



**SED 489**  
**Secondary School Mathematics and Science Project-Based Learning**

**COURSE SYLLABUS: Fall 2013**

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**I. COURSE INFORMATION**

**Textbook:**

Hassard, J. & Dias, M. *The Art of Teaching Science: Inquiry and Innovation in Middle School and High School* (2nd Edition). Routledge.

**Relevant Resources:**

Membership to National Science Teachers Association ([www.nsta.org](http://www.nsta.org), Member Services, Student Membership) or to National Council of Mathematics Teachers (<http://www.nctm.org/>, Join NCMT, Student E-Membership).

Common Core Standards <http://www.corestandards.org/>

Culturally Responsive Teaching <http://www.alliance.brown.edu/tdl/tl-strategies/crt-principles-prt.shtml>

Next Generation Science Standards <http://www.nextgenscience.org/>

WIDA CAN DO Descriptors [http://www.wida.us/standards/CAN\\_DOs/](http://www.wida.us/standards/CAN_DOs/)

**II. COURSE DESCRIPTION:**

SED 489 Secondary School Mathematics and Science Project-Based Learning provides school-based opportunities for candidates to explore the nature of adolescent learners, effective teaching practices, and the complexities of creating an environment that promotes achievement in mathematics and science for all adolescent learners. Through reflective cycles that intermingle school-based experiences with instructional seminars within the class cohort, participants develop a starting competence for designing mathematics and science instruction that is grounded in the research base of the profession and guided by the NSTA and NCMT standards for Teacher Preparation. The proficiencies established by the Department of Curriculum and Instruction at Texas A&M University, Commerce serve as assessment criteria for candidate performance,

and are correlated with the NSTA/NCATE standards for Teacher Preparation. These proficiencies and standards are the basis for instructional experiences and requirements of students in SED 489.

### **Conceptual Framework for Teacher Education at TAMUC**

Our vision as a nationally recognized Teacher Preparation Program is to remain at the forefront of educator preparation. Informed by responsive engagement in collaborative partnerships, we advance educational excellence through innovative teaching in an ever-changing global and digital learning environment. Our mission is to prepare educators to improve student learning within a collaborative teaching and learning community through innovative teaching, purposeful research, and engaged service.

The Department of Curriculum and Instruction at Texas A&M University is committed to developing expertise among candidates in initial and advanced programs as teachers, teacher leaders and school leaders who possess the capability, intent and expertise to facilitate high levels of learning in all of their students through effective, research-based practices in classroom instruction, and to enhance the structures that support all learning. To that end, the Teacher Preparation Program fosters the development of candidates as they progress through stages of growth from novice to proficient to expert and leader. Within the Teacher Preparation Program's conceptual framework, expertise is viewed as a process of continued development, not an end-state. To be effective, teachers and educational leaders must embrace the notion that teaching and learning are entwined and that only through the implementation of validated practices can all students construct meaning and reach high levels of learning. In that way, candidates are facilitators of the teaching and learning process. Finally, the Teacher Preparation Program recognizes values and demonstrates collaborative practices across the college and university and extends collaboration to the community-at-large. Through this collaboration with professionals in the university, local communities, public and private schools and school districts, parents and other professional partners, the Teacher Preparation Program meets the ultimate goal of bringing all of Texas' students to high levels of learning.

The TAMUC Teacher Preparation Program believes *all* learners are entitled to equitable educational opportunities. To that end, programs within the Teacher Preparation Program consist of curricula, field experiences, and clinical practice that promote candidates' development of knowledge, skills, and professional dispositions related to diversity identified in the unit's conceptual framework, including the local community, Texas, the nation, and the world. Curricula and applied experiences are based on well-developed knowledge foundations for, and conceptualizations of, diversity and inclusion so that candidates can apply them effectively in schools. Candidates learn to contextualize teaching and draw effectively on representations from the students' own experiences and cultures. They learn to collaborate and engage with families in ways that value the resources, understandings, and knowledge that students bring from their home lives, communities and cultures as assets to enrich learning opportunities. Candidates maintain high expectations for all students (including English learners, students with exceptionalities and other historically marginalized and underrepresented students), and support student success through research-based culturally, linguistically, and socially relevant pedagogies and curricula.

### III. LEARNING OUTCOMES:

Learning Outcomes	Assessments:
<b>NSTA/NCTM Standard 1: Content Knowledge</b>	
<p><b>Effective teachers understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure.</b></p> <p>Preservice teachers will show they:</p> <p>1a) Understand the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields.</p> <p>1b) Understand the central concepts of the supporting disciplines and the supporting role of science- and math-specific technology.</p> <p>1c) Show an understanding of state and national curriculum standards and their impact on the content knowledge necessary for teaching P-12 students.</p>	<p>PPR TExES math or science exams</p> <p>Cumulative Math or Science/Math GPA</p>
<b>NSTA/NCTM Standard 2: Content Pedagogy</b>	
<p><b>Effective teachers understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.</b></p> <p>Preservice teachers will:</p> <p>2a) Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn math/ science.</p> <p>2b) Include active inquiry lessons where students collect and interpret data in order to develop and communicate concepts and understand processes, relationships and natural patterns from empirical experiences. Applications of science- and math-specific technology are included in the lessons when appropriate.</p> <p>2c) Design instruction and assessment strategies that confront and address naïve concepts/preconceptions.</p>	<p>Planning Assignment (edTPA Task 1)</p>
<b>NSTA/NCTM Standard 3: Learning Environments</b>	
<p><b>Effective teachers are able to plan for engaging all students in science/math learning by setting appropriate goals that are consistent with knowledge of how students learn science/math and are aligned with state and national standards. The plans reflect the nature and social context of science/math, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources--including science- and math-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met.</b></p> <p>Preservice teachers will:</p> <p>3a) Use a variety of strategies that demonstrate the candidates' knowledge and understanding of how to select the appropriate teaching and learning activities – including laboratory or field settings and applicable instruments and/or technology- to allow access so that all students learn. These strategies are inclusive and motivating for all students.</p> <p>3b) Develop lesson plans that include active inquiry lessons where students collect and interpret data using applicable science- and math-specific technology in order to develop concepts, understand scientific processes, relationships and natural patterns from empirical experiences. These plans provide for equitable achievement of science/math literacy for all students.</p> <p>3c) Plan fair and equitable assessment strategies to analyze student learning and to evaluate if the learning goals are met. Assessment strategies are designed to continuously evaluate preconceptions and ideas that students hold and the understandings that students have formulated.</p>	<p>Instructing and Engaging Students in Learning Assignment (edTPA Task 2)</p> <p>Classroom observations</p>

3d) In a science classroom, plan a learning environment and learning experiences for all students that demonstrate chemical safety, safety procedures, and the ethical treatment of living organisms within their licensure area.	Management and Safety Plan
<b>NSTA Standard 4: Safety</b>	
<p><b>Effective teachers of science can, in a P-12 classroom setting, demonstrate and maintain chemical safety, safety procedures, and the ethical treatment of living organisms needed in the P-12 science classroom appropriate to their area of licensure.</b></p> <p>Preservice teachers will:</p> <p>4a) Design activities in a P-12 classroom that demonstrate the safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used within their subject area science instruction.</p> <p>4b) Design and demonstrate activities in a P-12 classroom that demonstrate an ability to implement emergency procedures and the maintenance of safety equipment, policies and procedures that comply with established state and/or national guidelines. Candidates ensure safe science activities appropriate for the abilities of all students.</p> <p>4c) Design and demonstrate activities in a P-12 classroom that demonstrate ethical decision-making with respect to the treatment of all living organisms in and out of the classroom. They emphasize safe, humane, and ethical treatment of animals and comply with the legal restrictions on the collection, keeping, and use of living organisms.</p>	Management and Safety Plan Assignment
<b>NSTA/NCTM Standard 5: Impact on Student Learning</b>	
<p><b>Effective teachers provide evidence to show that P-12 students' understanding of major science/math concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach.</b></p> <p>Preservice teachers will:</p> <p>5a) Collect, organize, analyze, and reflect on diagnostic, formative and summative evidence of a change in mental functioning demonstrating that scientific knowledge is gained and/or corrected.</p> <p>5b) Provide data to show that P-12 students are able to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science.</p> <p>5c) Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.</p>	Assessing Student Learning Assignment (edTPA Task 3)
<b>NSTA/NCTM Standard 6: Professional Knowledge and Skills</b>	
<p><b>Effective teachers strive continuously to improve their knowledge and understanding of the ever changing knowledge base of both content, and pedagogy, including approaches for addressing inequities and inclusion for all students in math/ science. They identify with and conduct themselves as part of the math/science education community.</b></p> <p>Preservice teachers will:</p> <p>6a) Engage in professional development opportunities in their content field such as talks, symposiums, research opportunities, or projects within their community.</p>	Reflection Narrative

#### IV. COURSE ACTIVITIES/ASSIGNMENTS AND GRADING:

This course provides the school and teaching context for experiential learning. We intermingle time with the cohort with time in the practicum placement, learning from more experienced teachers and from adolescent students. The focus at this stage is on “adopting” one middle or high school science class, growing to know those students very well, initially co-teaching and eventually lead-teaching that class for several weeks. You may also coteach an additional class

and will complete an array of learning tasks during the (over) three class sessions that you are in the school placement.

<b>Evaluation Items:</b>	<b>SED 489</b>
<b>Management Safety Plan</b>	<b>10%</b>
<b>Curriculum Resources Assignment</b>	<b>5%</b>
<b>Lesson Planning</b>	<b>20%</b>
<b>Unit Plan</b>	<b>30%</b>
<b>Written Reflections</b>	<b>10%</b>
<b>Critical Incident Reflection</b>	
<b>Content Exam</b>	<b>15%</b>
<b>Reflective Narrative Rubric</b>	<b>10%</b>

**Final Grading:**

A= 90%-100%

B= 80%-89%

C < 80%

**V. PROFESSIONALISM:**

It is expected that candidate teachers will conduct themselves with the professionalism that is required of practicing teachers. Such professionalism includes effective and respectful collaboration and communication with colleagues, prompt attendance of all meetings and classes, moral behavior and actions, appropriate communication and sharing of materials and plans with the mentor teacher and university supervisor, appropriate professional dress (even on “casual days”), etc. **If, at any time, a student’s actions or attitudes are judged to be less than professional by a supervisor, mentor teacher, or school principal, appropriate remedial action will be taken. Such action may include the development of a plan for the student to complete by the end of the semester or the removal of the student from the experience. A student must have a satisfactory rating on professionalism to receive a passing grade.**

**Attendance Policy:**

Students will be expected to attend all class meetings and participate in group activities. The students in-class attendance will reflect in the class assignments and participation section of the course evaluation. Professional conduct requires that the student show respect for others. This includes coming to class on time, staying for the entire class period, and cooperating with colleagues in and outside of class. **In the event of an absence on a day you are to report to the school (field placement), candidates must inform their supervisor and collaborating teacher before the start of the school day for the day missed.** Any absences beyond agreed upon extenuating circumstances will be reflected as a deduction in the professionalism component and/or other components of your course grade.

**VII. ACADEMIC INTEGRITY:**

Every TAMUC student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an “informal ”resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct ’s minimum one semester suspension requirement.