted but should carefully consider the quality and intellectual value of the work.

Participants taking courses for professional development unit (not-for-credit) must follow the same Participation Expectations as posted in the course syllabus. Participants will complete readings and tasks as outlined in the Task List. Forum Postings are also required. However, participants will be exempt from completing the Formative and Summative assignments unless otherwise noted. Proof of seat hours will be presented to the participants after completing the state required course evaluation located on the student portal.

Final projects are due and will be submitted to the instructor within the 8 weeks of the allotted class time. Unless the instructor states otherwise, all papers are expected to be properly formatted electronically.

Assessment and Grading

Throughout the course, participants will engage in both formal and informal formative and summative assessments. Points are assigned based on a four-point criterion rubric specifically delineated for each assessment that can be further defined as follows:

Distinguished: The assessment is highly imaginative; demonstrates critical thought; is unique; shows substantial application to one's own teaching or professional position; *goes above and beyond requirements*; is creative; demonstrates both breadth and depth of knowledge of transition-related subject matter; shows individual's personality; is professional in presentation and appearance; and demonstrates considerable effort. The assessment is exceptionally completed and demonstrates clear understanding of the tasks, gives explanations, and shows how the assessment applies to a teaching/learning situation. The assessment meets the specific criteria delineated in "Distinguished" on the course rubric.

Proficient: The assessment is well-organized and complete; is effectively and clearly presented; demonstrates clear understandings; applies what has been learned to the author's own classroom situation; clearly shows connections; is detailed; and is thoughtful and supported with ideas. A thoroughly completed assessment demonstrates that the participant shows awareness of the tasks, gives explanations, and shows how

the assessment applies to a teaching/learning situation. The assessment meets the specific criteria delineated in "Proficient" on the course rubric.

Basic: This is the lowest passing grade. The assessment meets minimum requirements; includes general information but lacks descriptive detail; shows limited application to teaching/learning; and lacks originality. This denotes work that does not meet **all** aspects of standards for academic performance in a graduate-level course. The assessment meets the specific criteria delineated in "Basic" on the course rubric.

Unsatisfactory: The assessment is missing evidence or information; is sloppy and poorly organized; demonstrates only surface understandings; shows no evidence of application to the author's own teaching situation; is poorly written; and does not meet minimum standards for academic performance in a graduate-level course. The assessment meets the specific criteria delineated in "Unsatisfactory" on the course rubric.

The assessments for this course are weighted as follows:

Participation and Reflection	30%
Formative Assessments	30%
Summative Assessments	40%

Academic Honesty and Integrity

All participants are expected to maintain academic honesty and integrity by doing their own work to the best of their ability. Academic dishonesty (cheating, fabrication, plagiarism, etc.) will result in the participant receiving a zero for that assignment or paper.

Americans with Disabilities Act Compliance

In compliance with Section 504 of the Rehabilitation Act and The Americans with Disabilities Act, participants who have any condition, either permanent or temporary, which might affect their ability to perform in this class are encouraged to inform the instructor at the beginning of the first session. Reasonable academic accommodations, aids, and adjustments may be made as needed to provide for equitable participation.

Attendance

Participants will have 8 weeks from the time of their first date of login to complete the course. It is the expectation that participants will post initial responses to Forum discussion questions by Thursdays. In addition, participants are to respond to at least two other participant posts by Sundays. Projects are only due in specific Milestones. Forum postings, assignments, and assessments must be completed by due dates specified within the course.

Late Work and Make-Up Policy

Participants are expected to keep pace with assignments and expectations. If a situation arises in which an assignment cannot be completed, the participant is expected to make arrangements with the instructor for the timely submission of such work. Failure to complete all work in this time frame will result in an **incomplete** or a grade of **F** for the work, depending on the reason for the delay.

University Compliance

Course content and instruction are bound by policies associated with the university granting academic credit for the course. Such policies include, but are not limited to: academic integrity and honor codes, institutional objectives and grade grievance procedures. These policies are located within the official academic catalogs which can be accessed through the university's official website.

Alignment to the Danielson Framework for Effective Teaching

The *Danielson Framework for Effective Teaching* is designed to provide educators with a structure for analyzing and assessing teacher practice and in constructing techniques to strengthen that practice.

Danielson, C. (2009). *Implementing the framework for teaching in enhancing professional practice*. Alexandria, VA: Association for Supervision and Curriculum Development.

Compliance with National Board of Professional Teaching Standards (NBPTS)

The NBPTS represents the highest level of professional achievement in the continuum of teacher professional development.

National Board for Professional Teaching Standards, www.nbpts.org

Compliance with Council for the Accreditation of Educator Preparation

CAEP advances excellent educator preparation through evidence-based accreditation that assures quality and supports continuous improvement to strengthen P-12 student learning.

Council for the Accreditation of Educator Preparation. (2016, June). www.caepnet.org