Course Time & Location: 8-9:15am, Bush Math Building

Chrissy Cross, Ph.D. Science
Education/Curriculum & Instruction
Office: ECRC Room 209K
Office Hours: Anytime my door is open, by appointment or during office hours: 10-11 M-F
Office Phone: 936-468-2792
Email: crossc1@sfasu.edu

Mrs. Stacia Prince, MS Mathematics
Office: Bush Mathematics 103K (or 334)
Office Hours: 10:30 – 12:00 TR; 1:00 – 2:00 W; anytime my door is open or by appointment
Office Phone: 936-468-6262
Email: princes@sfasu.edu

Class meeting time and place: TR 8:00 – 9:15, Bush Mathematics Bldg. Room 123

Prerequisite: JTCH 1102 or permission of JacksTeach co-director

Course Description
Knowing and Learning in Mathematics and Science is intended to focus on knowing and learning in secondary mathematics and science as understood from a multidisciplinary perspective. This course is not simply a general survey of theories. Instead, the primary goal is to provide students with the opportunity to identify theories and employ these theories to guide their own practice. UTeach is committed to the idea that practice and theory build on each other. Any teaching practice is guided by some theory of how people learn. If students are not aware of this, they are likely to adopt teaching practices without considering the full implications of theory behind them. UTeach wants its students to be thoughtful and reflective practitioners.

SFASU Policy 5.4: The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or

2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students who wish to be successful should plan to spend at least two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

Program Learning Outcomes
The successful JacksTeach candidate will:
1. Demonstrate a deep understanding of and ability to apply STEM content and foundational pedagogical content knowledge through effective teaching in K-12 classrooms;
   (Texas Teacher Standards 1, 2, 3, 4; Texas PPR Standards I, IV; Texas Science Standards I-IV, VI, XI)
2. Develop an effective classroom management plan that creates a STEM classroom environment conducive to active learning and inquiry techniques, and supportive of individual and collaborative learning; (Texas Teacher Standards 1, 2, 4; Texas PPR Standards II, III; Texas Science Standards I-V, VII)
3. Use a variety of instructional strategies to meet the needs of all students and inspire STEM learners to develop curiosity about local and global issues and the connections to STEM, through the application of critical thinking, creativity, problem solving, and technology; (Texas Teacher Standards 1, 2, 4; Texas PPR Standards II, III; Texas Science Standards I-IV, VI-VII, XI)

4. Implement a variety of assessment techniques to monitor learner progress and guide adaptation of instructional plans; and (Texas Teacher Standards 3, 5; Texas PPR Standards I, III, IV; Texas Science Standards IV-V)

5. Exhibit a disposition toward continued learning and professional growth through the utilization of self-evaluation and research-based practices. (Texas Teacher Standards 5, 6; Texas PPR Standards I, IV; Texas Science Standards I-IV)

**Student Learning Outcomes**

After completing the required readings and participating in class activities, the prospective mathematics or science educator will be able to do the following:

1. Articulate various standards (e.g., Texas Essential Knowledge and Skills) for knowing science and mathematics and articulate the implications of these standards for assessment, especially standardized assessment. (PLO 1, 2, 3, 4)

2. Describe the various theories used to explain mathematical and scientific knowing and learning and be able to apply these approaches in understanding and structuring classroom practice. (PLO 1, 2, 3, 4)
   a. Use the clinical interview method to make sense of someone’s reasoning about a topic in mathematics or science.
   b. Articulate what it means to know and learn relative to cognitive structures and describe how what people know change and develops.
   c. Explore the affordances offered by various technologies in supporting knowing and learning in mathematics and science.

3. Identify sources of educational inequity (e.g., mismatches between students’ home cultures and school culture) and describe strategies for fostering learning environments that are equitable for all students (e.g., making expectations explicit). (PLO 1, 2, 3, 4)

4. Express informed opinions on current issues and tensions in education, especially as they relate to mathematics and science instruction. (PLO 1, 2, 3, 4, 5)

*A complete listing of all educator preparation standards this course meets and a list of the key assessments used for program accreditation purposes can be found at: [www.sfajacksteach.org](http://www.sfajacksteach.org)*

**Text and Materials**

*Reading Materials*

You will read articles from various journals and chapters from different books during this course. It is important to note that these materials are copyrighted and must be used in compliance with U.S. Copyright Law. Under that law, you may view these materials on your computer but these materials may not be saved to your computer, revised, copied, or distributed without permission. They are to be used in support of the instructional activities required by this course only and shall be limited to the duration of the course, unless otherwise specified by the instructor or owner of the material. You may download or print materials only at the direction of your instructor, who knows which materials are copyrighted and which are not.

*Data Storage*

You will be required to have and use two forms of electronic storage for major course assignments (e.g., a hard drive and a jump drive, or two jump drives, etc.). You should become accustomed to keeping and organizing the storage of a variety of materials related to teaching in your content area.

NOTE: Students must have access to a web browser, have access to a word processor, and have a university email account that they check daily.

**Central Course Topics**

These topics are not necessarily sequential.

- Procedural and Conceptual Understanding
- Assessment
- Learning Theories (e.g., Behaviorism, Cognitive, and Social Perspectives)
- Equity
Teaching Strategies
This course is an introduction to the ways an in-depth understanding of how people know and learn can be used to help make the teaching and learning of mathematics and science more effective. To be useful, such a course needs to be both practical—by providing concrete details and examples of knowing or learning and ways to make students’ thinking visible—and principled—by providing a basis in both evidence and theory to support the use of these practices and techniques.

With this in mind, this course is designed so that you will have an opportunity to experience how these different practices and techniques work, read the research literature that documents the effectiveness of these practices and outlines the rationale for using these techniques, and then apply what you have learned to a specific teaching or research context.

Expectations/Attendance
Because a majority of the learning in this course hinges on group work done during the class time, attendance is of utmost importance. Attendance and participation are crucial to this class. Attendance will be taken every class period. If an absence occurs, the missed work can be made up with no penalty if the absence is excused. Excused absences include documented illness, deaths in the immediate family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. In accordance with University policy, accommodations for these excused absences will be made in a way that does not penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

Regular attendance and active participation at all class sessions and in online assignments is required and will greatly enhance your ability to be successful. Regular attendance is expected with no more than one unexcused absence from class for the semester. You must provide, when possible, advance notice of absences as well as relevant documentation regarding absences to the instructor(s) as soon as possible following the illness or event that led to an absence. Regardless of whether an absence is excused or unexcused, you are responsible for making up all work that is missed. Participation in class includes, but is not limited to, coming to class prepared with the required assignments completed and engaging in thoughtful and reflective class discussion and activities. Violation of the attendance and participation policy will result in a grade reduction of 3 points from the final course grade per unexcused absence beyond the one “free” unexcused absence. Participation is assessed daily (see the Participation Rubric in the Grading/Evaluation section below).

Course Grades Summary
Course grades will be based on the assignments described above. Additional description for each assignment will be discussed in class and can be found in the course Blackboard website. The requirements will be weighed as follows.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Points</th>
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<tbody>
<tr>
<td>Creative Reflections (10 pts.)</td>
<td>260</td>
</tr>
<tr>
<td>Theorist Presentation (2 presentations - 50 points each)</td>
<td>100</td>
</tr>
<tr>
<td>Clinical Interview : Expert/novice interview</td>
<td>150</td>
</tr>
<tr>
<td>Lesson Design Enactment Evaluation</td>
<td>150</td>
</tr>
<tr>
<td>Final Exam</td>
<td>140</td>
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<tr>
<td>TOTAL</td>
<td>800</td>
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1. **Creative Reflections (10 points each)**
   Each week you will have an assigned reading that you will be required to read. Each week you will create an arts-based reflection on that reading. One of the most important parts of teaching is learning how to present information in succinct, creative, and novel formats, this weekly assignment will help build that skill. There are 26 reflections that will be submitted weekly to the dropbox in the module where it is assigned. These assignments cannot be made up and will serve as discussion material during the class Zoom session. Be prepared for the instructor to pull up your reflection and show it to the class and be ready to discuss what you created.

2. **Clinical Interview: Expert/Novice Interview**
   You will complete one clinical interview assignment in which you compare an expert’s and a novice’s knowledge and reasoning patterns. A clinical interview is an extensive process of formally interviewing a subject engaged in a problem-solving activity. You will record the interviews, transcribe them, and then analyze the activity using the theories introduced in class and supported by relevant academic literature.
   a. Choose partners – August 26
   b. Interview protocol turned in and approved by instructors – September 2
   c. Transcripts need to be uploaded by – September 9
   d. Data analysis – September 16
   e. Due date of Clinical Interview First Draft – September 23
   f. Due date of Clinical Interview Final Draft – October 5

3. **Theorist Presentation (2 presentations)**
   You will make a video between 5-7 minutes that describes the learning theory associated with the theorist you have chosen, create at least one STEM visual to show what that learning theory means, and then an example of a math/science lesson that would fit that learning theory, finally you will reflect on how that learning theory fits with you educational experiences. The link to your video will be posted on the assigned discussion board that matches your due date. If you are not presenting you are required to watch your peers videos every week and leave a comment/question in the discussion board that exhibits your critical thinking skills. Since the global COVID 19 pandemic began, teachers have had to shift their thinking and build skills in online learning formats, this assignment will help students build online teaching skills, and also take a deep dive into educational theorists and their ideas on knowing and learning.

4. **Lesson Design, Enactment, and Evaluation**
   After selecting a topic and learning objectives, pairs will design a whole class assessment of students’ knowledge of this topic to be administered before and after instruction. Findings from the literature and analysis of the pre-assessments will be used to design and teach in class an effective lesson that employs the learning theories discussed in the course. The paper created for this assignment will include the lesson plan, a rationale for the design of the plan using the relevant literature, the quantitative evaluation of the learning of the class with a discussion that employs the learning theories explored in the course, and a reflection on what was learned to inform future teaching. The purpose of this assignment is to investigate what is learned as a result of instruction, and these findings should be used to revise and explain students’ knowledge of teaching.
   a. Lesson Plan Draft – October 12
   b. Lesson Assessments/Rubrics – October 19
   c. In Class Lessons – November 2, 4
   d. Lesson Data Analysis – November 16
   e. Lesson Design Paper – November 30

5. **Final Exam – December 2**
   You will engage with questions central to the course readings and discussions in a formal, open-ended exam.

**Academic Integrity (4.1)**
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to
   (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class;
(2) the falsification or invention of any information, including citations, on an assigned exercise; and/or
(3) helping or attempting to help another in an act of cheating or plagiarism.

Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are
(1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another;
(2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and
(3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf

Withheld Grades Semester Grades Policy (5.5)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodation. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Mental Health and Wellness
SFA values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students' mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
SFA Counseling Services
www.sfasu.edu/counselingservices
Rusk Building, 3rd Floor
936.468.2401

SFA Human Services Counseling Clinic
www.sfasu.edu/humanservices/139.asp
Human Services, Room 202
936.468.1041

Crisis Resources:
Burke 24-hour crisis line: 1.800.392.8343
Suicide Prevention Lifeline: 1.800.273.TALK (8255)
Crisis Text Line: Text HELLO to 741-741