

UMBC UGC New Course Request: EDUC431

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Proposed Effective Date: 8/2017

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COURSE INFORMATION:

Course Number(s)	EDUC 431
Formal Title	Methods for Teaching STEM in the Middle Grades
Transcript Title (≤30c)	Methods for Teaching STEM in the Middle Grades
Recommended Course Preparation	N/A
Prerequisite NOTE: Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.	EDUC 410 and EDUC 430 (Must be taken concurrently with EDUC 411 and EDUC 454)
Credits	3
Repeatable?	Yes <input checked="" type="checkbox"/> No
Max. Total Credits	3 This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.
Grading Method(s)	XReg (A-F) <input type="checkbox"/> Audit <input type="checkbox"/> Pass-Fail

PROPOSED CATALOG DESCRIPTION (no longer than 75 words):

This course introduces pedagogical practices associated with the teaching and learning of integrated STEM practices at the middle levels. The course addresses ideas that include (1) middle grades science, mathematics, engineering and technology (STEM) content, (2) understanding and developing middle grades students' thinking; (3) designing, selecting, and sequencing instructional tasks and assessments for learners in the middle grades; and (4) self-reflection on learning and teaching STEM at the middle school level.

RATIONALE FOR NEW COURSE:

The Maryland State Department of Education (MSDE) has added middle school (grades 4-9) to its areas of teacher certification. In order to be competitive within the State and serve the UMBC students who want to specialize in STEM education at the middle school level, the education department is proposing a new Middle School STEM Education degree. EDUC 431 is needed for the new degree, and fits into the curriculum as a key pedagogical content course for students participating in Phase I of their internship (student teaching). This course is a 400 level course because it provides advanced knowledge required for program completion. Students who enroll must be accepted into Phase I of internship and have departmental permission. Students in the course will be graded using the regular grading scale and be required to earn a B or better in the course to advance to the second phase of the internship. The course is not offered with a repeatable option.

ATTACH COURSE OUTLINE (mandatory):

**Department of Education
University of Maryland Baltimore County
EDUC 431
Methods of Teaching Middle School STEM
Fall 20XX**

**Dr. Jonathan Singer
Office: 410 455-3348
Class location 208 Sherman Hall
Office hours: By appt.**

THE UMBC DEPARTMENT OF EDUCATION MISSION is to research teaching and learning, and to develop caring, thoughtful, knowledgeable, and skilled teachers who are responsive to children, families and the community. We expect our graduates to be leaders in their schools as well as advocates for democracy and social justice.

The middle school STEM methods course is built on the premise that teaching STEM is about more than “content” and addresses the complexity of social and cultural factors that operate in schools and their surrounding communities, as well as in science at large. The course embraces the notion of teachers as life-long learners. This course is therefore just a beginning of a journey that will feature increasing competency as a teacher of science.

National Council of Teachers of Mathematics (NCTM) and National Science Teacher Association (NSTA) Standards for Preparation of Mathematics and Science Teachers are addressed in this course. Descriptions of these standards are found at the end of the syllabus. The course focuses on helping teachers address the Common Core State Standards for Mathematics (CCSSM) and Next Generation Science Standards (NGSS).

Course Objectives and Outcomes

Learning experiences in this course are framed around your current science, mathematics and pedagogical knowledge, skills, and dispositions.

During this course, you will:

- become familiar with current resource materials such as the Maryland Voluntary Curriculum Standards, district objectives, College and Career Readiness curriculum standards, NCTM standards and numerous science curriculum programs,
- enact inquiry-oriented activities by engaging in investigations involving exploration and discovery,
- develop a deep understanding of the nature of mathematics, the nature of science and their relationship with your teaching,
- gain experience in preparing, teaching, and analytically reflecting on middle school STEM lessons while working with students in local schools, and
- develop long-range teaching skills by preparing an in-depth science curriculum project.

EDUC XXX will be organized around the driving question:

How can I establish a learning community to support my teaching of middle school STEM?

This driving question is addressed by focusing upon a series of “sub questions”

- How do I know what to teach?
- How do I engage my students?
- How do I know what my students know?
- How do I connect class to the community?

Course Reading Material

1. Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. Routledge.

Course readings (that can be found in Blackboard, course documents).

On-line resources we'll use extensively:

2.A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas

http://www.nap.edu/catalog.php?record_id=13165

3. Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS. (2013).

Next Generation Science Standards. They are available on-line at

<http://www.nextgenscience.org/>

4. National Council of Teachers of Mathematics, Common Core State Standards for Mathematics

<http://www.nctm.org/ccssm/>

5. Leadership in Mathematics Education Network, Communicate, Support Motivate

<http://www.mathedleadership.org/ccss/materials.html>

6. Maryland Curriculum Standards

<http://mdk12.msde.maryland.gov/instruction/curriculum/>

7. Sites Associated with Universal Design for Learning

CAST: Center for Applied Special Technology <http://www.cast.org/index.html>

National Center on Universal Design for Learning <http://www.udlcenter.org/>

8. Site associated with Standards for assessing Pre-service Science Teachers

<http://www.nsta.org/pd/ncate/docs/2012NSTAPreserviceScienceStandards.pdf>

9. Science Safety website

<http://mdk12.org/instruction/curriculum/science/safety/> or

Alternative site: <http://www.csss-science.org/downloads/scisafe.pdf>

Blackboard

In this era of technology, and with the goal of fostering a community of learners, we will use Blackboard in this course. Some readings will be posted there and you will be expected to access it frequently to post your own assignments and to read your classmates' writings. Therefore you need to have good access to the Internet to participate on-line.

The class is based on the following ideas.

- The class is a community. To make it work, we ALL must be prepared and ready to participate every time we meet.
- Teachers need to learn to manage time both in and out of class. Therefore, you will be expected to hold to time constraints when presenting or contributing in class.
- Teachers are expected to be in school nearly every day and to be on time. Therefore, one excused absence is allowed under normal circumstances. After that, each absence will impact your grade, as will excessive lateness or leaving early.

Academic Integrity

By enrolling in this course, each student assumes the responsibility of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty and they are wrong. Academic misconduct could result in disciplinary action that may include suspension or dismissal.

Classroom Accommodations for Students with Disabilities:

If you are a student with a documented disability who requires an academic adjustment, auxiliary aids, or similar accommodations, please contact the Office of Student Support Services at 410-455-3250.

Course Requirements and Grading

Note: Since this course is intended to help you become the best teacher you can be, it will be graded with a mastery perspective. The percentages listed here are approximate, but will give you a sense of the relative weight of each assignment.

Assignments to be posted on TK-20 under course folder.

** Teaching portfolio elements on TK20

<u>Weight</u>	<u>Assignment Description</u>	<u>Due Date</u>
5%	Class Artifact	_____
10%	**Philosophy Statement	_____
10%	**Content Expertise	_____
10%	Safety and Legal Obligation Test	_____
10%	Local area resources	_____
10%	Interdisciplinary Instructional Activity:	
30%	# Focus Lessons PPT. presentations	
	• Classroom management	mid Sept
	• Evidence of student learning	mid Oct
	• Differentiated instruction	mid Nov
20%	# Final (Unit Plan)	Finals week
	• Unit Idea/Standards	
	• Pre/Post	
	• Outline/Chart	
	• Sample Lesson plan	

Class Descriptions

Due this week	In-class discussion and activities	Readings (To be discussed in class)
Week 1	<p>Question: How do I know what to teach?</p> <p>Instructional activity: What is science card exchange What is the nature of Mathematics</p> <p>Artifact: None</p>	Class expectations and Syllabus
Week 2	<p>Question: How do I know what to teach?</p> <p>Student Presentations of Assigned NGSS Appendix. Intro to NCSM Toolkits Toolkit 1 (Content) Training</p> <p>Interdisciplinary Instructional Activity: - Lesson design focusing cross-cutting themes</p> <p>Artifact:</p>	<p>Next Generation Science Standards</p> <ul style="list-style-type: none"> • Front Matter, • Structure • Assigned Appendices: A, C, F, G, H <p>NCSM Toolkits (section X) Hattie Part 1 (pp. 1 – 34)</p>
Week 3	<p>Question: How do I know what to teach?</p> <p>Interdisciplinary Instructional Activity: - Lesson design focusing disciplinary standards</p> <p>Artifact: _</p>	<p>Next Generation Science Standards Select one DCI - look up the same idea (or as close as possible) on the current MD state standards. Be ready to discuss how they are presented.</p> <p>National Council of Teachers of Mathematics, Common Core State Standards for Mathematics</p>
Week 4	<p>Enactment 1 presentation (Classroom Management)</p> <p>Philosophy statement due</p> <p>Artifact: __</p>	<p>Take a lesson from the mentor teacher and talk about what they taught and the adaptations they made.</p> <ul style="list-style-type: none"> • Slide 1-Lesson Plan from mentor/or self • Slide 2—What went well with evidence • Slide 3--Missed Opportunities/what would they do differently next time with evidence • Slide 4—Reflection on Mentor feedback.

<p>Week 5</p>	<p>Question: How do I engage my students? –</p> <p>Unit plan Idea due.</p> <p>Interdisciplinary Instructional Activity: Lesson design to maximize engagement</p> <p>Artifact: _____</p>	<p>UDL: Focus on principles</p> <ul style="list-style-type: none"> • Multiple means of Representation • Multiple means of action and expression. • Multiple means of Engagement. <ul style="list-style-type: none"> • Register for a CAST membership: • Review UDL websites <p>http://www.udlcenter.org/</p>
<p>Week 6</p>	<p>Question: How do I engage my students? – Prior Knowledge</p> <p>Interdisciplinary Instructional Activity (3): Lesson design focusing on eliciting student prior knowledge</p> <p>Artifact: _____</p>	<p>Annenberg Foundation http://www.learner.org/</p> <p>“Basic” Constructivism reading “Basic” Conceptual Change reading</p>
<p>Week 7</p>	<p>Question: How do I engage my students? – Collaborative learning Communities</p> <p>Interdisciplinary Instructional Activity (4): - Lesson design focusing on supporting group interactions –</p> <p>Artifact: _____</p>	<p>Hattie Part 2 (Chapters 4 & 5)</p> <ul style="list-style-type: none"> • Chpt. 4 – Preparing the lesson • Chpt. 5 – Starting the lesson
<p>Week 8</p>	<p>Enactment Presentation #2 Focus on Student Learning</p> <p>Unit plan Pre/Post test due</p>	<p>Discuss a lesson You led and talk about how it went and the adaptations you would make.</p> <ul style="list-style-type: none"> • Slide 1-Lesson Plan and highlight the content standard. • Slide 2—Artifacts of student work: Talking points--What were your informal and formal assessments and what did they measure. • Slide 3—Critique of student work: Look at the data. In general, how did the entire class do? Then give one example of full understanding and explain why and one example of partial understanding and explain why and how you could have taught this differently. • Slide 4--Reflection on Mentor feedback.

<p>Week 9</p>	<p>Question: How do I maintain my student’s engagement? – Scaffolding and making thinking visible</p> <p>Content Expertise Due</p> <p>Interdisciplinary Instructional Activity (5): Lesson design focusing on scaffolding student learning and making thinking visible.</p> <p>Artifact: _____</p>	<p>Hattie, Part 2 (Chpt. 6)</p> <ul style="list-style-type: none"> • Chpt.6 – The flow of the lesson: Learning
<p>Week 10</p>	<p>Question: How do I manage and support classroom activities and discussions?</p> <p>Science Safety test – graded in class.</p> <p>Interdisciplinary Instructional Activity (6): Lesson design focusing on facilitating small and large group inter-actions</p> <p>Artifact: _____</p>	<p>MD Science safety Module http://mdk12.org/instruction/curriculum/science/safety/ http://www.csss-science.org/downloads/scisafe.pdf</p>
<p>Week 11</p>	<p>Question: How do I know what my students know?</p> <p>Unit Plan: Outline/Chart and Sample Lesson plan due</p> <p>Interdisciplinary Instructional Activity (7): Lesson design focusing on formative feedback and assessment.</p> <p>Artifact: _____</p>	<p>Hattie, Part 2</p> <ul style="list-style-type: none"> • Chpt. 7 – The flow of the lesson: the place of feedback
<p>Week 12</p>	<p>Enactment Presentation #3 Differentiated Instruction</p> <p>Artifact: __</p>	<p>Discuss a lesson You led and talk about how it went and the adaptations you would make.</p> <ul style="list-style-type: none"> • Slide 1-Lesson Plan and point out a minimum of two populations that you need to differentiate for in your classroom • Slide 2—Adaptations: How did you differentiate instruction for each of the populations that you pointed out and why? • Slide 3—Evidence of the level of success of those adaptations for each population with evidence. • Slide 4--Reflection on Mentor feedback. (Signed form) Informal Assessment #3 by mentor/supervisor.

<p>Week 13</p>	<p>Question: How do I know what my students know?</p>	<p>Hattie, Part 2 chpt. 8</p>
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	<p>Interdisciplinary Instructional Activity (7): Lesson design focusing on summative assessment and using data to inform instruction</p> <p>Artifact: _____</p>	<ul style="list-style-type: none"> • Chpt. – 8 The end of the lesson
Week 14	<p>Question: How do I connect the class to the community?</p> <p>Class Project: Local area resources</p> <p>Artifact: _____</p>	<p>Students should be prepared to make a 10 minute presentation associated with their local community/context project.</p> <p>Please provide a 1 page handout to distribute to all class members that includes:</p> <ul style="list-style-type: none"> o Local area resource o Contact information o Services provided o Appropriate grade level/content area o Limitations and Benefits
Week 15	<p>Curriculum Unit Plan Presentations</p> <p>Artifact: _____</p>	<p>Hattie, Part 3 chpt. 9</p> <ul style="list-style-type: none"> • Chpt. – 9 Mind frames of teachers, schools leaders and systems