



**Midwest Teachers Institute**  
Teachers Helping Teachers

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**MTI 505 - Integrating Your Curriculum with STEM**

<b>Instructor Information:</b>	
<b>Instructor Name:</b>	Safiyah Malvin-MFS (Master's in Forensic Science), MAT
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<b>Instructor Background:</b>	Safiyah Malvin is a middle school science teacher at a diverse school in the southern suburbs of Chicago, IL. She teaches engineering, robotics, and general science courses to students in grades seventh and eighth. She has earned a Bachelor's of Science in Chemistry from Xavier University of Louisiana, Masters of Forensic Science from George Washington University, and a Masters of Art in Teaching from Governors State University. She has a passion for education, science, and creating practical engaging learning opportunities for students.

<b>Course Information</b>	
<b>Course Format (distance learning, online, webinar, experiential onsite courses):</b>	<b>Online Course</b> The LMS for delivering the course will be Canvas. An invitation will be sent to you by your instructor during the week prior to the start of your course. If you have not received an invitation, please email us at the MTI email address listed above.
<b>Prerequisites</b>	All MTI courses are designed for educators who have a minimum of a bachelor's degree. Prior to beginning the course, check with your district office to ensure that credit will be accepted for salary increase and professional development. All courses are for 3 graduate semester hours from our partnering university, Calumet College of St. Josephs.

<b>Required Books and Materials</b>	<ul style="list-style-type: none"> <li>• Vasquez, Jo Anne, Sneider, Cary, Comer, Michael. (2013). <i>STEM Lesson Essentials: Integrating Science, Technology, Engineering, and Mathematics</i>. Portsmouth, NH: Heinemann.</li> <li>• Internet access</li> <li>• LMS- Canvas Account and Login</li> </ul>
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<p><b>Learning Outcomes/Competencies:</b> At the completion of this course, the learner will be able to:</p> <ul style="list-style-type: none"> <li>• Gain an understanding of the definition of a STEM education -InTASC 1,2,3</li> <li>• Develop a vision of STEM literacy-InTASC 3,7,10</li> <li>• Create and develop principles that lead to effective STEM units-InTASC 4,5,7,8</li> <li>• Promote questioning and problem solving through STEM practices-InTASC 2,3,7,8</li> <li>• Evaluate pros and cons for introducing a STEM approach-InTASC 4,5,6,7</li> <li>• Implement effective assessment practices for summative, diagnostic, and formative purposes-InTASC 6,7,8</li> <li>• Learn, teach, practice and model strategies that reflect the three approaches to integrating STEM-InTASC 2,3,5,7,8,9</li> <li>• Create an environment to establish a community of respect and cooperation-InTASC 3,9,10</li> <li>• Develop strategies to effectively implement PBL units-InTASC 2,3,4,5,7,8</li> <li>• Be able to differentiate your assessment strategies-InTASC 6,7,8</li> <li>• Understand the process of creating PBL units-InTASC 4,5</li> <li>• Gain effective strategies for communicating your STEM approach with parents and community members-InTASC 9,10</li> </ul>
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**Course Description:** This course is designed to provide the learner with tools and strategies to design integrated, interdisciplinary STEM lessons and units that are both relevant and exciting to your students. STEM in itself is not a curriculum, but rather a way of organizing and delivering instruction by weaving the STEM disciplines together in thoughtful and intentional ways. Rather than teaching the new disciplines in isolation, the engineering and technological practices should be blended into existing lessons in ways that engage the students and help them master 21<sup>st</sup> century skills.

**Learning Strategies:** Professional literature analysis, whole group discussions, personal reflection, application assignments and project-based learning.

**Experiential Learning Opportunities:** Students will be reflecting on the assessments and tools that they develop/learn about in class and measuring/estimating the intended impact on student learning in the classroom. Students will learn by doing while completing a variety of activities throughout the course.

<b>Assessments</b>	
Answer and discuss weekly questions posted by instructor to online classroom at Canvas forum. 9 points per question.	45 points
Reflect and respond to 2 posts weekly made by colleagues online at Canvas classroom forum. 10 total- 9 points per response.	90 points

Application assignments- 2 assignments@ 45 points each	90 points
Research project	100 points
Evaluation/reflection paper	100 points
<b>Total points possible</b>	<b>425 points</b>
<b>Grading Scale: A (90-100%); B (80-89%)</b> <i>*Anything below a B will not receive graduate credit and result in a failing grade of F.</i>	
<p>If you do not receive a B or higher, your work will be returned to you for further correction and completion. You will be allowed one (1) re-submit to your instructor to achieve a grade of B or higher. If after your re-submit, you still do not achieve a B or higher you will receive a failing grade of F and therefore forfeit the 3 graduate credits.</p>	

<b>Answer and Discuss Rubric-5 answers @ 9 points each</b>			
<b>Category</b>	<b>Superior (3 pts)</b>	<b>Sufficient (2 pts)</b>	<b>Minimal(1pt)</b>
<i>Supporting Evidence in Practice</i> ____/3	Response shows strong evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows some evidence of ideas and insights from this course and how they are applied to the classroom.
<i>Accuracy</i> ____/3	All supporting facts and statistics are accurately represented.	Almost all supporting facts and statistics are accurately represented.	Some of the supporting facts and statistics are accurately represented.
<i>Grammar and Spelling</i> ____/3	Response includes 0-1 mistakes in grammar or spelling.	Response includes a few grammar and spelling mistakes.	Response includes several grammar and spelling mistakes.

<b>Reflect and Response Rubric- 10 responses @ 9 points each</b>			
<b>Category</b>	<b>Superior (3 pts)</b>	<b>Sufficient (2 pts)</b>	<b>Minimal(1pt)</b>
<i>Supporting Evidence in Practice</i> ____/3	Response shows strong evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows some evidence of ideas and insights from this course and how they are applied to the classroom.
<i>Accuracy</i> ____/3	All supporting facts and statistics are accurately represented.	Almost all supporting facts and statistics are accurately represented.	Some of the supporting facts and statistics are accurately represented.
<i>Grammar and Spelling</i> ____/3	Response includes 0-1 mistakes in grammar or spelling.	Response includes a few grammar and spelling mistakes.	Response includes several grammar and spelling mistakes.

<b>Application Rubric- 2 assignments @ 45 points each</b>
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Category	Superior (15-13 pts)	Sufficient (12-10 pts)	Minimal(9-7pts)
<i>Supporting Evidence in Practice</i> ____/15	Response shows strong evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows some evidence of ideas and insights from this course and how they are applied to the classroom.
<i>Accuracy</i> ____/15	All supporting facts and statistics are accurately represented.	Almost all supporting facts and statistics are accurately represented.	Some of the supporting facts and statistics are accurately represented.
<i>Grammar and Spelling</i> ____/15	Response includes 0-1 mistakes in grammar or spelling.	Response includes a few grammar and spelling mistakes.	Response includes several grammar and spelling mistakes.

<b>Project Rubric- 100 points</b>			
Category	Superior (20-18 pts)	Sufficient (17-16 pts)	Minimal ( 15-14pts)
<i>Understanding of web tool</i> ____/20	Shows strong understanding of activity, concept, or tool and maximize learning	Shows adequate understanding of activity, concept, or tool and benefit learning.	Shows little understanding of activity, concept, or tool and may not benefit learning.
<i>Practical evidence</i> ____/20	Shows strong evidence of ideas and insights gained from this course and how they are applied to classroom.	Shows evidence of ideas and insights from this course and how they are applied to classroom.	Shows little evidence of ideas and insights from this course or how they are applied to the classroom.
<i>Completion</i> ____/20	Completed in a thoughtful and meaningful manner.	Completed, but with minimal quality.	Not all projects are completed and of those that are, some are minimal quality.
<i>Grammar and Spelling</i> ____/20	Includes no mistakes in grammar or spelling.	Includes few grammar and spelling mistakes.	Includes numerous grammar and spelling mistakes.
<i>Sequencing</i> ____/20	Sequenced, showing if-then thinking and the logical order required to complete skill, solve problem, or use tool.	Not always sequenced, showing incomplete if-then thinking and understanding of logical order required to complete skill.	Confusing making it difficult to replicate activities; little understanding of logic or if-then thinking evidenced.

<b>Evaluation Rubric- 100 points</b>				
Category	Superior (20-17 pts)	Sufficient (16-13 pts)	Minimal(12-9pts)	Below Standard (8 pts)
<i>Supporting Evidence in Practice</i> ____/20	Response shows strong evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows some evidence of ideas and insights from this course and how they are applied to the classroom.	Response shows little evidence of ideas and insights from this course and there is little evidence they are applied to the classroom.

<b>Accuracy</b> ____/20	All supporting facts and statistics are accurately represented.	Almost all supporting facts and statistics are accurately represented.	Some of the supporting facts and statistics are accurately represented.	Many of the supporting facts and statistics are inaccurately represented.
<b>Grammar and Spelling</b> ____/20	Response includes 0-1 mistakes in grammar or spelling.	Response includes a few grammar and spelling mistakes.	Response includes several grammar and spelling mistakes.	Response includes numerous grammar and spelling mistakes.
<b>Logical Sequencing</b> ____/20	Response is written in a clear, concise, and well organized manner. Thoughts are presented in a coherent and logical manner.	Response is mostly clear, concise, and well organized. Thoughts are presented in a coherent and logical manner.	Response is somewhat unclear and/or disorganized. Some thoughts are presented in a coherent and logical manner.	Response is mostly unclear and/or disorganized. Many thoughts are presented in an incoherent and illogical manner.
<b>Reflection</b> ____/20	Response demonstrates an in-depth reflection on, and personalization of, the theories, concepts, and /or strategies presented in this course.	Response demonstrates some reflection on, and personalization of, the theories, concepts, and /or strategies presented in this course.	Response demonstrates a minimal reflection on, and personalization of, the theories, concepts, and /or strategies presented in this course.	Response demonstrates no reflection on, and personalization of, the theories, concepts, and /or strategies presented in this course.

## Course Schedule

### **Week 1 – Introduction to Course and LMS-Canvas Tutorial**

- Syllabi/Assignment Review
- Read Chapters 1 thru 4 in your textbook.
- What Are The STEM Disciplines and The STEM Approach.
- Discussion/Activity- Answer Week #1 Instructor Posted Question by Tuesday.
- Discussion/Reflection Activity- Post/Communicate 2 responses to your colleagues answers by Thursday.
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### **Week 2 – Learning the Five Guiding Principles**

- Read Chapters 5, 6 and 7 in your textbook.
- What Are The Five Guiding Principles.
- Discussion/Activity- Answer Week #2 Instructor Posted Question by Tuesday.
- Discussion/Reflection Activity- Post/Communicate 2 responses to your colleagues answers by Thursday.
- Application Assignment #1. Due by Sunday night end of week # 2

#### **Application # 1**

Refer to pages 61-62. Consider a common theme that will be the driving force behind your next grade level unit. Place yourself in the chair of the following teachers: • Science • English • Math • Social Studies • PE • Art Create a dialogue similar to page 61 of what each individual teacher would contribute to the thematic unit. Once you have the dialogue, create a multidisciplinary plan (pg. 62) about that common theme outlining a key concept or important skill that would help the students develop a deeper understanding.

### **Week 3 –Three Approaches to Integrated STEM**

- Read Chapters 8, 9 and 10 in your textbook.
- What Are The Pros and Cons to The Approaches.
- Discussion/Activity- Answer Week # 3 Instructor Posted Question by Tuesday.
- Discussion/Reflection Activity- Post/Communicate 2 responses to your colleagues answers by Thursday.
- Application # 2 due by Sunday Night end of week # 3

#### **Application #2**

Consider the information you have learned about integrating STEM into your curriculum. Now it is your turn to convince other staff members back at your school that the STEM approach should be implemented into your lessons and curriculum. Please create a 10-15 slide PowerPoint/Google slides or Prezi outlining: • Introduction of STEM • 5 guiding principles (Chapter 3) • 3 STEM Approaches to Integrated STEM (Chapter 8) • Characteristics of a STEM PBL Unit • Conclusion.

#### **Week 4 –Disciplinary Approaches to STEM**

- Read Chapter 11, 12 and 13 in your textbook.
- Which Is Most Engaging To Students?
- Discussion/Activity- Answer Week # 4 Instructor Posted Question by Tuesday.
- Discussion/Reflection Activity- Post/Communicate 2 responses to your colleagues answers by Thursday.
- Research project due by Sunday night end of week #4

#### **Research Project**

Using the proposal literature in Chapter 16 Titled “*From Ripple to River*” research two other school districts attempts to integrate STEM into their curriculum. Use the internet, books, or articles to find your sources. Choose (1) option below.

#### **Option #1**

Create a “Strategic Plan” that will explain how you would move STEM curriculum into your district. Please follow figure 16.1 on page 165 of your book. Each year must have a title and you will need a minimum of three bullet points for each year. Complete the plan for 3 years. Also, please cite your sources.

#### **Option #2**

Write a 3-5 page paper using your gathered research and explain how you would integrate STEM into your district. APA format and Cite your sources.

#### **Week 5 –Backward Design For Starting an Integrated STEM Unit.**

- Read Chapters 14 thru 17 in your textbook.
- The Benefits.
- Discussion/Activity- Answer Week #5 Instructor Posted Question by Tuesday.
- Discussion/Reflection Activity- Post/Communicate 2 responses to your colleagues answers by Thursday.
- Final Evaluation Assignment due by Sunday night.

#### **Final Evaluation/Reflection**

Compose a 3-5 page paper APA format outlining your reaction/reflection of the key topics from the text. Please supplement your reflection with text from the book and other outside sources,(at least 2). Cite all work. You may include, but are not limited to, the following:

- a. STEM Literacy
- b. 5 STEM Guiding Principles
- c. STEM Practices
- d. 3 Approaches to Integrated STEM
- e. Project-Based Learning i. Characteristics of STEM PBL
- f. STEM Assessment
- g. Pros/Cons of Implementing STEM
- h. Evaluation and Reflection on Resources for Creating STEM Curricula

## End of Course Survey

Now that you are finished with this class, please take the time to help us improve our product. In order to make sure that we are providing the best possible service, please take our [survey](#).

We appreciate your help and your commitment to the profession.

## Academic Honesty

Academic dishonesty is any form of cheating which results in students giving or receiving unauthorized assistance in an academic exercise or receiving credit for work which is not their own. Any academic dishonesty is grounds for dismissal. Any student judged to be engaged in cheating may receive a failing grade for the course, or any other penalty, which the instructor finds appropriate. Academic dishonesty is a behavioral issue, not an issue of academic performance. As such, it is considered an act of misconduct and is also subject to the University disciplinary process as defined in the Student Code of Conduct.

### Acts of Dishonesty Include:

- Cheating—intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise. The term academic exercise includes all forms of work submitted for credit or hours.
- Fabrication—intentional and unauthorized falsification or invention of information or citation in an academic exercise.
- Facilitating Academic Dishonesty—intentionally or knowingly helping or attempting to help another to violate a provision of the institutional code of academic integrity.

- Plagiarism—the deliberate adoption or reproduction of ideas, words, or statements of another person as one’s own without acknowledgement.

Unauthorized Collaboration—intentionally sharing information or working together in an academic exercise when the course instructor does not approve such actions.

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## ADA Statement

The University abides by the Americans with Disability Act and Section 504 of the Rehabilitation Act of 1973, which stipulates that no student shall be denied the benefits of an education “solely by reason of a handicap.” If you have a documented disability that may affect your work in this class and for which you may require accommodations, please contact the Disability Resource Coordinator as soon as possible to arrange accommodations. In order to receive accommodations, you must be registered with and provide documentation of your disability to the Disability Resource Office.

The Disability Resource office will provide Extended Studies with documentation of the disability and any accommodations that are needed.

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**The ten INTASC standards are listed below. Specific standards for knowledge, dispositions, and performances accompany each principle, but space does not permit listing them below. For a complete copy of the INTASC standards, contact Jean Miller, Director of INTASC, Suite 700, One Massachusetts Avenue NW, Washington DC 20001-1431.**

### **The InTASC Model Core Teaching Standards (April 2011)**

#### **The Learner and Learning**

##### Standard #1: Learner Development

The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.

##### Standard #2: Learning Differences

The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.

##### Standard #3: Learning Environments

The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.



## **Content Knowledge**

### Standard #4: Content Knowledge

The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.

### Standard #5: Application of Content

The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

## **Instructional Practice**

### Standard #6: Assessment

The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.

### Standard #7: Planning for Instruction

The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

### Standard #8: Instructional Strategies

The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

## **Professional Responsibility**

### Standard #9: Professional Learning and Ethical Practice

The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.

### Standard #10: Leadership and Collaboration

The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.