Course Syllabus: Equipping All Students for Success in STEM

Number of Credits: 1*

Course Instructors: Miriam Woods, Jordan Mix

Course Description: Over the last decade, new vigor and vitality has been focused on students succeeding in science, technology, engineering, and mathematics (STEM) courses. With a desperate need for the United States to stay competitive in an increasingly globalized economy, more resources are being poured into educational and training programs to increase the number of qualified STEM professionals. Historically, women and marginalized community groups have accounted for a small portion of those pursuing STEM careers. However, more effort is being utilized to address this.

This course will examine the best practices to make STEM courses accessible to at-risk students and marginalized populations. Topics will include white privilege in science, barriers for marginalized populations, and strategies for making the content accessible for all students. In will include best practices for differentiating content for students of color, women, English learners, and students with disabilities. At the end of the course, participants will reflect on the interdisciplinary connections between standards and develop an implementation plan for best practices.

Learning Objectives: Upon completion of this course, students will be able to:

- Understand, analyze, and explain the historical dominance of white males in STEM fields and the historical bias of how STEM fields can be taught to students.
- Understand how white privilege and microaggressions in STEM education can hinder the experience of marginalized students.
- Identify key differentiation strategies to provide an accessible education to students from marginalized communities students, specifically highlighting English Language Learners and students with Individual Education Plans
- Develop an implementation plan integrating techniques and resources for a more inclusive STEM classroom.

Course Requirements: To receive full credit for the course, participants must complete ALL assignments and respond to specific questions outlined in each assignment. Failure to complete all assignments will result in a disqualification in the course and a failing grade.

Resources:

Okhee Lee, Emily Miller, and Rita Januszyk (2015). NGSS for All Students. ISBN-10: 978-1-938946-29-5

The text includes first-hand classroom scenarios of teachers illustrating how they engage diverse demographic groups in their classrooms. The seven groups include economically disadvantaged students, student from major racial and ethnic groups, students with disabilities, English language learners, girls, students in alternative education, gifted and talented students.

Jana Echevarria, MaryEllen Vogt, and Deborah J. Short. Making Content Comprehensible for English Learners: The SIOP Model (5th Edition) ISBN-10: 0134045238

This book discusses a research-based model for designing lessons with English Language Learners in mind. The SIOP model assists teachers in articulating key writing, listening, and speaking objectives that students must achieve in tandem with specific content objectives.

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Getting Started

- After registering for the course, you will be sent an email with the website address, password and course key you need to access your online course, along with log in instructions.
- Access each assignment through the course home page. All assignments will be submitted through the Moodle platform on each respective assignment page.
- Please save a backup copy of all course assignments and completed work.

Participation:

- You are not required to be present (i.e. online) specific days or times. You will work at your own pace. The course is structured in 3 Weekly Units, however all assignments will not be due until the final day of the course.
- All responses will be posted online. Large documents, files, photographs or PowerPoint presentations may be attached as part of your response by using the "Attachment" option.
- You may work collaboratively and submit similar responses on all assignments except the Implementation Paper, which must be individually authored.

INTASC Standards that are addressed in this course:

- 2. The teacher understands how children learn and develop, and can provide learning opportunities that support their intellectual, social and personal development.
- 3. The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.
- 4. The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving and performance skills.
- 5. The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.
- 6. The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.
- 7. The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.
- 9. The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professional in the learning community) and who actively seeks out opportunities to grow professionally.
- 10. The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support students' learning and well-being.

Check the Iowa Teaching Standards that are addressed in this course:

X	1. Enhance Student Achievement		5. Monitoring Student Learning
	2. Content Knowledge	X	6. Classroom Management
X	3. Planning and Preparation	X	7. Professional Growth
X	4. Instructional Strategies		8. Professional Responsibilities

Assignment List/Timeline: This assignment list with estimated times for completion is meant to serve as a helpful checklist for you as a learner in completing all the assignments! This is a recommended amount of time to review all articles, webinars, videos, and other materials associated with each assignment. You may take longer or shorter to complete each assignment and times are only estimates based on past learners experiences.

Topic/Activity	In Class	Out of Class
Getting to Know the Class; Additional Readings: Take the time to get to know the class layout, read over the Help Section, and review any other materials present in the class to get started. Take your time!		3 hours
Week 1 - The Current State of Affairs		
Discussion: **Introductions** – Participants will introduce themselves to their class and discuss what they hope to gain from the course.	1 hour	2 hours
Discussion: Privilege in Science – Participants will understand the driving forces behind expanding STEM education and training. Participants will also understand the demographics of people who traditional enter STEM professions. After reviewing materials, participants will discuss the ramifications of these issues in their classrooms and society.	1 hour	2 hours
Discussion: Historical Bias – Participants will analyze materials that discuss the bias for how history is recorded. Participants will reflect on how these biases may affect how STEM curricula are taught in the classroom.	1 hour	2 hours
Discussion: Microaggressions – Participants will read articles on the concept of microaggression, and how it links to STEM classrooms and careers. They will share their understanding in a discussion post.	1 hour	2 hours
Week 2 - Barriers in Teaching STEM		
Discussion: STEM and Women – Participants will analyze the barriers that exist for females in STEM classes and careers. They will write a discussion post of their perspectives and respond to their classmates.	1.5 hours	2.5 hours
Discussion: STEM and Racial/Ethnic Minorities – Participants will analyze the barriers that exist for racial and ethnic minorities who pursue STEM classes and careers in several articles and videos. Participants will read several articles about these people and synthesize their findings in a discussion post.	1.5 hours	3 hours
Discussion: STEM and English Language Learners – Participants will analyze the unique barriers for English Language Learners in STEM classrooms. They will review research-based teaching strategies to help assist them learn. In a discussion post, they will share differentiation strategies and comment on others' suggestions.	1.5 hours	3 hours
Discussion: STEM and Individuals with Disabilities – Participants will review articles that outline best practices for teaching STEM courses to individuals with disabilities. They will share their findings with their classmates in a discussion post.	1.5 hours	3 hours
Week 3 – Application		
Discussion: STEM in Alternative Education – Participants will review differentiation strategies for individuals in alternative education settings. In a discussion post, participants will share ways they can differentiate their instruction to meet the needs of these individuals.	1 hours	2.5 hours
Discussion: Standards – Participants will receive current Iowa science standards, math standards, engineering standards, and technology literacy standards. In a discussion post, they will analyze interdisciplinary connections between the standards to integrate all STEM subcategories into their unique courses.	1 hours	2 hours
Final: Implementation Plan – Participants will submit a paper on how they will use the information they gained in the course in their educational setting. They will be asked to give specific examples of how they will work to improve the lives of their students or motivate their colleagues to do the same.	3 hour	3 hours
Total Class Time	**15 hours**	**30 hours**

Coursework: Participants can earn up to 75 points total for the course. The following table depicts the breakdown of points possible for the required coursework

Activity	Points
10 Discussions (5 points each)	50
Final Implementation Plan/Paper	25
Total	**75**

Grading Scale – Graduate Credit

100-90% (75-68 points)	A
89-80% (67-60 points)	B
79-70% (59-53 points)	C
69-60% (52-45 points)	D
59%-Below (<45 points)	F

Grading Scale - License Renewal Credit

100-80% (75-60 points)	P
79%-Below (<60 points)	NP

Student Requirements: Students are required to:

- Participate in all discussion forums
- Complete a final implementation plan

Americans with Disabilities Act: If you are a student with a disability and require any auxiliary aids, services, or other accommodations for this class, please see the instructor to discuss your accommodation needs.

Statement of Plagiarism: Academic dishonesty results in failure of this course. Give credit where credit is due. Use the APA Publication Manual to cite references when needed. Not crediting ideas or words of others is unacceptable scholarship as is submitting work that was done for a previous course or that is not your own origin in design or completion. Submit original assignments. Do not submit work for this course you have done for other courses.

Grading Rubrics for Individual Activities

Discussion Forums (50 points possible) Discussion Forums are asynchronous ways to engage in class discussions. They require you to submit an answer to a question and respond to the posts of other peers. Because they are an integral part of sharing strategies, analyzing research, and sharing ideas, discussion forums in this course comprise a significant percentage of your final grade. It's highly recommended that you read and respond to more than the required two peer postings because greater participation will facilitate a greater depth of understanding. Additionally, it's important to make posts in a timely manner to benefit from peer responses.

Grading Rubric for Discussion Forums		
		Points
Critical Thinking	Makes connections to the other content and real=life that are supported by reference(s) and example(s)	1
	Offers new ideas, connections, or applications	1
	Expresses and justifies personal opinion	1
Assignment Specific Criteria	Addresses all parts of the assignment, cites sources	1
Participation (Responses to at least 2 peer posts)	Responds to other posts (when available)	1
Total Points Possible		5

Implementation Plan (25 points possible) - The implementation plan is a critical part of this course. Participants must complete a one-page implementation plan. The paper is meant to be a reflection as well as a chance to state what you will use going forward. The rubric below will be used to grade the Implementation Plan, but additional details will be provided within the course.

Grading Rubric for Implementation Plan		
		Points
Critical Thinking	Highlights any new knowledge gained as a result of course.	5
	Offers new ideas, connections, or applications	5
	Expresses and justifies personal opinion	3
	Discusses Overall Implications	2
Assignment Specific Criteria	Addresses all parts of the assignment, cites sources	2
Mechanics	Writing is clear, well developed, and organized, No or few grammar and spelling errors	2
Implementation	Clearly states ideas to use in the future	2
	States resources to be used	2
	Is realistic in their approach – understands limitations may exist	2
Total Points Possible		25