MISSISSIPPI STATE UNIVERSITY COLLEGE OF EDUCATION
DEPARTMENT of INSTRUCTIONAL SYSTEMS and WORKFORCE DEVELOPMENT
Course Syllabus

Course Prefix and Number: TECH 4483/6483
Course Title: Methods of Teaching STEM in the Middle School
Credit Hours: 3 credit hours
Method of Instruction: C = LECTURE

Catalogue Description
Three Hours Lecture: A study of objectives, materials, and methods appropriate for teaching STEM in the middle school.

College of Education Conceptual Framework:

The faculty in the College of Education at Mississippi State University are committed to assuring the success of students and graduates by providing superior learning opportunities that are continually improved as society, schools, and technology change. The organizing theme for the conceptual framework for the College of Education at Mississippi State University is educational professionals - dedicated to continual improvement of all students' educational experiences. The beliefs that guide program development are as follows:

1. **KNOWLEDGE** - Educational professionals must have a deep understanding of the organizing concepts, processes, and attitudes that comprise their chosen disciplinary knowledge base, the pedagogical knowledge base, and the pedagogical content knowledge base. They must also know how to complement these knowledge bases with the appropriate use of technology.

2. **COLLABORATION** - Educational professionals must continually seek opportunities to work together, learn from one another, forge partnerships, and assume positions of responsibility.

3. **REFLECTION** - Educational professionals must be willing to assess their own strengths and weaknesses through reflection. They must also possess the skills, behaviors, and attitudes necessary to learn, change, and grow as life-long learners.

4. **PRACTICE -** Educational professionals must have a rich repertoire of research-based strategies for instruction, assessment, and the use of technologies. They must be able to focus that array of skills on promoting authentic learning by all students or clients, while exhibiting an appreciation and commitment to the value and role of diversity.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Describe the key aspects of the history and development of STEM in the middle school framework. **(InTASC #1, CFPO #3)**
2. Describe the competencies needed to teach the STEM in the middle school framework. **(**InTASC **#1, CFPO #3)**
3. Describe the purposes and goals of STEM using the Understanding by Design template. **(InTASC #1-9, CFPO #2, 3, 6, 8-12)**
4. Applying appropriate methods of teaching and assessment to meet the diverse needs, interests, and abilities of middle school students. **(**InTASC **#1-8, CFPO #2, 3, 9-12)**
5. Interpret minimum specifications of hardware and demonstrate proper procedures used to install hardware/software, manage, and troubleshoot in a networked environment.
   (InTASC #1, CFPO #3, 11)
6. Define the role of professional associations as they apply to professional development in **the** area of STEM in the middle school.**(INTASC # 9, 10, CFPO #1)**
7. Demonstrate effective teaching by modeling micro-lessons in STEM in the middle school areas. **(**InTASC **#1-8, CFPO #2, 3, 5, 7, 8, 10-12)**
8. Demonstrate knowledge of appropriate assessment in STEM in the middle school areas. **(**InTASC **# 8, CFPO #3, 4, 10, 11)**

Detailed Course Outline:

1. Licensure requirements (MDE, 2008) (1 hour)
2. Teaching orientation, ethics, personality development and emerging careers (STEM, 2011; Einsiedel, 2009; Klaus, etal, 2007; Cole, 2011; CNET, 2011;VARK, 2011; States, 2011; USBLS, 2011) (3 hrs.)
   a. Objectives and content
   b. Instructional strategies for teaching orientation and ethics
   c. Evaluating learning
3. Teaching technology literacy (Morrison & Wells, 2010; Baldauf, 2012; Parsons & Oja, 2012; Shelly & Vermaat, 2012) (5 hrs.)
   a. Objectives and content (1 hour)
   b. Instructional strategies for teaching technology literacy (2 hours)
   c. Evaluating learning (2 hours)
4. Teaching the design process and how it is used to develop products (Chopra, 2011; Grover, 2009; CAD, 2011; Google Sketchup 8, 2011; Design, 2011) (5 hrs.)
   a. Objectives and content (1 hour)
   b. Instructional strategies for teaching the design process (2 hours)
   c. Evaluating learning (2 hours)
5. Teaching emerging technologies (STEM, 2011; Einsiedel, 2009) (3 hours)

   a. Objectives and content
   b. Instructional strategies for teaching emerging technologies
   c. Evaluating learning

6. Teaching 3-D models with CAD software and how it is used in the drafting and design industry (STEM, 2011; Chopra, 2011; CAD, 2011; Google Sketchup 8, 2011; Design, 2011) (5 hours)
   a. Objectives and content (2 hours)
   b. Instructional strategies for teaching CAD software (3 hours)

7. Evaluating learningTeaching sustainable design and technology and the impact on industry. (STEM, 2011; Chopra, 2011; CAD, 2011; Google Sketchup 8, 2011; Design, 2011) (5 hours)
   a. Objectives and content (1 hour)
   b. Instructional strategies for teaching the sustainable design process (2 hours)
   c. Evaluating learning (2 hours)

8. Teaching power and energy, how it is used in industry and the effects it has on the environment. (STEM, 2011; Boyle, 2004; Clean, 2010; Dept of Energy, 2011; EIA, 2011; Energy, 2011; EduGreen, 2011; TVA, 2011) (4 hours)
   a. Objectives and content (1 hour)
   b. Instructional strategies for teaching about the power and energy industry and how it impacts the environment. (2 hours)
   c. Evaluating learning (1 hour)

9. Teaching robotics and how it is used in industry. Simulate robotics programming. (STEM 2011; NASA, 2011; RoboMind, 2011; Robotics, 2011; Virtual, 2011) (5 hours)
   a. Objectives and content (1 hour)
   b. Instructional strategies for teaching robotics and how it is used in industry. (2 hours)
   c. Evaluating learning (2 hours)

10. Teaching financial and economic literacy, the purpose and importance of credit, and the role financial decisions have in your personal life. (STEM, 2011; Garman and Forque, 2010; Tyson, 2009; Ramsey, 2009; Dollar, 2011) (5 hours)
    a. Objectives and content (1 hour)
    b. Instructional strategies for teaching financial and economic literacy (2 hours)
    c. Evaluating learning (2 hours)

11. Teaching workplace skills (STEM, 2011; Klaus, et al, 2007) (4 hours)
    a. Objectives and content (1 hour)
    b. Instructional strategies for teaching workplace skills (1 hour)
    c. Evaluating learning (2 hours)

Text(s):

Research and curriculum unit for workforce development vocational education. (2011). *STEM*: *Curriculum Framework for Mississippi Public Schools*. Retrieved January 13, 2013, from http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Description of Instruction:

(Campus 1) Lecture. Instruction will be delivered through face-to-face lectures. The teaching format will include lecture, discussion, demonstration, hands-on activities and simulations, project assignments, and exams.

(Campus 5) Lecture. This course will be delivered via an on-line platform – Canvas. Class materials will include handouts, preparation guidelines, supplementary materials, and recorded lectures. Class activities such as group discussions will be held on Canvas in the format of threaded discussion topics.

Honor Code:

(Campus 1& 5) Mississippi State University has an approved Honor Code that applies to all students. The honor code states: "As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the honor code, to accept responsibility for learning, and to follow the philosophy and rules of the honor code. Ignorance of the rules does not exclude any member of the MSU community from the requirements or consequences of the honor code.

For additional information please visit: http://www.honorcode.msstate.edu

(Campus 5 specifically) Online tests will be administered with random ordered questions. All written assignments must be submitted through Turnitin.

Technology:

(Campus 1) Students will be required to use Canvas to access course syllabus, class preparation guidelines and handouts, and supplemental course materials, as well as to check their grades. Students may also be required to submit assignments using Canvas.

(Campus 5) Students will be required to use Canvas to access course syllabus, recorded lectures, class preparation guidelines and handouts, and supplemental course materials, as well as to check their grades. Students will also be required to submit assignments using Canvas. In addition to these, students will engage in class discussions by creating or relying to threaded discussion topics on Canvas.

Technical Support: The MSU Help Desk is a service provided at no charge to all students, staff, and faculty at Mississippi State University. The consultants are there to help you with various computer-related information or problems. Check the Information Technology Services (ITS) Web site at http://www.its.msstate.edu for handouts and/or resolutions to common computer problems. If you cannot find an answer to your question on the Web or you do not have access to the Internet, please call ITS at 325-0631 or 888-398-6394 (7:30 a.m. to Midnight Monday through Thursday; 7:30 a.m. to 5:00 p.m. Friday; 1:00 p.m. to Midnight Sundays).You can also e-mail ITS directly for help with

technical problems at helpdesk@msstate.edu or go by their office at 108 Allen Hall with walk-in hours from 8:00 a.m. to 10:00 p.m. Monday to Thursday; 8:00 a.m. to 5:00 p.m. Friday; 1:00 p.m.-10:00 p.m. Sunday.

Diversity:

This course will comply with the Mississippi State University diversity policies. Issues in diversity (gender, race, SES, culture) will be noted as concerns with individual differences in the field and will be identified and regularly assessed when discussing topics.

Accommodation for Students with Disabilities:

Students with disabilities in need of accommodations to meet the expectations of this course are encouraged to bring this need to the attention of the instructor and should register with the Office of Student Support Services as soon as possible. The Office of Student & Disability Support Services is located in 01 Montgomery Hall, (662) 325-3335 (phone), and http://www.sss.msstate.edu (web address).

University Safety Statement:

Mississippi State University values the safety of all campus community members. Students are encouraged to register for Maroon Alert texts and to download the Everbridge App. Visit the Personal Information section in Banner on your mystate portal to register. To report suspicious activity or to request a courtesy escort via Safe Walk, call University Police at 662-325-2121, or in case of emergency, call 911. For more information regarding safety and to view available training resources, including helpful videos, visit ready.msstate.edu.

Field Component:

There is no field component in this course.

Evaluation of Student Progress: (Campus 1 and Campus 5)

Student progress will be measured as follows:

Quizzes and Exam: Students will complete quizzes and a comprehensive final examination. Quizzes and exam will contain questions covering knowledge and understanding of the material, as well as explanation of this knowledge. Questions may be taken from the text, lecture materials, laboratory experiments, supplementary materials (handouts), and from instructor demonstrations. Students who will not be able to take an exam at a scheduled time are responsible for contacting the instructor and arranging to make up the exam, prior to that scheduled exam. The quizzes and exam will be objective and performance based. (Objectives 1-8)

Learning log and blog postings: Students will read articles from professional publications that have significance to each unit in the STEM in the middle school framework, maintain a reading weblog, and post reflections to a reading blog (Obj. 8).

Wiki assignment: The instructor will choose STEM-related articles based on the academic background of students, articles that have room for improvements and that are

relevant to students' fields of study improves the overall experience them. Students then write about what they know. They will learn to articulate complex concepts online to audiences outside their field of study. (Objectives 1-8)

UBD unit/lesson plan/delivery/critique: Students will complete selected assignments and quizzes in required framework applications to show mastery of those applications (Obj. 2, 5). Students will plan a unit of instruction within the STEM in the middle school content area using the Understanding by Design template (Obj. 3, 6). They will develop all assessment tools required to deliver the unit plan developed for STEM in the middle school content area (Obj. 10). Students will also deliver one lesson planned in the unit plan that infuses STEM in instruction (Obj. 9). Finally, students will critique their own teaching delivery and that of other students (Obj. 7).

UBD unit/lesson materials and assessment: In connection with the assignment above, students will develop materials and assessments to support their online unit. (Objectives 1-8)

Instructional strategies assignment wiki: Students will complete assignments related to instructional strategies that infuse STEM and meet the learning needs and preferences of middle school students. They will complete a wiki that will be used to present their work (Obj. 2, 4).

Weekly Assignments: Students will have weekly assignments over the course of the semester that will facilitate students' exploration and deeper understanding of the materials covered in class. Students will write a 1-page journal entry based on the assignment. Journal entries will be double-spaced in 12-point Times New Roman font. Assignments will be submitted through Canvas. Guidelines will be posted on Canvas. LATE ASSIGNMENTS WILL NOT BE ACCEPTED unless there are some unforeseen circumstances. (Objectives 1-8)

Graduate Assignments:
Graduate students will complete a ten-page research paper on a contemporary topic related to online education as approved by the instructor. Graduate students will present the paper to the class. (Objectives 1-8)

Evaluation of Student Progress:

Undergraduates:	
Quizzes and exams	15%
Learning log and blog postings	10%
Wiki assignment	10%
UBD unit/lesson plan/delivery/critique	20%
UBD unit/lesson materials and assessment	20%
Instructional strategies assignment wiki	10%
Weekly assignments	15%
Graduates:	
Quizzes and exams	15%
Learning log and blog postings	10%
Wiki assignment	10%

UBD unit/lesson plan/delivery/critique	15%
UBD unit/lesson materials and assessment	15%
Instructional strategies assignment wiki	10%
Weekly assignments	15%
Graduate research assignment	10%

Grading Scale:

90% - 100.00%	A
80% - 89.99%	B
70% - 79.99%	C
60% - 69.99%	D
<59.99%	F

Attendance Policy:

The class is responsible to read the MSU Attendance Policy AOP 12.09. https://www.policies.msstate.edu/policy/1209.

In accordance with university policy (AOP 12.09), students should attend all classes. When an absence from class is essential, the student must inform the instructor via phone or Email, and provide appropriate documentation.

Attendance in the **online course** is evaluated on a weekly basis. Each student is expected to join the online environment at the scheduled time for a combination of lecture and discussion. Just as in the face-to-face environment, not being logged in for class constitutes a single absence.

Title IX Policy:

MSU is committed to complying with Title IX, a federal policy that prohibits discrimination, including violence and harassment, based on sex. This means that MSU's educational programs and activities must be free from sex discrimination, sexual harassment, and other forms of sexual misconduct. If you or someone you know has experienced sex discrimination, sexual violence and/or harassment by any member of the University community, you are encouraged to report the conduct to MSU's Director of Title IX IEEO Programs at 325-8124or by e-mail to titleix@msstate.edu. Additional resources are available at http://www.msstate.edu/web/security/title9-12.pdf, or at http://students.msstate.edu/sexualmisconduct/.

Bibliography:

Books

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Cole, C. (2011). *Connecting students to STEM careers: Social networking strategies*. Eugene, OR: International Society for Technology in Education.

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