MISSISSIPPI STATE UNIVERSITY™
COLLEGE OF EDUCATION

Department of Curriculum, Instruction, and Special Education Course Syllabus

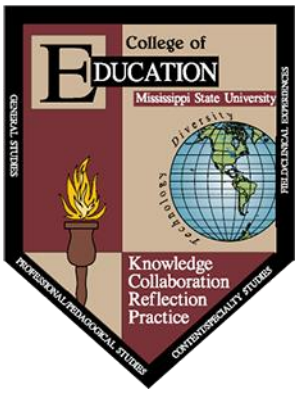
EDS 4653 Methods of Teaching Science

Credit Hours: Three (3) credit hours

Method of Instruction: Lecture

Catalog Description: Prerequisite: (Admission to Teacher Education) Three hours lecture. Field based. Students will gain insight into the methods of teaching science in grades 7-12, including selection, organization, presentation and assessment required by NSES.

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 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 center on the tenets of knowledge, collaboration, reflection, and practice. For additional information, please visit https://www.educ.msstate.edu/about/framework/.

Course Objectives

1. To introduce current philosophy and methods of teaching science. (INTASC # 1, 2, 5, 7, & 9; CFPO # 1, 2, & 10)
2. To provide practice in teaching techniques (Mini-teaching lesson). (INTASC # 1, 2, & 3; CFPO # 5, 6, & 7, CRT 1.1)
3. To introduce the science curricula and demonstrate the objectives of each. (INTASC #1; CFPO # 3)
4. To discuss Task Stream and Science NCATE requirements. (INTASC # 1; CFPO # 9)
5. To discuss assessment and various evaluation methods. (INTASC # 5 & 10; CFPO # 4; CRT 13.1 14.1**)**
6. To review the Interstate New Teacher Assessment and Support Consortium (INTASC) Standards. (INTASC # 2, 3, 5, 6, 7, 8, 9, & 10; CFPO # 1)
7. To emphasize laboratory safety for all science content areas. (INTASC # 1; CFPO # 3)
8. To communicate professional responsibilities. (INTASC # 6, 9, & 10; CFPO # 1 & 8)
9. To promote self-development in the teaching of science inquiry. (INTASC # 1, 2, & 3; CFPO # 5, 6, & 7)

Detailed Course Outline/Topics Covered in the Course

Learning Module	Topic
Lesson Planning	Assessing the best lesson plan design. (3 Hours) Time Management. (1 Hour)
The Nature of Science Education	What is science instruction? (3 Hours) Science teacher content knowledge. (3 Hours) Enhancing Science Instruction. (3 Hours) Nature of Science and Science misconceptions. (3 Hours)
Philosophical Rational	Informal Science Environments (4 Hours) Educational Psychology in the service of science instruction. (2 Hours) Assessment in Science Education. (3 Hours) Constructivism and conceptual change. (2 Hours)
Research support for Best practices in Science Teaching	Inquiry Rational and Practical Issues (6 Hours) Inquiry Assessment and Lab design (4 Hours)
Safety and Reflection of Practice	Safety and Ethical Treatment of Animals (3 Hours) Teaching as a Reflective Practice (3 Hours) Professional Organizations and Support (1 Hour)

Text(s)/Course Materials

Assigned readings as necessary

Description of Instruction

Lecture. This methods course provides students with structured field experiences and embedded assessments to build foundation to support the transition into student teaching. Students develop a portfolio of science teaching artifacts that align with national accreditation requirements.

Mississippi State University Honor Code

"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. Students will be required to state their commitment on examinations, research papers, and other academic work. Academic dishonesty will not be tolerated and will be dealt with according to MSU policy. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code.

For additional information visit: http://students.msstate.edu/honorcode.

Technology

Technology will be used in both the delivery of the course content and through course requirements completed by graduate students. Delivery of course content will use PowerPoint presentations, materials on the Internet and Canvas. All course assignments will be completed using appropriate software.

Diversity

Student will examine materials teaching methods for appropriateness to use with diverse learners. This includes differentiated instruction to address student achievement, cultural diversity and gender identity within science education.

Accommodations 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 and can be reached via telephone at (662) 325-3335. http://www.sss.msstate.edu.

Field Component

The field experience in this course includes 50+ observation hours in secondary Science classrooms.

Evaluation of Student Progress

Student Assignments/Activities:

Laboratory Practical (100 points) The purpose of this assignment for pre-service teachers is to design and engage in a lab practical that will assess laboratory inquiry, safety, equipment, techniques, and scientific literacy needed for completion of a laboratory science course in primary or secondary school. Detailed instructions and rubrics will be given in class.

Misconception Interviews, Lesson Plan and Reflection (100 points) In order to understand where to begin instruction, it is crucial to know where students are "coming from" in terms of their understandings about science. Often, students' understanding of science concepts differs from the accepted scientific explanation. For this assignment, you will interview 2 children about a science concept, compare their answers to commonly held misconceptions, and consider what this means related to teaching science in the classroom. Then, teach a lesson based on the misconceptions at your placement. A more detailed description of the assignment and rubric for assessment will be distributed during class.

Discrepant Event Presentation and Lesson Plan and Reflection (100 points) (*Lesson plan and reflection, *Presentation Mondays) Find, modify and/or otherwise develop a discrepant event and present it to the class in 5-8 minutes. This presentation should be accompanied by a one page (front/back is OK) handout with the following sections: a) overview/introduction, b) grade level targeted, c) time constraints and issues, d) necessary materials, e) discussion of where this would fit within the science curriculum, f) the nature of the discrepancy and a discussion of what is happening from a scientific perspective. Please provide a copy of the handout to each class member at the conclusion of your presentation. Note, for help in finding discrepant events you should consult Tik Liem's book (*Invitations to Science Inquiry*), visit the following web sites, and/or search "discrepant events" on line: 1) http://www.nipissingu.ca/education/geraldl/sciencegeneral/discrepant_events.htm; 2) http://www.tcnj.edu/~minogue/Course%20Materials/Discrepant%20Events_activity.pdf; 3) http://bcramond.myweb.uga.edu/home/DiscrepantEvents.htm;
4) http://www.carlwozniak.com/Presentations/DiscrepantEvents.doc
You will also be required to present your discrepant event at your placement and write a brief reflection about the lesson. The presentation must be videotaped and submitted for assessment.

Inquiry Lesson Plan-Classroom Based (100 points) For this assignment, the teacher candidate will develop a classroom-based science inquiry lesson plan using the template provided. Identify specific science processes addressed by this lesson and explain how this lesson plan promotes science inquiry

and understanding of science processes. Include prior knowledge assessment (Formative) and post assessments (Summative) with a formative assessment at the end. The lesson plan should reflect a lesson that will be taught in a 50-minute classroom session. The teacher candidate will then present a shortened version (10-15 min) of the lesson to the class (no more than 20 minutes). Upon completion of the presentation, the teacher candidate will write a short reflection of the lesson.

Inquiry Lesson Plan-Laboratory Based (100 points) For this assignment, you will develop a laboratory-based science inquiry lesson plan using the template provided. Be sure to identify specific science processes addressed by this lesson and explain how this activity promotes science inquiry and understanding of science processes. Include prior knowledge assessment (Formative) and post assessments (Summative). Formative assessment at the end. The teacher candidate will also need to include special considerations for safety issues as well as organization and cost of the laboratory events. The lesson plan should reflect a lesson that will be taught in a 50-minute classroom session. The teacher candidate will then present a shortened version of the lesson to the class (no more than 20 minutes). Upon completion of the presentation, the teacher candidate will write a short reflection of the lesson.

Professional Development (100 points) Each teacher candidate will be required to attend the Mississippi Science Teachers Association annual state conference held in late October. The teacher candidates will be required to attend three morning, three evening sessions, and the exposition. The teacher candidate will need to register and pay for the Monday only Undergraduate/Graduate Student ($18.00). If you would like to stay longer, it is at your discretion. The teacher candidate will be given a signature form for verification of attendance by session author(s). Students will then complete a reflection one symposium. The reflection should include: (a) brief description of the session, (b) applicable content area, (c) new methods/techniques, (d) focus on population of students (K-12), (e) how you would implement this in your classroom, and (f) a brief summary of opportunities exhibited at the expo that were particularly interesting or focused on your content area or interests.

Portfolio Self-Assessment (100 points) Upon completion of the science artifact portfolio, candidates will complete a self-assessment with justification of how the specific assignments in the science artifact portfolio align with NSTA standards. The candidate responses and justifications will be assessed by the instructor using the NSTA criterion assessment format. The purpose of the comparison assessment is two-fold: to assess the strengths and weaknesses to provide candidate intervention prior to internship and for improvement of science methods courses.

Portfolio Presentation (100 points) Each teacher candidate will be required to present a summary of the science artifact portfolio along with improvements and reflections. The presentation will last approximately 15 minutes. The teacher candidates and responses will be assessed using an established rubric of teacher excellence. A more detailed assignment description will be given in class.

Observation summaries (150 points) Each student is required to complete and record a minimum of 50 hours of science classroom experience and a minimum of 10 hours of science fair assistance. A final overall reflection on your observations and how they influenced your perception of teaching is required (3-5 pages, APA format). You are also required to keep a spreadsheet to document your observation hours, it must be signed by your placement teacher each visit.

Professionalism (50 points) As a prospective teacher, you will be expected to conduct yourself in a professional manner.

NSTA Membership (50 points) Join NSTA Student membership $39. Upload proof of membership (receipt) to myCourses.

Science in the News (2x50=100 points) (*Wednesdays) Each student will present two current science stories from mainstream media. This includes a short summary (no more than 1-2 pages APA format), rational for selection and a description of where it fits into your science curriculum. Students will also include a brief description of how this could be taught in the classroom as well as a description of diversity and differentiated instruction. Students will incorporate the Science in the News into an interactive lesson to be presented to the class. Students are required to bring a copy of the article for all

students to class, a handout of the description of the activity, and any materials to use for an interactive activity.

Completion of Safety Training (50 Points) Safety training is offered free of charge from Flinn scientific. Complete this training by registering at their website (http://labsafety.flinnsci.com/Home.aspx) watch the video series and complete the assessments. Upload a summary of your Certificate of completion including chapter scores to myCourses. This assignment is time consuming (7 hours of video), so plan accordingly.

Unit Plan: Science Artifact Portfolio (700 total points*)* The unit plan or science artifact portfolio consists of 6 different assignments and a self-assessment document. Each set of documents for each assignment along with the self-assessment will be uploaded to by assigned dates. Elaboration of differentiated instruction is required for each assignment. These will be posted on mycourses as well as *Taskstream*. A brief description of each component will follow.

Final (100 points) More information on the final will be announced at a later time.

Note: To obtain a passing grade for this course, you must complete all assignments.

Weighting of Assignments

Science Artifact Portfolio	**Point Value**
NSTA Membership	50
Completion of Safety Training	50
Unit Plan: *Laboratory Practical	100
Unit Plan: *Misconceptions	100
Unit Plan: *Discrepant Events	100
Unit Plan: *Classroom Activity Lesson	100
Unit Plan: *Laboratory Activity Lesson	100
Unit Plan: *Professional Development	100
Unit Plan: *Portfolio Self-Assessment	100
Science in the News (4 @ 25 points)	100
Observation Document and Reflection	150
Professionalism (Tardies/Timely submissions/etc.)	50
Final (Portfolio Presentation)	100
Total	1200

*Items to be uploaded to Taskstream

Grading Scale

Grade	**Percentage**	**Points**
A	100% to 93%	1116-1200
B	92.9% to 86%	1032-1115
C	85.9% to 79%	948-1031
D	78.9% to 72%	864-947
F	71.9% and ↓	864 ↓

Attendance Policy

In accordance with university policy (AOP 12.09), students are expected to attend all classes. AOP 12.09 also defines what is an excused absence. When an absence from class is essential, the student must inform the instructor by email and provide appropriate documentation upon their return.

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 discrimination based on sexual orientation, sexual harassment, and other forms of sexual misconduct. If you or someone you know has experienced 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 325-8124 or by e-mail to titleix@msstate.edu. Additional resources are available at http://www.msstate.edu/web/security/title9-12.pdf, and at http://students.msstate.edu/sexualmisconduct/.

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.

Mississippi Educator Code of Ethics

This code shall apply to all persons licensed according to the rules established by the Mississippi State Board of Education and protects the health, safety and general welfare of students and educators. Ethical conduct is any conduct which promotes the health, safety, welfare, discipline and morals of students and colleagues. Unethical conduct is any conduct that impairs the license holder's ability to function in his/her employment position or a pattern of behavior that is detrimental to the health, safety, welfare, discipline, or morals of students and colleagues. Any educator or administrator license may be revoked or suspended for engaging in unethical conduct relating to an educator/student relationship (Standard 4). Additional information on the Mississippi Educator Code of Ethics 10 standards is available at https://www.mdek12.org/sites/default/files/documents/code-of-ethics_final.pdf.

Failure to comply with Mississippi Educator Code of Ethics will result in a dispositions infraction.

Mississippi College and Career-Ready Standards

Content standards outline the skills and knowledge expected of students from grade to grade and subject to subject. In addition to the Mississippi College and Career-Readiness Standards, the Mississippi Department of Education has developed a wide variety of training materials for educators and administrators across the state.

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