DIVISION OF ELEMENTARY & SECONDARY EDUCATION

Professional Education Program Proposal

COVER SHEET

Institution: University of Arkansas, Fayetteville **Date Submitted:** 10/30/20

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Name of program: STEM Education **CIP Code:** n/a

Degree or award level (B.S., M.A.T., graduate non-degree, etc.): non-degree

Indicate the title and grade range of the license for which candidates will be prepared:

Title: Chemistry **Grade Range:** 7-12

Proposal is for:

- ☐ **New First-Time Licensure Program** (Complete Section A)
- ☐ **New Educator Licensure Endorsement Program** (Complete Section B)
- ☑ **Revision(s) to Approved Licensure Program** (Complete Section C)
- ☐ **Deletion of Approved Licensure Program** (Complete Section D)

Indicate the portion of the proposed program to be delivered via Distance Learning Technology (online): 0 **%**

Proposed program starting date: Fall 2021

Will this program be offered at more than one site? ☐Yes ☑No

If yes, list the sites where the program will be offered:

Prior approval by AHECB is required for Arkansas public institutions and institutions certified under Ark. Code Ann. §6-61-301 to offer programs at off-campus sites.

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Proposed Revisions to an Existing Educator Licensure Program (Section C)

For Chemistry (7-12) Licensure

Introduction

The **STEM Education Program for Math, Science, Computer Science teacher licensure** is proposing several changes that are described here, expected to take into effect Fall 2021, for all five our licensure areas (mathematics, biology/life science, chemistry, physics, and computer science.) Our students currently get their degrees in a licensure area (except for Computer Science which follows a prescribed program of study not attached to a computer science degree), and take the prescribed courses to be recommended for teacher licensure. We are phasing out the name UAteach, which had been inspired by our affiliation with the UTeach model from the University of Texas, and our licensure programs of study will be under the umbrella name STEM Education.

2. Rationale for Major Revisions to Programs of Study

There are two main reasons driving our proposed changes to the current program.

a) *To increase flexibility allowing STEM majors other than math, biology, chemistry and physics to complete the program of study for licensure, and to simplify.*

We currently have approximately 20 degree plans filed with the state that lead to licensure through the UAteach program - *variations on math, biology, chemistry and physics degrees*. We would like to switch to the simpler approach of having one program of study for each of our 5 licensure areas (math, life science, chemistry, physics, and computer science) that specifies the required content courses that meet the Arkansas Educator Competencies, rather than require a degree in the licensure area. We accomplished this for Computer Science licensure when we applied for that in 2017, and would like to now accomplish this for the other 4 licensure areas. This would, for instance, give engineering, geology, or animal science majors an opportunity to get licensed to teach one of our 5 subjects areas if they complete the specified content courses that meet the educator competencies for licensure, as well as the education courses that meet the Arkansas Teaching Standards, TESS competencies, and reading awareness competencies. When individual departments change their requirements for the majors, we will not have to change our program of study because it will not be dependent on the full degree anymore. We fully expect that the vast majority of our students will complete a degree in their licensure area, but appreciate that we have a viable pathway for other majors to complete our licensure program in a content area by taking the specific content courses that we are specifying here as meeting the educator competencies. Furthermore, the 'downsizing' to 5 programs of study from the 20^{+} degree plans currently in place is appealing in itself.

b) *To implement strategic changes designed to increase enrollment, ensure that our program is cost effective and sustainable, and a valuable experience for future STEM teachers.*

A brief background: The UAteach program began in 2012, a grant-funded replication of the UTeach model from University of Texas. We completed the four-year implementation period in

2016. We now intend to take the best of the UTeach philosophy (recruiting STEM majors with engaging 1-2 credit hour introductory classes, early field experiences, leveraging the synergy and efficiency of preparing math, science, and computer science teachers in the same classes, offering a streamlined licensure program that fits into STEM majors' degree plans…) and incorporate it with what works best with existing structures at the University of Arkansas. The UTeach Institute has been informed that we will discontinue the use of the original name UAteach and that we are tweaking the original model, and they are fine with that – there is no obligation on our part to have any formal tie with the UTeach Institute, although we will certainly interact informally with them toward the common mission of preparing high quality math, science, and computer science teachers, and they still claim us as one of their successful replication sites.

Description of and rationale for changes:

- **To have 2 entry pathways into the program, with the intention of increasing our pool of potential teacher candidates, we will add another introductory course option (The Art of STEM Communication).** This course is designed to attract a wide variety of STEM majors, not necessarily future teachers, who value the importance of being able to effectively communicate complex STEM subjects and are interested in learning techniques from the discipline of education. We are hoping that this dynamic course will hook more STEM majors to become interested in teaching. However, after taking this course, if classroom teaching is not their career goal, yet they value knowledge about pedagogy and its usefulness in any career, they can continue in other courses (including most of the licensure program courses) to earn a newly proposed 9 credit hour certificate in STEM Education. If they are more interested in teaching but do not have enough room in their STEM degree for the entire licensure program, they can continue in our program courses to earn a minor in STEM Education, without getting the teaching license. We are sharing this to explain the motivation behind having 2 entry paths into the teacher licensure courses laid out in our programs of study. The new introductory course will include similar education content as our current 'Step 1' and 'Step 2' introductory classes, although taught more from a STEM professional perspective, than a classroom teacher perspective, and either entry path prepares students for the next course in the teacher licensure program.
- **To change both the practicum expectation and the credit hours for our existing introductory courses to better align instructor workload with university expectations.** The UTeach model designed the first two introductory classes as 1 credit hour courses in order to increase the likelihood that STEM majors could fit the course into their schedules. However, these 1 credit hour 'Step 1' and 'Step 2' courses are notorious for being much more work, for both student and instructors, than a typical 1 credit hour course due to the additional practicum component of the courses. To address this, we are removing the school practicum from the 'Step 1' ARSC 1201 course and keeping the school practicum in the 'Step 2' ARSC 1212 course, but changing the course to a 2 credit hour course to more accurately reflect the workload involved.
- **To revise curriculum to add specific subject area 'methods' classes (math methods, science methods),** that will be shared with the methods course in the Master of Arts in

Teaching program. This addresses one deficiency in the UTeach model – the lack of specific content methods courses (instead, both math and science majors took all courses together). It also is a move to efficiency and sustainability as both undergraduate and graduate math/science teacher ed programs have had low enrollment; combining the methods courses will help both programs. The math or science methods courses will take the place of the "Project-based Instruction" course that came from the UTeach model, and project/problem based learning will be covered as one of many strategies in the methods courses.

- **To add the requirement of a dedicated course for special needs content that includes strategies for teaching English Language Learners (CIED 4023, an existing course that other secondary ed programs use).** The UTeach model integrates special needs content throughout the courses, but a couple of the changes mentioned above will make it more difficult to accomplish this so we believe adding a special needs course will better prepare our students.
- **Course number and name changes, transition of program name:** The various changes described above necessitated an overall re-numbering of most courses and re-naming of some. The program name will eventually change to reflect more accurately the goals of a broader program that includes a certificate, minor, and complete pathway to teacher licensure.

3. Institutional Approval Process (required for major revisions)

a) Description of the University of Arkansas' educator preparation program approval process:

- University Teacher Education Board (approved September 2020)
- Provost

b) Provost will send document when approved.

4. Documentation of Revisions

4a. Changes to Curriculum

4a*i*. Original program of study approved 2012-2013 for Chemistry licensure and Proposed Revised Program of Study, with comparisons.

Several 120 credit hour degree plans (B.S. with different options, B.A.) were approved. Here is one of them with the required UAteach courses embedded within. All of these degree plans will be replaced with one program of study for Chemistry 7-12 licensure. A summary of the revised program of study is provided below, prior to the competency documents.

One original Chemistry degree plan from 2012-2013:

Chemistry B.A. with UAteach Program – Physical Science Licensure

Fall Semester Year 1
3 ENGL 1013 Composition I
4 MATH 2554 Calculus I or MATH 1203 (if required)
4 CHEM 1213/1211L Chemistry for Majors I or CHEM 1103/1101L University Chemistry I
3 Elementary II world language course numbered 1013
1 ARSC 1201 Inquiry Approaches to Teaching: UTeach Arkansas STEP I
15 Semester hours

Spring Semester Year 1
3 ENGL 1023 Composition II
4 MATH 2564 Calculus II or MATH 2554 or MATH1213 or 1284C(if needed)
4 CHEM 1223/1221L University Chemistry for Majors II or CHEM 1123/1121L University Chemistry II
3 Intermediate I world language course numbered 2003
1 ARSC 1221 Inquiry Based Lesson Design: UTeach Arkansas STEP II
15 Semester hours

Fall Semester Year 2
4 MATH 2564 Calculus 2 or MATH 2554 if needed
4 PHYS 2054/2050L University Physics I
4 CHEM 3603/3601L Organic Chemistry I
3 STEM 2103 Knowing and Learning in Science and Mathematics Instruction
15 Semester hours

Spring Semester Year 2
4 PHYS 2074 University Physics II
4 CHEM 3613/3611L Organic Chemistry II
4 MATH 2564 if needed OR University/state core fine arts/humanities/social science/history requirement
3 STEM 2203 Classroom Interactions in Science and Mathematics Instruction
14-15 Semester hours

CONTINUED from previous page: One original Chemistry degree plan from 2012-2013:

Fall Semester Year 3
4 CHEM 2263/2261L Analytical Chemistry Lecture & Lab
4 PHYS 2094 University Physics III
6 University/state core fine arts/humanities/social science/history requirements
3 CHEM 3273 Research Methods
17 Semester hours

Spring Semester Year 3
3 CHEM Upper level Chemistry course
3 CHEM 3813 Introduction to Biochemistry
9 University/state core fine arts/humanities/social science/history requirement
15 Semester hours

Fall Semester Year 4
3 STEM 3303 Project-based Instruction in Science and Mathematics
4 CHEM 3453/3451L Elements of Physical Chemistry
4 PHYS 3614 Modern Physics or ASTR 2003/2001L Survey of the Universe
6 University/state core fine arts/humanities/social science/history requirements
17 Semester hours

Spring Semester Year 4
9 STEM 4409 Clinical Supervised Teaching Internship
3 STEM 4333 Perspectives on Mathematics and Science
12 Semester hours

120-121 Total Hours

Changes specific to Chemistry program of study: Teacher candidates will take SEED 4003 Teaching Secondary Science instead of STEM 3303 Project-based Instruction. Required Chemistry content courses will be those specified in the competency matrix of Educator Competencies, rather than the entire Chemistry degree.

Proposed for New Program of Study: 21 credit hours of Education Coursework	**Description of Changes**
STEM 2003 Art of STEM Communication **Or** ARSC 1201 Intro to Teaching STEM Subjects & ARSC 1212 Field Experience in Teaching STEM Subjects	*Added an option for the introductory 'try out teaching STEM' course. Changed ARSC 1221 to a two-credit course (ARSC 1212) to reflect workload involved in practicum. New course names.*
STEM 2103 Knowing and Learning	*Added Foundations of Reading Competencies*
STEM 3203 Classroom Interactions	*Changed course number/upper level*
CIED 4023 Teaching in Secondary Inclusive Settings	*New requirement.*
SEED 4003 Teaching Secondary Science	*New requirement (in lieu of Project-based Instruction)*
STEM 4506 Supervised Clinical Teaching Internship	*Changed credit hours of internship from 9 to 6, in line with majority of other UA teacher ed programs*

Proposed for New Program of Study: Courses that meet Chemistry Competencies (see Competencies Matrix for course numbers and options)	**Description of Changes**
Chemistry I	*Students have been advised into these courses since 2012-13. SEED 4003 "Teaching Secondary Science" is a new requirement and appears on educator competencies as well as TESS and ATS as it supports all of them.*
Chemistry II	
Organic Chemistry I	
Organic Chemistry II	
Physical Chemistry	
CHEM 3273 Inquiry & Modeling in Science Education	
STEM 4333 History & Philosophy of Science for Science Teachers	
SEED 4003 Teaching Secondary Science	

4a*ii*. Revised Curriculum Matrix that shows course alignment with Arkansas Educator Competencies for Chemistry (7-12) Licensure.

Chemistry, Grades 7-12	**Course Alignment with DESE Content Competencies**							
	Univ. Chemistry I Or Chemistry for Majors I	Univ. Chemistry II or Or Chemistry for Majors II	Organic Chemistry I or Organic Chemistry for Majors I	Organic Chemistry II or Organic II for Majors II	Elements of Physical Chemistry or Physical Chemistry	Inquiry & Modeling in Science Education	History & Philosophy of Science for Science Teachers	Teaching Secondary Science
	CHEM 1103/1L or CHEM 1213/ 1L	**CHEM 1123/1L or CHEM 1223/1L**	**CHEM 3603/1L or CHEM 3703/1L**	**CHEM 3613/1L or CHEM 3713/1L**	**CHEM 3453/1L or CHEM 3504**	**CHEM 3273**	**STEM 4333**	**SEED 4003**
1. Central Concepts or Current Theories of Chemistry								
1.1	X	X						
1.2	X	X						
1.3	X	X						
1.4	X	X						
2. Principles of Chemistry								
2.1	X	X			X			
2.2	X	X						
2.3	X	X	X		X			
2.4	X	X			X			
3. Incorporate Crosscutting Concepts								
3.1	X	X	X					X
3.2	X		X					X
3.3	X							X
3.4	X							X
3.5	X							X
3.6	X		X	X				X

3.7	X							X
4. Incorporate Science and Engineering Practices								
4.0						X		X
5. Incorporate History and Nature of Science								
5.1						X	X	X
5.2						X	X	X
5.3						X	X	X
5.4						X	X	X
5.5						X	X	X
5.6						X	X	X
5.7						X	X	X
5.8						X	X	
6. Incorporate Mathematical Skills and Concepts Related to Physical Science								
6.1	X	X				X		
6.2	X	X				X		
6.3	X	X						
6.4	X	X						
6.5	X	X						
6.6	X	X						
7. Incorporate Disciplinary Literacy								
7.1	X	X				X	X	
7.2	X	X				X	X	
7.3	X	X	X	X	X	X	X	
7.4	X	X	X	X	X	X		
7.5	X	X	X	X	X	X		
7.6	X	X	X	X	X	X		
7.7	X	X	X	X	X	X	X	
7.8	X	X	X	X	X	X	X	
7.9	X	X				X		
7.10						X		

7.11						X		
7.12						X		
7.13						X		
7.14						X		
7.15						X		
7.16						X		
7.17						X		
7.18						X		
8. Incorporate Safety								
8.1	X	X				X		X
8.2	X	X				X		X
8.3	X	X				X		X
8.4								X
8.5								X
9. Integration of STEM (science, technology, engineering, and mathematics)								
9.1						X		X
9.2	X	X				X		X
9.3								X
9.4	X	X			X	X		X
9.5	X	X						X
9.6	X	X				X		X
9.7								X
9.8								X
9.9							X	X
9.10	X	X						X
9.11								X
Incorporate Principles of Engineering Design, Technology, and Applications of Science								
10.1								X
10.2								X
10.3						X		

10.4						X		
10.5								X
10.6								X
10.7								X
10.8						X		X

4a*iii*. Revised Curriculum Matrix that shows course alignment with Arkansas Teacher Standards.

All Licensure Areas		Course Alignment with Arkansas Teaching Standards - 2020 revision									
		*Includes Field Experience									
	New Course-STEM 2003 (Intro Option 1)	ARSC 1201 (intro Option #2 w/ ARSC 1212)	ARSC 1212* (intro Option #2 w/ ARSC 1201)	STEM 2103	STEM 3203*	New Course-STEM 4003* Science only	New Course-STEM 4303* (option 1) Math only	New Course-STEM 4313* (option 2) Math only	CATE 4073* CS only	New Course-CIED 4023	STEM 4506*
Standard #1 Learner Development	Art of STEM Communicaton	Intro to Teaching STEM Subjects	Field Experience InTeaching STEM Subjects	Knowing & Learning	Classroom Interactions	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Supervised Clinical Teaching Internship
Performances											
1 (a)					X	X	X	X	X	X	X
1 (b)		X	X		X	X	X	X	X	X	X
1 c)										X	X
Essential Knowledge											
1 (d)				X	X	X	X	X	X	X	X
1 (e)		X	X	X	X	X	X	X	X	X	X
1 (f)		X	X		X	X	X	X	X	X	X
1 (g)	X	X	X	X	X	X	X	X	X	X	X
Critical Dispositions											
1 (h)	X	X	X	X	X	X	X	X	X	X	X
1 (i)	X	X	X	X	X	X	X	X	X	X	X
1 (j)				X	X	X	X	X	X	X	X

1 (k)					X	X	X	X	X	X	X
Standard #2 Learning Differences	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
2 (a)					X	X	X	X	X	X	X
2 (b)					X	X	X	X	X	X	X
2 (c)					X	X	X	X	X	X	X
2 (d)	X	X	X		X	X	X	X	X	X	X
2 (e)					X	X	X	X	X	X	X
2 (f)										X	X
Essential Knowledge											
2 (g)				X	X	X	X	X	X	X	X
2 (h)				X	X	X	X	X	X	X	X
2 (i)					X	X	X	X	X	X	X
2 (j)	X	X	X	X	X	X	X	X	X	X	X
2 (k)				X	X	X	X	X	X	X	X
Critical Dispositions											
2 (l)				X	X	X	X	X	X	X	X
2 (m)	X	X	X	X	X	X	X	X	X	X	X
2 (n)	X	X	X		X	X	X	X	X	X	X
2 (o)					X	X	X	X	X	X	X
Standard #3 Learning Environments	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
3 (a)										X	X
3 (b)						X	X	X	X	X	X
3 (c)	X	X	X		X	X	X	X	X	X	X

3 (d)	X	X	X		X	X	X	X	X	X	X
3 (e)						X	X	X	X	X	X
3 (f)	X	X	X		X	X	X	X	X	X	X
3 (g)	X	X	X		X	X	X	X	X	X	X
3 (h)	X	X	X		x	X	X	X	X	X	X
Essential Knowledge											
3 (i)	X	X	X	X	X	X	X	X	X	X	X
3 (j)	X	X	X		X	X	X	X	X	X	X
3 (k)					X	X	X	X	X	X	X
3 (l)	X	X	X	X	X	X	X	X	X	X	X
3 (m)	X	X	X		X	X	X	X	X	X	X
Critical Dispositions											
3 (n)						X	X	X	X	X	X
3 (o)		X	X	X	X	X	X	X	X	X	X
3 (p)		X	X		X	X	X	X	X	X	X
3 (q)	X	X	X		X	X	X	X	X	X	X
3 (r)	X	X	X	X	X	X	X	X	X	X	X
Standard #4 Content Knowledge	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
4 (a)	X	X	X	X	X	X	X	X	X	X	X
4 (b)	X	X	X		X	X	X	X	X	X	X
4 (c)	X	X	X		X	X	X	X	X	X	X
4 (d)	X	X	X	X	X	X	X	X	X	X	X
4 (e)	X	X	X	X	X	X	X	X	X	X	X
4 (f)					X	X	X	X	X	X	X
4 (g)					X	X	X	X	X	X	X

4 (h)				X	X	X	X	X	X	X	X
4 (i)										X	X
Essential Knowledge											
4 (j)	X	X	X			X	X	X	X	X	X
4(k)	X	X	X	X	X	X	X	X	X	X	X
4 (l)	X	X	X		X	X	X	X	X	X	X
4 (m)	X	X		X	X	X	X	X	X	X	X
4 (n)					X	X	X	X	X	X	X
Critical Dispositions											
4 (o)	X	X	X	X	X	X	X	X	X	X	X
4 (p)	X	X	X		X	X	X	X	X	X	X
4 (q)	X	X	X		X	X	X	X	X	X	X
4 (r)				X	X	X	X	X	X	X	X
Standard #5 Application of Content	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
5 (a)						X	X	X	X	X	
5 (b)	X	X	X			X	X	X	X	X	
5 (c)					X	X	X	X	X	X	X
5 (d)	X	X				X	X	X	X	X	
5 (e)	X	X				X	X	X	X	X	
5 (f)						X	X	X	X	X	
5 (g)						X	X	X	X	X	
5 (h)				X		X	X	X	X	X	
Essential Knowledge											
5 (i)	X	X	X		X	X	X	X	X	X	X
5 (j)		X	X			X	X	X	X	X	X

5 (k)	X	X				X	X	X	X	X	X
5 (l)	X	X	X		X	X	X	X	X	X	X
5 (m)	X	X	X		X	X	X	X	X	X	X
5 (n)	X	X	X			X	X	X	X	X	X
5 (o)						X	X	X	X	X	X
5 (p)						X	X	X	X	X	X
Critical Dispositions											
5 (q)	X					X	X	X	X	X	X
5 (r)	X	X	X	X		X	X	X	X	X	X
5 (s)	X	X	X		X	X	X	X	X	X	X
Standard #6 Assessment	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
6 (a)					X	X	X	X	X	X	X
6 (b)	X		X		X	X	X	X	X	X	X
6 (c)										X	X
6 (d)										X	X
6 (e)	X	X	X		X	X	X	X	X	X	X
6 (f)					X	X	X	X	X	X	X
6 (g)										X	X
6 (h)										X	X
6 (i)										X	X
Essential Knowledge											
6 (j)			X	X	X	X	X	X	X	X	X
6 (k)				X	X	X	X	X	X	X	X
6 (l)				X	X	X	X	X	X	X	X
6 (m)				X						X	X

6 (n)				X	X	X	X	X	X	X	X
6 (o)										X	X
6 (p)										X	X
Critical Dispositions											
6 (q)				X						X	X
6 (r)					X	X	X	X	X	X	X
6 (s)										X	X
6 (t)					X	X	X	X	X	X	X
6 (u)										X	X
6 (v)				X						X	X
Standard #7 Planning for Instruction	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
7 (a)	X	X	X		X	X	X	X	X	X	*X*
7 (b)					X	X	X	X	X	X	*X*
7 (c)		X	X		X	X	X	X	X	X	*X*
7 (d)				X	X	X	X	X	X	X	*X*
7 (e)										X	X
7 (f)					X	X	X	X	X	X	X
Essential Knowledge											
7 (g)	X	X	X		X	X	X	X	X	X	X
7 (h)	X	X	X			X	X	X	X	X	X
7 (i)				X	X	X	X	X	X	X	X
7 (j)				X	X	X	X	X	X	X	X
7 (k)	X	X	X	X	X	X	X	X	X	X	X
7 (l)	X		X	X	X	X	X	X	X	X	X
7 (m)										X	X

Critical Dispositions											
7 (n)	X	X	X	X	X	X	X	X	X	X	X
7 (o)					X	X	X	X	X	X	X
7 (p)					X	X	X	X	X	X	X
7 (q)	X	X	X	X	X	X	X	X	X	X	X
Standard # 8 Instructional Strategies	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
8 (a)	X	X	X		*X*	X	X	X	X	X	X
8 (b)			X		*X*	X	X	X	X	X	X
8 (c)										X	X
8 (d)	X	X	X		*X*	X	X	X	X	X	X
8 (e)	X	X	X	X	X	X	X	X	X	X	X
8 (f)	X	X	X	X	X	X	X	X	X	X	X
8 (g)					X	X	X	X	X	X	X
8 (h)	X	X	X		X	X	X	X	X	X	X
8 (i)	X	X	X		X	X	X	X	X	X	X
Essential Knowledge											
8 (j)				X	X	X	X	X	X	X	X
8 (k)				X	X	X	X	X	X	X	X
8 (l)					X	X	X	X	X	X	X
8 (m)	X	X	X	X	X	X	X	X	X	X	X
8 (n)	X	X	X		X	X	X	X	X	X	X
8 (o)	X	X	X		X	X	X	X	X	X	X
Critical Dispositions											
8 (p)	X	X	X	X	X	X	X	X	X	X	X
8 (q)	X	X	X	X	X	X	X	X	X	X	X

8 (r)		X	X		X	X	X	X	X	X	X
8 (s)	X	X	X	X	X	X	X	X	X	X	X
Standard #9 Professional Learning and Ethical Practice	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											
9 (a)				X	X	X	X	X	X	*X*	*X*
9 (b)										*X*	*X*
9 (c)					X	X	X	X	X	*X*	*X*
9 (d)										*X*	*X*
9 (e)	X	X	X	X	X	X	X	X	X	X	X
9 (f)						X	X	X	X	X	X
Essential Knowledge											
9 (g)					X	X	X	X	X	X	X
9 (h)					X	X	X	X	X	X	X
9 (i)	X	X	X	X	X	X	X	X	X	X	X
9 (j)										X	X
9 (k)										X	X
Critical Dispositions											
9 (l)		X	X		X	X	X	X	X	X	X
9 (m)	X	X	X	X	X	X	X	X	X	X	X
9 (n)				X	X	X	X	X	X	X	X
9 (o)					X	X	X	X	X	X	X
Standard #10: Leadership and Collaboration	STEM Communication	Intro toTeaching	Field Exp. In Teaching	KL	CI	Science Teaching Methods	Teaching Sec. Math 1	Teaching Sec. Math 2	Teaching Programming	Inclusive Settings	Internship
Performances											

10 (a)										X	X
10 (b)										X	X
10 (c)										X	X
10 (d)										X	X
10 (e)										X	X
10 (f)										X	X
10 (g)										X	X
10 (h)										X	X
10 (i)										X	X
10 (j)										X	X
10 (k)										X	X
Essential Knowledge											
10 (l)										X	X
10 (m)				X						X	X
10 (n)					X	X	X	X	X	X	X
10 (o)						X	X	X	X	X	X
Critical Dispositions											
10 (p)										X	X
10 (q)										X	X
10 (r)										X	X
10 (s)										X	X
10(t)						X	X	X	X	X	X

4a*iv*. Revised Curriculum Matrix that shows course alignment with TESS Competencies.

	Course Alignment with Teacher Excellence and Support System								**2020**	**Revision**	
			***Includes Field Experience**								
Section I: Framework for Teaching	New Course-STEM 2003 (Intro Option #1)	ARSC 1201 (Intro Option #2 with ARSC 1212)	ARSC 1212* (Intro Option #2 with ARSC 1201)	STEM 2103	STEM 3203*	New Course-SEED 4003* Science only	New Course-SEED 4303* (Option 1) Math only	New Course-SEED 4313* (Option 2) Math only	CATE 4073* CS only	New Course-CIED 4023	STEM 4506*
Domain 1: Planning and Preparation	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	Knowing & Learning	Classroom Interactions	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Clinical Supervised Teaching Internship
1.a	X	X	X	X	X	X	X	X	X	X	X
1.b	X	X	X	X	X	X	X	X	X	X	X
1.c	X	X	X		X	X	X	X	X	X	X
1.d	X	X	X		X	X	X	X	X	X	X
1.e	X	X	X		X	X	X	X	X	X	X
1.f	X	X	X	X	X	X	X	X	X	X	X
Domain 2: The Classroom Environment	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
2.a	X	X	X	X	X	X	X	X	X	X	X

2.b	X	X	X	X	X	X	X	X	X	X	X
2.c	X	X	X	X	X	X	X	X	X	X	X
2.d	X	X	X	X	X	X	X	X	X	X	X
2.e						X	X	X	X	X	X
Domain 3: Instruction	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
3.a	X	X	X	X	X	X	X	X	X		X
3.b	X	X	X	X	X	X	X	X	X		X
3.c	X	X	X	X	X	X	X	X	X		X
3.d	X	X	X	X	X	X	X	X	X		X
3.e	X	X	X		X	X	X	X	X		X
Domain 4: Professional Responsibilities	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
4.a	X	X	X	X	X	X	X	X	X		X
4.b						X	X	X	X		X
4.c											X
4.d						X	X	X	X		X
4.e					X	X	X	X	X		X
4.f					X	X	X	X	X		X
Section II: Law and Process											

1. TESS Objectives	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
1.1					X						X
1.2					X						X
1.3											X
1.4											X
1.5											X
1.6											X
2. TESS Teacher Requirements	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
2.1											X
2.2											X
2.3											X
3. Framework for Teaching Design	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
3.1											X
3.2											X
3.3											X
3.4											X

4. TESS Evidence Collection	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
4.1											X
4.2											X
4.3											X
4.4											X
4.5											X
4.6											X
5. TESS Rubric Formula	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
5.1											X
6. Arkansas TESS Teacher Tracks	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
6.1											X
6.2											X
6.3											X
6.4											X
7. Professional Growth Plan	Art of STEM Communication	Intro to Teaching	Field Experience in	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary	Internship

		STEM Subjects	Teaching STEM Subjects							Inclusive Settings	
7.1											X
7.2											X
7.3											X
7.4											X
8. Mentor Process	Art of STEM Communication	Intro to Teaching STEM Subjects	Field Experience in Teaching STEM Subjects	KL	CI	Teaching Secondary Science	Teaching Secondary Math 1	Teaching Secondary Math 2	Teaching Programming	Teaching in Secondary Inclusive Settings	Internship
8.1											X
8.2											X
8.3											X
8.4											X

4a*v*. Syllabi for new education preparation courses and for the revised course that includes Science of Reading competencies.

Syllabi include:

New: STEM 2003 The Art of STEM Communication

New: STEM 4023 Teaching in Secondary Inclusive Settings

New: SEED 4003 Teaching Secondary Science

Revised: STEM 2103 Knowing & Learning in Science and Mathematics

STEM 2003 The Art of STEM Communication

If scientists can't communicate with the public, with policy makers, with one another, the future is going to be held back. We're not going to have the future that we could have -Alan Alda

Course Information

Department of Curriculum & Instruction; College of Education & Health Professions
Instructor; Office; Office Hours: Contact Information: Course Location TBA

Course Description

It is widely known that breakdown of communication contributes to mistrust and misunderstanding of the scientific enterprise. In this dynamic, interdisciplinary course including guest lectures, socio-scientific issues, and theatre-style methods, students will learn to communicate complex STEM topics clearly and effectively using research-based practices from the field of education.

Prerequisites This course is designed for STEM majors and minors.

Course Textbook and Materials

- Alda, A. (2017). *If I understood you, would I have this look on my face?* Random House.
- Olson, R. (2018). *Houston we have a narrative: Why science needs story*. University of Chicago Press.
- Additional assigned readings will be provided through class links or through Blackboard

Course Goals

Scientists, doctors, and engineers must be able to communicate clearly and persuasively the ideas and methods they use and generate. Likewise, critiquing and communicating ideas individually and in groups is an essential professional activity (Next Generation Science Standards *Science and Engineering Practices*, 2013). This course is designed to serve

multiple purposes: a) to engage STEM majors in learning to communicate science concepts effectively to lay audiences, both in writing and in oral communication, b) to critically analyze socio-political issues in science, articulate one's own viewpoint, and understand viewpoints of a diverse population c) to interest students in pursuing either a career in STEM education and completing the teacher licensure program for secondary math, biology, chemistry, physics, or computer science, OR continuing with 6-12 credit hours of coursework to earn either a certificate or a minor to acquire pedagogical knowledge that will enhance their value as communicators in any STEM career, d) meet General Education Learning Outcomes 1.1, 1.2, and 3.4c-e) meet a University Core social sciences requirement by considering how individuals, groups, and institutions interact with science and socio-scientific issues, and f) meet Arkansas Teaching Standards 2,4-8 and TESS Competencies 1a-f, 2a-d, 3a-e).

STEM is an acronym for Science, Technology, Engineering, and Mathematics. Although communication of science is the main focus of this course, and science is acknowledged as its own discipline, the use of the term STEM acknowledges the interdisciplinary aspects of science. Furthermore, with science as a human endeavor, this course reaches into the social sciences to fully understand the issues that surround it, and the need for STEM literacy and effective communication.

Course Objectives (Gen Ed Goals/learning outcome indicators are specified below)

I. Increase Understanding of the Societal Importance of STEM Literacy and the Need for Effective Communication of STEM Ideas

- What is STEM literacy? Who decides what people should know? Experts in STEM education and other STEM fields have gathered to form a consensus, although not without controversy, on what people should know and learn about science and mathematics in the K-12 schools in order to prepare a scientific and mathematically literate society. These ideas are spelled out in frameworks such as the Next Generation Science Standards, the Common Core Mathematics Standards, and variations of these at individual state levels. *Students will learn to identify the content and disciplinary practice standards addressed in the presentations they give, and be able to articulate how understanding these disciplinary practices contributes to STEM literacy.* (1.2c, 3.4e)

- Guest speakers including professionals from STEM disciplines, medical professions, journalism, political science, and statistics will discuss the nature of their work and communication methods unique to their discipline, in relation to STEM issues. STEM professionals will present their experiences of how their work is perceived by the public and the challenges that they have in promoting understanding of their work and the evidence that they provide. *Students will engage in discussion with these guest speakers, identify relevant communication skills, and reflect in writing.* (1.2a,b, Goal 3, 3.4c,d.)

- Socio-scientific and socio-political controversies such as vaccinations and climate change will be discussed with expectations that *students will justify their assertions with credible sources, and critically analyze others' assertions with fact-checking and evidence, particularly when they create their own STEM Talk presentations and write an article on a STEM issue.* (1.1d,e, 1.2a,b,e, 3.4c,d,e)

- What goes wrong when people do not have the prior knowledge to understand a STEM issue in society, or have misconceptions? How science is presented in the media and how the public perceives it will be examined with the purpose of *identifying where communication breaks down when misconceptions occur relating to science, and when beliefs are not based on scientific evidence*. *In addition to learning ways to connect what people already know with what you want them to know, students will learn strategies to address misconceptions/pre-conceptions/alternate conceptions.* (1.1a, 1.2a,c, 3.4c)

- Living in a multi-cultural, diverse society, what considerations will help ensure that all people can attain STEM literacy? What considerations will help communicate STEM information to a diverse audience? *Students will learn to enhance communication with a diverse audience, by increasing social and cultural awareness and empathy, and being attentive to common misconceptions.* (1.2a)

II. Learn Research-based Strategies for Communicating Complex STEM Information and Issues

(the strategies/objectives below support Learning Outcomes 1.1a-d, 1.2a-d, 3.4e)

- Organizing/outlining a verbal or written presentation to present ideas coherently
- Identifying the objectives of the information to be conveyed and evaluating at the end that your objectives have been met
- Assessing the audience's prior knowledge
- Engaging your audience; involving them and connecting with them to keep them engaged;
- Checking in with the audience to assess understanding along the way; using techniques to keep them attentive
- Using questioning techniques that help clarify thinking and generate critical thinking
- Breaking down complex material into 'bite-size' chunks
- Being aware of technical vocabulary and making it accessible to an audience
- Finding multiple ways to present an idea or concept, different representations, different angles of approach, that help deepen understanding and allows for connections between concepts
- Being aware of the diversity of the audience and responding accordingly to different perspectives
- Soliciting and incorporating feedback to improve writing and presentations
- Reflecting on presentations based on audience feedback with intent to improve future communication

III. Consider STEM Career Pathways

- Discussion of how the various STEM professions value effective communication, including medical professions, research scientists, and the teaching profession, may open up considerations of career options that promote STEM literacy*.

**Students who complete STEM 2003 may continue with program courses to earn a 9 credit hour Certificate in STEM Communication, a 15 credit hour Minor in Secondary STEM Education, or complete the full 26 credit hour program to earn teacher licensure in mathematics, biology, chemistry, physics, or computer science.*

Course Expectations

Participation and Attendance:
Students are expected to attend all classes to avoid missing essential information, experiences, and collaboration with groups/partners. Students will observe and learn from professionals in their field of study as well as develop and practice effective communication skills. Initial assignments will be conducted during class time; therefore, prompt and consistent attendance is critical for success in this class.

Assessments

In-class Effective Communication Activities: (1.1a,d, 1.2a,b,c,d)

Students will be involved in a variety of effective communication and improvisation activities during the course to hone their communication skills. These will include active/responsive listening, improv training, empathy, cultural responsiveness, science as story-telling/narrative, making thinking visible , breaking down complex concepts into chunks, use of models/visual aids to explain a phenomenon, etc. Students will reflect on these activities in their journals.

Journal Reflections: (1.1a, 1.2a,b, 3.4c)
Students will reflect on weekly guest speaker discussions, readings, and communication activities in a student journal. These reflections will include but are not limited to what they have learned about communication, what they can improve upon, and any takeaways that they deem necessary to acquire successful communication skills as a scientist, educator, or other professional. Students will write a total of 9 weekly journal entries, (300 words each). Every three weeks, students will summarize (500 words each) their weekly journal reflections which will include (a) an Aha moment (b) an improvement they made in their TED Talk/Video or other assignment, and (c) an important takeaway from the previous three weeks to help track their growth in thinking about STEM communication. *(total writing for all reflections 4200 words)*

Effective Written Communication Assignments: (1.1a-e, 1.2a-e, 3.4c-e)

Students will critically analyze two articles (written for a lay audience) on a STEM issue for their clarity, effectiveness of argument, and how they are evidence-based. (300 words x 2).

Students will write an article on a STEM issue (1500 words), designed for a newspaper or journal with a general public audience, that conveys complex scientific information in a clear and engaging way, and cites sources to ensure credibility. Peers will critique one another's articles, evaluating the credibility and use of scientific information, and authors will revise for final submission. *(total writing for 3 assignments 2100 words).*

2 STEM Talks (TED Talks): (1.1a-e, 1.2a-e, 3.4c-e)

Individual or pairs of students will conduct two 5-8 minute STEM (TED) Talks on a STEM topic of their choice, which they will develop and refine over several weeks. Students will research the topic to understand the complex and naturally-interdisciplinary nature of the issue and the multiple perspectives from which individuals approach issues related to the topic. They will create a written rough draft and present it through video. Students will upload STEM Talk #1 and #2 videos to the Blackboard discussion boards. Peers will comment on three videos based on a rubric looking for clarity and coherence of expression and presence of evidence. Students will refine their TED Talk based on comments and class discussions. They will present their final TED talks to the class and upload to Blackboard their final transcript (1000 words) and individual reflection papers (300 words) that address audience reaction, awareness of diversity of audience, and how the presentation could be improved. *(total writing 2600 words)*

Shark Tank: STEM Edition Final Presentation, Transcript, and Reflection (1.1a-e, 1.2a-e, 3.4c-e)

Students will work in groups of 2-3 to develop a Shark Tank-style pitch on a controversial STEM issue. (Shark Tank pitches can be of the same STEM issue but with different viewpoints.) Students will collect and organize information from multiple sources and disciplines to understand the complex and naturally-interdisciplinary nature of the issue and the multiple perspectives from which individuals approach the issue, vetting sources for credibility, and choose an argument to present with justification. They will create and administer a google form pre-assessment on the topic/issue to the class audience to gauge their prior knowledge, write a transcript of their presentation (1000 words), cite sources to back up arguments, and record a video of their presentation to upload to Blackboard discussion board. Students will comment on three other videos based on a rubric looking for clarity and coherence of expression and presence of evidence. Students will revise their transcript and refine their Shark Tank pitch based on feedback to prepare for the 5-8 minute final presentation to the class. They will collect feedback from the audience on clarity of presentation and how convinced the audience was by the evidence provided for the argument. Individual final reflections will be written (300 words) that addresses the audience reaction, awareness of diversity and responsiveness of audience, and how the presentation could be improved. Final transcript and reflection paper will be uploaded to Blackboard. *(total writing 1300 words)*

Assignments/Grading	**Points**	**Due Date**
Participation/Attendance (5 pts per class period)	150	
Weekly Journals - 9 entries	90	
Journal Reflection Summary #1	50	
Journal Reflection Summary #2	50	
Journal Reflection Summary #3	50	

STEM Talk #1 Transcript, Video, and Blackboard Comments/feedback
100
STEM Talk #1 Presentation, Final Transcript, and Reflection
100

STEM Talk #2 Video and Blackboard Comments
100
STEM Talk #2 Presentation, Final Transcript, and Reflection
100

Effective Written Communication Assignments:
Article Critique #1
50
Article Critique #2
50
Newspaper or Journal Article for General Public
150

Shark Tank: STEM Edition Initial Transcript, Feedback, and Video
100
Shark Tank: STEM Edition Final Presentation, Final Transcript, and Reflection
100

Total Points Possible
1240 points

Resources

National Research Council. 2013. *Next Generation Science Standards: For States, By States*. The National Academies Press.

CIED 4023. Teaching in Inclusive Secondary Settings (Su). 3 Hours.
This course is designed to prepare pre-service teachers to teach in inclusive classroom settings at the secondary level. Course content will focus on the ways in which exceptionality, specifically focused on high-incidence disabilities and culture, specifically focused on English language learners mediate the learning experiences of secondary level students.

College of Education
DEPARTMENT OF CURRICULUM AND INSTRUCTION
Special Education Program
"Scholar-Practitioner"

I. Program Affiliation: Curriculum and Instruction

Course Number and Title: CIED 4023 Teaching in Inclusive Secondary Settings

Catalog Description:

This course is designed to prepare secondary teachers to teach in inclusive secondary settings. Course content provides information about the various ways diversity mediates the instructor's curricular decisions and the learning experiences of secondary-level students. The course content will provide an overview of definitions of exceptionalities, legal basis for the education of individuals with exceptionalities in the United States, and strategies for designing and implementing interventions in secondary–level classrooms.

Instructor: Special Education Faculty

II. Relationship to Knowledge Base:

Basic Level (M.A.T.)
The Scholar-Practitioner Model at this level provides an introduction to instruction that accommodates diversity and provides a foundation for the developing professional. This course is one of the core courses required of students enrolling in the Secondary M.A. T. program.

III. Goal:

The goal of this course is to provide future scholar-practitioners with a knowledge base concerning the issues involved in the successful instruction of secondary–level students

IV. Competencies:

A. By the end of the course, the student will access, use, and/or generate knowledge by integrating theory and practice. ATS 1, 4, 5/ TESS 1, 3
B. Create an inclusive teaching environment that accommodates academic diversity among secondary-level students. ATS 2, 3 / TESS 1,2
C. Create an inclusive teaching environment that reflects evidence-based inclusive practices. ATS 6, 7, 8 / TESS 2, 3
D. Give examples of how to create collaborative relationships and empower communication within a classroom environment ATS 3 TESS 2
E. Give examples of how to create a responsive social environment conducive to student learning in secondary-level settings ATS 1,2,3,7 TESS 1,2,3
F. Give examples of how to create successful transitions to various educational/community settings ATS 2 TESS 1
G. Give examples of how to implement and monitor large and small group instruction ATS 2,3,6,7,8 TESS 1,2,3
H. Give examples of how to implement teaching strategies in the context of specific domains (e.g., reading, writing, spelling, mathematics) ATS 4,5,6,7,8 TESS 1,3

V. Content:

A. Understanding the foundations and fundamentals of special education (i.e., an overview of definitions of exceptionalities, legal basis for the education of individuals with exceptionalities in the United States) ATS 1,2 TESS 1
B. Creating an inclusive environment that supports students with exceptionalities ATS 2,3,6,7 TESS 1,2
C. Differentiating instruction for students with exceptionalities ATS 2,6,7,8 TESS 1,3
D. Give examples of how to select critical content in designing modifications. ATS 4,6,7 TESS 1,3
E. Give examples of how to build a learning community in the classroom. ATS 2,3 TESS 2
F. Give examples of how to assess and build upon student's background knowledge when designing curricula. ATS 2,4,6,7 TESS 1,3
G. Give examples of how to implement teaching strategies designed to be responsive to students' individual differences. ATS 2,6,7,8 TESS 1,3,
H. Give examples of how to enhance instruction by teaching cognitive and meta-cognitive strategies (i.e., teaching students how" to learn). ATS 1,6,7 TESS 1,3
I. Give examples of special education policies and procedures ATS 1,2 TESS 1

VI. Evaluation and Assignments

- Quizzes-Textbook Chapters (130 points)
- Assignment 1 Textbook Real World Assignment (60 points)
- Assignment 2 My 13th Winter Essay (60 points)
- Assignment 3 My 13th Winter Essay (60 points)
- Assignment 4 Textbook Real World Assignment(60 points)
- Assignment 5 Accessibility Checklist (30 points)
- Assignment 6 Journal Essay(120 points))

Quiz Information: Each student will have the option to complete two attempts on the quizzes for each of the assigned chapters.

This is an option--you do not have to complete the second attempt for each of the assigned chapters.

The reason for the option of taking a second attempt is to provide a second opportunity for students who do poorly on the first attempt.

Quiz 1 items will be generated randomly. The time slot is 1-hour.

If the student wishes to take the second attempt, attempt two test items will be generated randomly. However, there is a likelihood that some items from the first quiz will appear on the second attempt.

The higher grade will be entered in the grade book.

Information pertaining to the other assignments is located in the Weekly folders. Please view the Schedule to note the due dates per assignment.

VII. Syllabus Change:

The professor reserves the right to make changes as necessary to this syllabus. If changes are made, advance notification will be given to the class.

VIII. Grading Scale: Based upon a total of 520 points

93%100 %	A

85-92.9%	B
77%-84.9%	C
70%-76.9%	D
< 70%	F

IX. Due Dates:

Online courses take a lot of commitment and self-direction. Your ability to schedule your time well is instrumental in being successful in this class. You may follow the recommended reading/assignment schedule or work ahead at your own pace. Specific due dates for all work are noted on the syllabus. All assignments must be completed by the date due (before midnight). If assignments are not turned in by the due date the instructor reserves the option to not grade the assignment. Subsequently, you will receive a zero for that assignment.

X.

Required texts/readings:
Gargiulo, R. M. (2015). *Special education in contemporary society* (5th ed.). Thousand Oaks, CA: Sage.

Abeel, S. (2003). *My thirteenth winter: A memoir*. New York, NY: Scholastic.

Department of Curriculum and Instruction/UAteach Program
Introduction to Teaching Secondary Science
SEED 4003/5003
Fall 2020

Credit Hours:	3
Class Time:	Mondays 4:30-7:00pm
Class Location:	Peabody 307 and Remotely via Blackboard Collaborate Ultra
Instructor:	Dr. Stephen Burgin
Office:	312 Peabody Hall
Office Hours:	by appointment
Telephone:	
E-mail:	srburgin@uark.edu

Introduction

The main purpose of this course is to provide secondary science teacher candidates with experiences that will increase their knowledge of research-based approaches to the teaching of science (including but not limited to PBI) and that will boost their confidence regarding the ability to apply those approaches in public school settings in order to impact student learning. Numerous readings, assignments, and discussions will be designed in order to give you something practical that you can take from here into your future classrooms. It is up to you to take advantage of the opportunities this course will provide you as you grow professionally.

Recommended Text

Windschitl, M., Thompson, J., & Braaten, M. (2018). *Ambitious Science Teaching*. Boston, MA: Harvard Education Press. (9791682531624)

Required Readings (ONLINE)

Various chapters and articles from science education literature will be posted on Blackboard. It is your responsibility to access and read these resources prior to the class period where they will be discussed. These readings may be modified during the course of the semester.

Course Descriptions from Catalog

SEED 5003: Study of the methods and materials for teaching science. Includes philosophical, cognitive, and psychological dimensions of teaching science. The planning of instruction, microteaching, safety and liability issues, and the development of instructional materials are included.

SEED 4003: This teacher preparation course focuses on the integration of mathematics and science concepts in project-based lessons to model ways used by scientists, mathematicians, and engineers in addressing real world problems. Each student team will design and teach a project-based unit and evaluate its effectiveness in a secondary classroom.

Student Outcomes

At the conclusion of this course, the students will be able to:

- Access and utilize current research, theory, knowledge within science education (ATS 4, 5, 9; TESS Domain 1)
- Demonstrate an understanding and an ability to engage diverse students in science education practices (ATS 1, 2, 3, 7; TESS Domain 1)
- Write effective instructional objectives for secondary science utilizing the next generation of science standards (ATS 7; TESS Domain 1)
- Develop and implement written lesson plans for secondary science (ATS 3, 5, 7, 8; TESS Domains 1; 2; 3)
- Organize a short-term PBI unit of instruction for secondary science taking into account the cost of the materials needed (ATS 3, 5, 7, 8; TESS Domains 1, 2)
- Develop pre and post assessments to make sense of student learning in secondary science (ATS 5, 6, 7; TESS Domains 1, 3)

Field Teaching Experience

Preservice teachers (PSTs) in SEED 4003 are required to attain 8-10 hours of field experiences in local middle or secondary classrooms. PSTs in SEED 5003 Teaching Secondary Science are required to be in their field placement full time Tuesday through Friday except when otherwise notified.

Course Requirements & Assessment

1. Topic and Standards Identification (5%)

You will write a 1 page rationale that identifies the science topic or related science topics that your lesson plans/PBI unit plan will focus on. Additionally you will identify the associated Arkansas K-12 Science Standards.

2. Annotated Bibliography (15%)

Current journals provide an excellent source of ideas for your secondary science classroom. For this assignment, you will collect and review five articles (at least one of which must be from JRST) from the following journals: *Science Scope*, *The Science Teacher*, and the *Journal of Research in Science Teaching (JRST)*. If you find articles that you would like to review from another journal, please consult the instructor.

3. Lesson Plan 1 (Technology) (10%)

You will create a lesson plan (the first in your 3 lesson unit plan) that employs instructional technology in the context of your previously identified topic. For example, this lesson plan might rely on virtual models and/or simulations.

4. Unit Plan Outline/Overview (5%)

You will be writing an outline and overview for a 4-week project/problem-based unit that contains your three individual lesson plans and more.

5. Lesson Plan 2 (Inquiry) (10%)
You will create a lesson plan (the second in your 3 lesson unit plan) that employs a learning cycle for your students to learn about and participate in inquiry in the context of your previously identified topic. This lesson will also incorporate issues of safety in the science classroom.

6. Lesson Plan 3 (Socioscientific Issues) (10%)
You will create a lesson plan (the third in your 3 lesson unit plan) related to your previously identified topic in the context of a socioscientific issue (SSI). This will be a cross-disciplinary lesson in that it also must include social studies standards to be approved by Dr. Endacott. This lesson will also include the teaching of science in light of culturally relevant pedagogy and issues of social justice.

7. Grant Proposal (10%)
You will be writing a grant proposal that could be used to purchase supplies needed for the implementation of your PBI Unit Plan.

8. Scope and Sequence (20%)
You will be outlining an entire course of instruction for one academic year identifying where within that year your Unit Plan is located.

9. Project/Problem Based Unit Plan Presentations and Microteaching (15%)
Upon completion, you will be presenting your unit plan to your peers, and will teach a portion of one of your lessons to the class in a microteaching format.

Evaluation
Late assignments will be penalized

Grade Scale: 100-90 A; 89-80 B, 79-70 C, 69-60 D, 59-0 F

Attendance
Regular attendance is an important component to a course designed to help you develop into a teaching professional. After 2 absences you will need to meet with me during office hours to best determine how you will be able to successfully complete the course requirements.

Blackboard
Course materials and additional readings can be accessed through Blackboard at https://learn.uark.edu/

Knowing and Learning (STEM 2103)
Fall 2020

Course Description: This course examines theories of learning to provide a firm foundation for teaching, learning, and communicating within STEM disciplines. Drawing from scholarship in educational psychology and other disciplines, students explore implications for designing effective learning environments, the relationship between communication and learning, and how learning is influenced by culture.

This course, taught virtually or f2f, emphasizes the benefits of a social constructivist approach to teaching and learning so that students develop their own meaning and knowledge structures through experiences and interactions with others.

Prerequisites: None

Course Goals: The critical role of having caring and knowledgeable communicators in STEM fields can not be overemphasized. Professionals in all settings have a responsibility to ensure that learning and knowing occurs at appropriate levels of understanding depending on communication goals. The goal of this course is to use learning theory to develop a powerful tool kit of approaches to design learning environments and choose communication strategies that effectively engage learners to know and understand complex ideas in mathematics and science.

The work of such theorists as Piaget, Bruner, Ausubel, Vygotsky, as well as theories relating to motivation, memory, intelligence, and identity, among others, will be explored. Students will see that teaching practices as well as effective two-way communication are guided by theories of how people learn. With the premise that practice and theory build on each other, students will also come to understand that research in math and science education is ongoing as practice continues to be examined.

Course instruction will emphasize the following topics about what it means to learn and to know:

Learning Theories and Strategies

- To develop a working knowledge of foundational theories and their implications for effective two-way communication and effective teaching that minimizes barriers to the learners' understanding
- To articulate your own assumptions and beliefs about learning and knowing, subsequently recognizing and identifying barriers that inhibit effective teaching and learning situations.
- To examine impediments to learning such as learning disabilities and reading difficulties, and strategies that enable success.

Learning Environments

- To explore the unifying role of the teacher as a facilitator of learning
- To explore the role of learning environments on learning
- To explore the role of *affect* in learning and its implications for communicating effectively
- To compare and contrast the pros and cons of teacher vs student centered teaching/learning environments and how to appropriately incorporate both in instruction
- To explore how student and teacher mindsets affect the learning environment
  - To understand how culture influences learning and how knowledge of individual differences can be leveraged to improve learning

Course Objectives: At the conclusion of this course, students will have demonstrated knowledge of and abilities to do the following:

- Compare and contrast different learning theories, and identify practical applications of each.
- Construct models of knowing and learning to guide effective communication strategies and inform classroom instructional practices.
- Articulate what it means to know and learn relative to cognitive structures and describe how what people know changes and develops.
- Describe various paradigms for evaluating science and mathematics understanding.
- Articulate various standards for knowing science and mathematics, and articulate the implications of these standards for assessment, including standardized assessment.
- Use the clinical interview method to make sense of someone's reasoning about a topic in science or mathematics.
- Express informed opinions on current issues and tensions in education, especially as they relate to mathematics and science instruction.
- Evaluate and select appropriate technology to using best practices
- Acquire knowledge of disciplinary literacy in your content area, how to support secondary students in reading technical STEM text, and demonstrate awareness of the Foundations of Reading Competencies - foundational reading skills, reading comprehension strategies, assessment and instruction.

Key Assessments

- Clinical Interview
- Microteaching/ Theory Enactment
- Personal Learning Theory Reflection Paper
- ‘Science of Reading” and Disciplinary Literacy Assignment

4a*vi.* Changes to Common Assessments

- There are 2 changes to common assessments.
  1) Pedagogical competency will be demonstrated by using the TESS Summative (instead of PRAXIS Principles of Learning and Teaching 7-12).
  2) A new assessment will be used: Educators Disposition Assessment, administered during STEM 3203 and STEM 4506.

These assessments are provided below, with rubrics:

TESS Summative Assessment:

Intern Teacher:	**Date:**	**School:**
Observer:	**Grade:**	**Rotation / Observation #:**
Mentor:	**Subject:**	**Program: MAT or UAteach**

Domain 1: Planning and Preparation *To be completed from responses to questions before and after a lesson. Additional information may be obtained during classroom observation of teaching.*		
Score	*Key: 1=Ineffective 2=Progressing 3=Effective 4=Highly Effective* *See rubric for performance criteria: Rubric for Scoring*	
	a:	Demonstrating knowledge of content and pedagogy
	b:	Demonstrating knowledge of students
	c:	Selecting instructional outcomes
	d:	Demonstrating knowledge of resources
	e:	Designing coherent instruction
	f:	Assessing student learning

Key Proficient "Look Fors"	**Criteria**
Classroom Observation • Clear and accurate classroom explanation • Effective and accurate oral communication • Accurate answers to student questions • Feedback to students furthers learning • Interdisciplinary connections ***Teacher Lesson Plans/Interview*** • Reflect important concepts in discipline • Accommodate prerequisites concepts/skills • Intra-interdisciplinary connections • Appropriate mechanics in all oral and written communication	**a. Teacher is familiar with major concepts/skills of the subject he/she teaches. Familiar with connections between subject and other disciplines.** **- Knowledge of prerequisite relationships** **- Knowledge of content-related pedagogy** Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:
Teacher Lesson Plans/ Interview • Plans reflect information about students gathered formally and informally • Plans reflect student interests and needs	**b. Teacher demonstrates knowledge of students.** **- Knowledge of child and adolescent development** **- Knowledge of the learning process** **- Knowledge of students' skills, knowledge, and language proficiency** **- Knowledge of students' interest and cultural heritage** **- Knowledge of students with special needs**

• Participation in community cultural events documented/referenced • Designs or participates in opportunities for families	Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:
Teacher Lesson Plans/Interview Outcomes… • represent big ideas; • challenge students • connect to national, state, and local standards • reflect learning NOT doing • permit assessment (observable/measurable) • are differentiated for all students' needs • represent concepts/skills central to the discipline and related to those in other disciplines	**c. Teacher selects instructional outcomes.** **- Value, sequence, and alignment** **- Clarity** **- Balance** **- Suitability for diverse learners** Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:
Teacher Plans/Interviews • Utilizes several and differentiated resources • District-provided materials • Range of texts • Guest speakers • Internet resources • Materials provided by professional organizations • Teacher continuing professional education courses or professional groups • Community resources	**d. Teacher demonstrates knowledge of resources.** **- Resources for classroom use** **- Resources to extend content knowledge and pedagogy** **- Resources for students** Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:
Teacher Plans/Interviews • Structured lesson plan supports outcome and reflects important concepts and significant cognitive challenge • Indicates relationships to prior learning • Activities represent high-level thinking • Opportunities for student choice • Varied resources • Thoughtfully planned grouping	**Teacher designs coherent instruction.** **earning activities** **nstructional materials and resources** **nstructional groups** **esson and unit structure** Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:
Teacher Plans/Interviews • Assessments match outcomes and students • Expectations clearly defined • Develops appropriate strategies to monitor progress • Results guide future instruction	**Teacher assesses student learning.** **ongruent with instructional outcomes** **riteria and standards** **esign of formative assessments** **sed for Planning** Evidence from *Teacher Lesson Plan/Interview/ Preconference Responses*:

Domain 2: The Classroom Environment *To be completed during observation of a lesson* *(due to pandemic restrictions, evidence can include actions over a longer period of time)*		
Score	*Key: 1=Ineffective 2=Progressing 3=Effective 4=Highly Effective* *See rubric for performance criteria: Rubric for Scoring*	
	a:	Designing an environment of respect and report
	b:	Establishing a culture for learning
	c:	Managing classroom procedures

	d:	Managing student behavior
	e:	Organizing physical space

Criteria	Key "Look Fors"
Classroom Observation **a: Teacher interactions with students. Students' interactions with one another.**	
Evidence from classroom observations and follow-up interviews:	• Polite language and encouragement is used in each interaction between the students and teacher • Respect for students' background and their life situations • A caring environment is established including "we" statements to make students feel part of the group • Acknowledges and listens to each student thoughtfully
Classroom Observation **b: The importance of the content. Expectations of learning and achievement. Student pride in work.**	
Evidence from classroom observations and follow-up interviews:	• Teacher shares the lesson's learning goal and explains the lesson's purpose • Expectations are high and supported through positive voice and body language • Quality participation and work are expected and recognized • Effort and persistence are anticipated and acknowledged
Classroom Observation **c: Routines are clearly established to minimize loss of instructional time. Teacher has established procedures for group work making sure students understand what they are to do and how they are to accomplish it. There are clear procedures to manage transitions, distribution of materials and supplies.**	
Evidence from classroom observations and follow-up interviews:	• All routines function smoothly • Minimal or no loss of instructional time • Students are empowered to carry out the routines; they know what to do and where to proceed • Groups and/ or individuals productively work to meet the learning goal • Materials and supplies are handled smoothly and efficiently
Classroom Observation **d: Standards of conduct appear to be clear to students, and the teacher monitors student behavior against those standards. The teacher's response to student misbehavior is appropriate and respects the students' dignity.**	•
Evidence from classroom observations and follow-up interviews:	• Clear standards of conduct are stated and referred to during a lesson • Positive behavior is acknowledged • Preventative action is taken and clear consequences are established • Teacher remains fair and consistent • Teacher is constantly aware of student conduct
Classroom Observation **e: The classroom is safe, and learning is accessible to all students; the teacher ensures that the physical arrangement is appropriate to the learning activities. The teacher makes effective use of physical resources, including computer technology.**	• • Surroundings are appealing, suitable and facilitate learning

Evidence from classroom observations and follow-up interviews:	• The space is accessible and safe for all students • Physical resources including computer technology are effectively utilized by teacher and students

Domain 3: Instruction *To be completed during observation of a lesson* *(due to pandemic restrictions, evidence can include actions over a longer period of time)*		
Score	*Key: 1=Ineffective 2=Progressing 3=Effective 4=Highly Effective* *See rubric for performance criteria: Rubric for Scoring*	
	a:	Communicating with students
	b:	Using questioning and discussion techniques
	c:	Engaging students in learning
	d:	Using Assessment in Instruction
	e:	Demonstrating flexibility and responsiveness

Key Proficient "Look Fors"	**Criteria**
• Clarity of lesson purpose • Clear directions and procedures specific to lesson activities • Absence of content errors • Clear explanations of concepts • Students understand the content • Correct and imaginative use of language	*Classroom Observation* **a: Expectations for learning. Directions and procedures. Explanations of content.** Evidence from classroom observations and follow-up interviews:
• Questions of high cognitive challenge formulated by students • Questions of high cognitive challenge formulated by teacher • Questions with multiple correct answers • Multiple approaches to questions even when there is a single correct response • Effective use of student responses and ideas • Discussion with the teacher stepping out of the central, mediating role • High levels of student participation in discussion	*Classroom Observation* **b: Quality of questions. Discussion techniques. Student participation.** Evidence from classroom observations and follow-up interviews:
• Activities aligned with the goals of the lesson • Student enthusiasm, interest, thinking, problem-solving, etc.	*Classroom Observation* **c: Activities and assignments. Grouping of students. Instructional materials and resources. Structure and pacing.** Evidence from classroom observations and follow-up interviews:

• Learning tasks that require high-level student thinking • Learning tasks that are aligned with lesson objectives • Students actively "working" rather than watching while their teacher "works" • Suitable pacing of the lesson, neither dragging nor rushed • Time allowed for closure and student reflection	
• Teacher pays close attention to evidence of student understanding • Teacher poses specifically-created questions to elicit evidence of student understanding • Teacher circulates to monitor student learning and to offer feedback • Students assess their own work against established criteria • Teacher adjusts instruction in response to evidence of student understanding (or lack of it)	*Classroom Observation* **d: Assessment criteria. Monitoring of student learning. Feedback to students. Student self-assessment and monitoring of progress.** Evidence from classroom observations and follow-up interviews:
• Teacher incorporates student interests and events of the day into a lesson • Teacher makes visible adjustment in the face of students' lack of understanding • Teacher seizes on a "teachable moment"	*Classroom Observation* **e: Lesson adjustment. Response to students. Persistence.** Evidence from classroom observations and follow-up interviews:

Summary:

Domain 4: Professional Responsibilities		
Score	*Key: 1=Ineffective 2=Progressing 3=Effective 4=Highly Effective* *See rubric for performance criteria: Rubric for Scoring*	
	a:	Reflecting on teaching in terms of accuracy and use in further teaching
	b:	Maintaining accurate records
	c:	Communicating with families
	d:	Participating in a professional community
	e:	Developing and growing professionally
	f:	Demonstrating professionalism

Domain D: Teacher Professionalism	
Key Proficient "Look Fors"	**Criteria**
• Accurate reflections on a lesson • Citations of specific adjustments to practice, • Draws on a repertoire of strategies	**a. Reflecting on teaching.** **- Accuracy** **- Use in future teaching** Evidence from semester long observations:

Tracks student completion of assignments. Systems for measurement of student progress against instructional outcomes. Maintains accurate noninstructional records	**b. Maintaining accurate records** **- Student completion of assignments** **- Student progress in learning** **- Non-instructional records** Evidence from semester long observations:
• Frequent and culturally appropriate information sent home regarding the instructional • System measurement of program and student progress • Two-way communication between the teacher and families. • Frequent opportunities for families to engage in the learning process	**c. Communicating with families** **- Information about the instructional program** **- Information about individual students** **- Engagement of families in the instructional program** Evidence from semester long observations:
• Regular participation with colleagues to share and plan for student success • Regular participation in professional courses or communities that emphasize • Improving practice (i.e. Action Research) • Self-starting in classroom work. • Volunteers and supports school and community initiatives	**d. Participating in a professional community** **- Participating in a professional community** **- Involvement in a culture of professional inquiry** **- Service to the school** **- Participation in school and district projects** Evidence from semester long observations:
• Frequent attendance in courses/workshops; regular academic reading • Participation in learning networks with colleagues; • Regular sharing of feedback; accepts and acts on constructive criticism. • Participation in professional organizations supporting academic inquiry	**e. Growing and developing professionally** **- Enhancement of content knowledge and pedagogical skill** **- Receptivity to feedback from colleagues** **- Service to the profession** Evidence from semester long observations:
• Displays high standards of honesty, integrity, and confidentiality in interactions with colleague, students, and the public. • Actions demonstrate that students are the highest priority ensuring that all students have the opportunity to succeed. • Consistently fulfilling school district mandates regarding policies and procedures • Regular attendance and participation in team and faculty meetings. • Consistent and on time in attendance, • Professional dress and demeanor.	**f. Showing professionalism** **- Integrity and ethical conduct** **- Service to students** **- Advocacy** **- Decision making** **- Compliance with school and district regulations** Evidence from semester long observations:

TESS Summative Assessment RUBRIC

	Component	Ineffective	Progressing	Effective	Highly Effective
Domain 1: Planning & Instruction	*1a: Demonstrating knowledge of content and pedagogy*	Teacher's plans and practice display little knowledge of the content, prerequisite relationships between different aspects of the content, or of the instructional practices specific to that discipline.	Teacher's plans and practice reflect some awareness of the important concepts in the discipline, prerequisite relations between them and of the instructional practices specific to that discipline.	Teacher's plans and practice reflect solid knowledge of the content, prerequisite relations between important concepts and of the instructional practices specific to that discipline.	Teacher's plans and practice reflect extensive knowledge of the content and of the structure of the discipline. Teacher actively builds on knowledge of prerequisites and misconceptions when describing instruction or seeking causes for student misunderstanding.
	1b: Demonstrating knowledge of students	Teacher demonstrates little or no knowledge of students' backgrounds, cultures, skills, language proficiency, interests, and special needs, and does not seek such understanding.	Teacher indicates the importance of understanding students' backgrounds, cultures, skills, language proficiency, interests, and special needs, and attains this knowledge for the class as a whole.	Teacher actively seeks knowledge of students' backgrounds, cultures, skills, language proficiency, interests, and special needs, and attains this knowledge for groups of students.	Teacher actively seeks knowledge of students' backgrounds, cultures, skills, language proficiency, interests, and special needs from a variety of sources, and attains this knowledge for individual students.
	1c: Setting instructional outcomes	Instructional outcomes are unsuitable for students, represent trivial or low-level learning, or are stated only as activities. They do not permit viable methods of assessment.	Instructional outcomes are of moderate rigor and are suitable for some students, but consist of a combination of activities and goals, some of which permit viable methods of assessment. They reflect more than one type of learning, but there is little or no attempt at coordination or integration.	Instructional outcomes are stated as goals reflecting high-level learning and curriculum standards. They are suitable for most students in the class, represent different types of learning, and are capable of assessment. The outcomes reflect opportunities for coordination.	Instructional outcomes are stated as goals that can be assessed, reflecting rigorous learning and curriculum standards. They represent different types of content, offer opportunities for both coordination and integration, and take account of the needs of individual students.
	1d: Demonstrating knowledge of resources	Teacher demonstrates little or no familiarity with resources to enhance own knowledge, to use in teaching, or for students who need them. Teacher does not seek such knowledge	Teacher demonstrates some familiarity with resources available through the school or district to enhance own knowledge, to use in teaching, or for students who need them. Teacher does not seek to extend such knowledge	Teacher is fully aware of the resources available through the school or district to enhance own knowledge, to use in teaching, or for students who need them.	Teacher seeks out resources in and beyond the school or district in professional organizations, on the Internet, and in the community to enhance own knowledge, to use in teaching, and for students who need them.
	1e: Designing coherent instruction	The series of learning experiences are poorly aligned with the instructional outcomes and do not represent a coherent structure. They	The series of learning experiences demonstrates partial alignment with instructional outcomes, some of which are likely to engage students in significant learning. The lesson or unit	Teacher coordinates knowledge of content, of students, and of resources, to design a series of learning experiences aligned to instructional outcomes and suitable to groups of	Teacher coordinates knowledge of content, students, and resources to design learning experiences aligned to instructional outcomes, differentiated where appropriate for all students and significant learning. The lesson or unit's structure is clear and allows

		are suitable for only some students.	has a recognizable structure and reflects partial knowledge of students and resources.	students. The lesson or unit has a clear structure and is likely to engage students in significant learning.	for different pathways according to student needs.
	1f: Designing student assessments	Teacher's plan for assessing student learning contains no clear criteria or standards, is poorly aligned with the instructional outcomes, or is inappropriate to many students. The results of assessment have minimal impact on the design of future instruction.	Teacher's plan for student assessment is partially aligned with the instructional outcomes, without clear criteria, and inappropriate for at least some students. Teacher intends to use assessment results to plan for future instruction for the class as a whole.	Teacher's plan for student assessment is aligned with the instructional outcomes, using clear criteria, is appropriate to the needs of students. Teacher intends to use assessment results to plan for future instruction for groups of students.	Teacher's plan for student assessment is fully aligned with the instructional outcomes, with clear criteria and standards that show evidence of student contribution to their development. Assessment methodologies may have been adapted for individuals, and the teacher intends to use assessment results to plan future instruction for individual students.

	Component	**Ineffective**	**Progressing**	**Effective**	**Highly Effective**
Domain 2: The Classroom Environment	*2a: Creating an environment of respect and rapport*	Negativity, insensitivity to cultural backgrounds, sarcasm, and put-downs characterize interactions both between teacher and students, and among students.	Interactions, both between the teacher and students and among students, reflect only occasional insensitivity or lack of responsiveness to cultural or developmental differences among students.	Civility and respect characterize interactions, between teacher and students and among students. These reflect general caring, and are appropriate to the cultural and developmental differences among groups of students.	Students play an important role in ensuring positive interactions among students. Relationships between teacher and individual students are highly respectful, reflecting sensitivity to students' cultures and levels of development.
	2b: Establishing a culture for learning	Teacher displays little or no energy, and conveys low expectations for student achievement. The students themselves show little or no pride in their work.	Teacher's attempt to create a culture for learning is only partially successful. Teacher displays minimal commitment to the work and only moderate expectations for student achievement. Students themselves display little pride in their work.	The classroom culture is positive, and is characterized by high expectations for most students, genuine commitment to the work by both teacher and students, with students demonstrating pride in their work.	High levels of student energy and teacher passion for the subject create a culture for learning in which both students and teacher share a belief in the importance of the subject, and all students hold themselves to high standards of performance, initiating improvements to their work.
	2c: Managing classroom procedures	Much instructional time is lost due to inefficient classroom routines and procedures, for transitions, handling of supplies, and performance of non-instructional duties..	Some instructional time is lost due to only partially effective classroom routines and procedures, for transitions, handling of supplies, and performance of non-instructional duties.	Little instructional time is lost due to classroom routines and procedures, for transitions, handling of supplies, and performance of non-instructional duties, which occur smoothly.	Students contribute to the seamless operation of classroom routines and procedures, for transitions, handling of supplies, and performance of non-instructional duties.

	2d: Managing student behavior	There is no evidence that standards of conduct have been established, and little or no teacher monitoring of student behavior. Response to student misbehavior is repressive, or disrespectful of student dignity.	It appears that the teacher has made an effort to establish standards of conduct for students. Teacher tries, with uneven results, to monitor student behavior and respond to student misbehavior.	Standards of conduct appear to be clear to students, and the teacher monitors student behavior against those standards. Teacher response to student misbehavior is appropriate and respects the students' dignity.	Standards of conduct are clear, with evidence of student participation in setting them. Teacher's monitoring of student behavior is subtle and preventive, and teacher's response to student misbehavior is sensitive to individual student needs. Students take an active role in monitoring the standards of behavior.
	2e: Organizing physical space	The physical environment is unsafe, or some students don't have access to learning. There is poor alignment between the physical arrangement and the lesson activities.	The classroom is safe, and essential learning is accessible to most students, and the teacher's use of physical resources, including computer technology, is moderately effective. Teacher may attempt to modify the physical arrangement to suit learning activities, with partial success.	The classroom is safe, and learning is accessible to all students; teacher ensures that the physical arrangement is appropriate to the learning activities. Teacher makes effective use of physical resources, including computer technology.	The classroom is safe, and the physical environment ensures the learning of all students, including those with special needs. Students contribute to the use or adaptation of the physical environment to advance learning. Technology is used skillfully, as appropriate to the lesson.

	Component	**Ineffective**	**Progressing**	**Effective**	**Highly Effective**
Domain 3: Instruction	*3a: Communicating with students*	Expectations for learning, directions and procedures, and explanations of content are unclear or confusing to students. Teacher's use of language contains errors or is inappropriate to students' cultures or levels of development.	Expectations for learning, directions and procedures, and explanations of content are clarified after initial confusion; teacher's use of language is correct but may not be completely appropriate to students' cultures or levels of development.	Expectations for learning, directions and procedures, and explanations of content are clear to students. Communications are appropriate to students' cultures and levels of development	Expectations for learning, directions and procedures, and explanations of content are clear to students. Teacher's oral and written communication is clear and expressive, appropriate to students' cultures and levels of development, and anticipates possible student misconceptions.
	3b: Using questioning and discussion techniques	Teacher's questions are low-level or inappropriate, eliciting limited student participation, and recitation rather than discussion.	Some of the teacher's questions elicit a thoughtful response, but most are low-level, posed in rapid succession. Teacher' attempts to engage all students in the discussion are only partially successful.	Most of the teacher's questions elicit a thoughtful response, and the teacher allows sufficient time for students to answer. All students participate in the discussion, with the teacher stepping aside when appropriate.	Questions reflect high expectations and are culturally and developmentally appropriate. Students formulate many of the high-level questions and ensure that all voices are heard.
	3c: Engaging students in learning	Activities and assignments, materials, and groupings of students are inappropriate to the instructional outcomes, or students' cultures or levels of understanding, resulting in little	Activities and assignments, materials, and groupings of students are partially appropriate to the instructional outcomes, or students' cultures or levels of understanding, resulting in moderate intellectual engagement. The	Activities and assignments, materials, and groupings of students are fully appropriate to the instructional outcomes, and students' cultures and levels of understanding. All students are engaged in work of a high	Students are highly intellectually engaged throughout the lesson in significant learning, and make material contributions to the activities, student groupings, and materials. The lesson is adapted as needed to the needs of individuals, and the structure and pacing

		intellectual engagement. The lesson has no structure or is poorly paced.	lesson has a recognizable structure but is not fully maintained.	level of rigor. The lesson's structure is coherent, with appropriate pace.	allow for student reflection and closure.
	3d: Using Assessment in Instruction	Assessment is not used in instruction, either through students' awareness of the assessment criteria, monitoring of progress by teacher or students, or through feedback to students.	Assessment is occasionally used in instruction, through some monitoring of progress of learning by teacher and/or students. Feedback to students is uneven, and students are aware of only some of the assessment criteria used to evaluate their work.	Assessment is regularly used in instruction, through self-assessment by students, monitoring of progress of learning by teacher and/or students, and through high quality feedback to students. Students are fully aware of the assessment criteria used to evaluate their work.	Assessment is used in a sophisticated manner in instruction, through student involvement in establishing the assessment criteria, self-assessment by students and monitoring of progress by both students and teachers, and high quality feedback to students from a variety of sources.
	3e: Demonstrating flexibility and responsiveness	Teacher adheres to the instruction plan, even when a change would improve the lesson or of students' lack of interest. Teacher brushes aside student questions; when students experience difficulty, the teacher blames the students or their home environment.	Teacher attempts to modify the lesson when needed and to respond to student questions, with moderate success. Teacher accepts responsibility for student success, but has only a limited repertoire of strategies to draw upon.	Teacher promotes the successful learning of all students, making adjustments as needed to instruction plans and accommodating student questions, needs and interests.	Teacher seizes an opportunity to enhance learning, building on a spontaneous event or student interests. Teacher ensures the success of all students, using an extensive repertoire of instructional strategies.

	Component	**Ineffective**	**Progressing**	**Effective**	**Highly Effective**
Domain 4: Professional Responsibilities	*4a: Reflecting on Teaching*	Teacher does not accurately assess the effectiveness of the lesson, and has no ideas about how the lesson could be improved.	Teacher provides a partially accurate and objective description of the lesson, but does not cite specific evidence. Teacher makes only general suggestions as to how the lesson might be improved.	Teacher provides an accurate and objective description of the lesson, citing specific evidence. Teacher makes some specific suggestions as to how the lesson might be improved.	Teacher's reflection on the lesson is thoughtful and accurate, citing specific evidence. Teacher draws on an extensive repertoire to suggest alternative strategies and predicting the likely success of each.
	4b: Maintaining Accurate Records	Teacher's systems for maintaining both instructional and non-instructional records are either non-existent or in disarray, resulting in errors and confusion.	Teacher's systems for maintaining both instructional and non-instructional records are rudimentary and only partially successful.	Teacher's systems for maintaining both instructional and non-instructional records are accurate, efficient and successful.	Students contribute to the maintenance of the systems for maintaining both instructional and non-instructional records, which are accurate, efficient and successful

	4c: Communicating with Families	Teacher communication with families, about the instructional program, or about individual students, is sporadic or culturally inappropriate. Teacher makes no attempt to engage families in the instructional program.	Teacher adheres to school procedures for communicating with families and makes modest attempts to engage families in the instructional program but are not always appropriate to the cultures of those families.	Teacher communicates frequently with families and successfully engages them in the instructional program. Information to families about individual students is conveyed in a culturally appropriate manner.	Teacher's communication with families is frequent and sensitive to cultural traditions; students participate in the communication. Teacher successfully engages families in the instructional program; as appropriate.
	4d: Participating in a Professional Community	Teacher avoids participating in a professional community or in school and district events and projects; relationships with colleagues are negative or self-serving,	Teacher becomes involved in the professional community and in school and district events and projects when specifically asked; relationships with colleagues are cordial.	Teacher participates actively the professional community, and in school and district events and projects, and maintains positive and productive relationships with colleagues.	Teacher makes a substantial contribution to the professional community, to school and district events and projects, and assumes a leadership role among the faculty.
	4e: Growing and Developing Professionally	Teacher does not participate in professional development activities, and makes no effort to share knowledge with colleagues. Teacher is resistant to feedback from supervisors or colleagues.	Teacher participates in professional development activities that are convenient or are required, and makes limited contributions to the profession. Teacher accepts, with some reluctance, feedback from supervisors and colleagues.	Teacher seeks out opportunities for professional development based on an individual assessment of need, and actively shares expertise with others. Teacher welcomes feedback from supervisors and colleagues.	Teacher actively pursues professional development opportunities, and initiates activities to contribute to the profession In addition, teacher seeks out feedback from supervisors and colleagues.
	4f: Demonstrating Professionalism	Teacher has little sense of ethics and professionalism, and contributes to practices that are self-serving or harmful to students. Teacher fails to comply with school and district regulations and timelines.	Teacher is honest and well-intentioned in serving students and contributing to decisions in the school, but teacher's attempts to serve students are limited. Teacher complies minimally with school and district regulations, doing just enough to "get by."	Teacher displays a high level of ethics and professionalism in dealings with both students and colleagues, and complies fully and voluntarily with school and district regulations. Teacher complies fully with school and district regulations.	Teacher is proactive and assumes a leadership role in ensuring the highest ethical standards, and seeing that school practices and procedures ensure that all students, particularly those traditionally underserved, are honored in the school. Teacher takes a leadership role in seeing that colleagues comply with school and district regulations.

Educators Disposition Assessment:

Educator Disposition Assessment

Name:		Date:	
Evaluator:			

Directions: Please use the following numbers to rate the teacher candidate on each of the 9 dispositions based on the following scale by marking (or highlighting) the corresponding number in the cell.

0-Needs Improvement: minimal evidence of understanding and commitment to the disposition
1-Developing: some evidence of understanding and commitment to the disposition
2-Meets Expectations: considerable evidence of understanding and commitment to the disposition

Indicators for each disposition are found in the cells. Please mark/highlight the associated indicators (bullets) in each cell that apply to the teacher candidate. (Note. It is both possible and likely you will mark/highlight indicators in multiple cells for each disposition.) Scores for each of the nine dispositions will be averaged to calculate an overall composite score. Lastly, please add comments at the bottom of this page to support ratings as needed.

1. Disposition:Demonstrates Effective Oral Communication Skills		
Associated Indicators		
Needs Improvement 0	**Developing 1**	**Meets Expectations 2**
• Does not consistently demonstrate professional oral communication skills as evidenced by making *major* errors in language, grammar, and word choice ○ • Does not vary oral communication to motivate students as evidenced by monotone voice with visible lack of student participation ○	• Demonstrates professional oral communication skills as evidenced by using appropriate language, grammar, and word choice for the learning environment, yet makes some common and noticeable errors ○ • Strives to vary oral communication as evidenced of some students demonstrating a lack of participation ○	• Demonstrates strong professional oral communication skills as evidenced by using appropriate language, grammar, and word choice for the learning environment ○ • Varies oral communication as evidenced by encouraging participatory behaviors

• Choice of vocabulary is either too difficult or too simplistic	• Occasionally uses vocabulary that is either too difficult or too simplistic	○ • Communicates at an age appropriate level as evidenced by explaining content specific vocabulary

2. Disposition: Demonstrates Effective Written Communication Skills		
Associated Indicators		
Needs Improvement 0	**Developing 1**	**Meets Expectations 2**
• Communicates in tones that are harsh or negative as evidenced by fostering negative responses ○ • Demonstrates *major* spelling and grammar errors or demonstrates frequent common mistakes	• Communicates respectfully and positively but with some detectable negative undertones, evidenced by unproductive responses ○ • Demonstrates *common* errors in spelling and grammar	• Communicates respectfully and positively with all stakeholders as evidenced by fostering conventional responses ○ • Demonstrates precise spelling and grammar

3. Disposition: Demonstrates professionalism Danielson: 4f; InTASC: 9(o)		
Associated Indicators		
Needs Improvement 0	**Developing 1**	**Meets Expectations 2**
• Does not respond to *communications* and does not submit all assignments ○ • Fails to exhibit punctuality and/or attendance ○ • Crosses *major* boundaries of ethical standards of practice ○ • Divulges inappropriate *personal* life issues at the classroom/workplace as evidenced by uncomfortable responses from others ○	• Delayed response to *communications* and late submission of assignments ○ • Not consistently punctual and/or has absences ○ • Crosses *minor* boundaries of ethical standards of practice ○ • Occasionally divulges *inappropriate* personal life issues into the classroom/workplace, but this is kept to a minimum ○ • Functions as a collaborative group member as evidenced	• Responds promptly to *communications* and submits all assignments ○ • Consistently exhibits punctuality and attendance ○ • Maintains professional boundaries of ethical standards of practice ○ • Keeps *inappropriate* personal life issues out of classroom/workplace ○ • Functions as a collaborative group member as evidenced by high levels of

• Functions as a group member with no participation	by minimal levels of participation towards productive outcomes or monopolizes conversation	participation towards productive outcomes

4. Disposition: Demonstrates a positive and enthusiastic attitude Marzano: 29		
Associated Indicators		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Often complains when encountering problems and rarely offers solutions ○ • Resists change and appears offended when suggestions are made to try new ideas/activities ○ • Demonstrates a flattened affect as evidenced by lack of expressive gestures and vocal expressions	• Seeks solutions to problems with prompting ○ • May tentatively try new ideas/activities that are suggested yet is often unsure of how to proceed ○ • Overlooks opportunities to demonstrate positive affect	• Actively seeks solutions to problems without prompting or complaining ○ • Tries new ideas/activities that are suggested ○ • Demonstrates an appropriately positive affect with students as evidenced by verbal and non-verbal cues

5. Disposition: Demonstrates preparedness in teaching and learning Danielson: 1e, 3e, 4a; InTASC: 3(p)		
Associated Indicators		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Rejects constructive feedback as evidenced by no implementation of feedback ○ • Possesses an inaccurate perception of teaching/learning effectiveness as evidenced by limited concept of how to improve ○ • Comes to class unplanned and without needed materials ○ • Does not have awareness to alter lessons in progress as	• Somewhat resistant to constructive feedback as evidenced by a lack of follow through on some suggestions ○ • Reflection contains inaccuracies as evidenced by needing assistance for corrective measures of improvement ○ • Comes to class with some plans and most needed materials	• Accepts constructive feedback as evidenced by implementation of feedback as needed ○ • Learns and adjusts from experience and reflection as evidenced by improvements in performance ○ • Comes to class planned and with all needed materials ○

evidenced by activating no changes when needed	○ • Aware that lesson is not working but does not know how to alter plans to adjust	• Alters lessons in progress when needed as evidenced by ability to change plan mid-lesson to overcome the deficits

6. Disposition: Exhibits an appreciation of and value for cultural and academic diversity Danielson: 1b, 2a, 2b; Marzano: 36, 39; InTASC: 2(m), 2(n), 2(o), 3(o), 9(m), 10(q)		
Associated Indicator		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Demonstrates inequitable embracement of all *diversities* ○ • Is challenged to create a *safe classroom* as evidenced by ignoring *negative* behaviors by students	• Goes through the *expected and superficial motions* to embrace all *diversities* ○ • Strives to build a *safe classroom* with zero tolerance of *negative* behaviors towards others but needs further development in accomplishing this task	• Embraces all *diversities* as evidenced by implementing *inclusive activities and behaviors* with goals of *transcendence* ○ • Creates a *safe classroom* with zero tolerance of negativity to others as evidenced by correcting *negative* student behaviors

7. Disposition: Collaborates effectively with stakeholders Danielson: 4c, 4d; Marzano: 55, 56; InTASC: 1(k), 3(n), 3(q), 7(o)		
Associated Indicator		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Is inflexible, as evidenced by inability to work well with others and does not accept majority consensus ○ • Tone exhibits a general lack of respect for others as evidenced by interruptions and talking over others ○ • Rarely collaborates or shares strategies and ideas even when prompted	• Demonstrates some flexibility ○ • Maintains a respectful tone in most circumstances but is not consistent ○ • Shares teaching strategies as evidenced by some effort towards collaboration	• Demonstrates flexibility as evidenced by providing considered responses and accepts majority consensus ○ • Maintains a respectful tone at all times, even during dissent as evidenced by not interrupting or talking over others ○ • Proactively shares teaching strategies as evidenced by productive collaboration

8. Disposition: Demonstrates self-regulated learner behaviors/takes initiative Danielson: 4e; Marzano: 57; InTASC: 9(l), 9(n), 10(r), 10(t)		
Associated Indicators		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Is unable to self-correct own weaknesses as evidenced by not asking for support or overuse of requests for support ○ • Does not conduct appropriate research to guide the implementation of effective teaching as evidenced by a lack of citations in work	• Is beginning to recognize own weaknesses and asks for support making some effort to become involved in professional growth ○ • Level of research needs further development to acquire fully and integrate resources leading to implementing different and effective teaching styles	• Recognizes own weaknesses as evidenced by seeking solutions before asking for support ○ • Researches and implements most effective teaching styles as evidenced by citing works submitted

9. Disposition: Exhibits the social and emotional intelligence to promote personal and educational goals/stability (Marzano: 37, 38)		
Associated Indicators		
Needs Improvement **0**	**Developing** **1**	**Meets Expectations** **2**
• Demonstrates immaturity and lack of self-regulation as evidenced by overreacting to sensitive issues ○ • Does not demonstrate perseverance and resilience (grit) as evidenced by giving up easily ○ • Demonstrates insensitivity to feelings of others as evidenced by a lack of compassion and empathetic social awareness	• Demonstrates level of maturity to self–regulate after initial response is one of overreaction to sensitive issues ○ • Demonstrates perseverance and resilience (grit) most of the time ○ • Demonstrates sensitivity to feelings of others most of the time	• Demonstrates appropriate maturity and self-regulation as evidenced by remaining calm when discussing sensitive issues ○ • Demonstrates perseverance and resilience (grit) as evidenced by tenacious and determined ability to persist through tough situations ○ • Demonstrates sensitivity to feelings of others as evidenced by compassionate and empathetic social awareness

AVERAGE COMPOSITE SCORE ACROSS NINE DISPOSITIONS:

COMMENTS:

4avii. Revisions to Field Experience

The practicum component of ARSC 1201 *Inquiry Approach to Teaching (re-named Introduction to Teaching STEM Subjects)* will be eliminated for reasons described earlier. The course STEM 3303 Project-based Instruction course, which had a practicum component, is being eliminated. It is being replaced with subject area methods courses during which the students will have an equivalent practicum experience to that in the eliminated course. The clinical supervised teaching internship has always encompassed the entire university semester, thus it meets current DESE requirements.

Here is a summary table of all field experience in the revised program.

Summary of Field Experiences		
	Grade Levels	**Time in mentor teacher's classroom**
ARSC 1212 Field Experience in Teaching STEM Subjects	**Grades 7-8**	**6 hours**
STEM 2103 Knowing & Learning	**Grades 7-12**	**2 hours**
STEM 3203 Classroom Interactions	**Grades 9-12**	**6 hours**
SEED 4003 Teaching Secondary Science **Or** **SEED 4303 Teaching Secondary Mathematics** **Or** **CATE 4073 Teaching Programming**	**Grades 7-12**	**8-10 hours**
STEM 4506 **Clinical Supervised Teaching Internship**	**2 internship rotations:** **Grades 7-8** **Grades 9-12**	**16 weeks total; all day (approximate split of 6 and 10 weeks with longer rotation for intern's preferred level)**

4b, 4c. Not applicable/No Changes

5. Transition Plan

Three changes cause a need for a transition plan:

- Change of ARSC 1221 to a 2 credit course ARSC 1212 (to reflect workload of practicum). Students who take the original one credit hour course during 2020-21 will have that course substituted for the revised 2 credit course.
- Elimination of STEM 3303 in favor of students taking MAT math or science methods course. We have already been cross-listing STEM 3303 with the MAT math and science

methods courses, offering combined sections of undergrad and graduate, so in essence, this change has already been made. By fall 2021, the undergraduate versions of these courses, STEM 4003 *Science Methods* and STEM 4303 *Math Methods,* will be approved so our new 2020-21 cohort will be taking them with the new course numbers.

- CIED 4023 Teaching in Inclusive Settings is a new requirement. The students enrolled in STEM 2103 (the course in which we get students to start the application process to our program through UA Office of Teacher Education) in fall 2021 will primarily define the cohort of teacher candidates who will be required to take this course and abide completely by the revised program, although any student who completed ARSC 1201 prior to Fall 2020 and was advised in the original program will still abide by earlier requirements.

Thank you for reviewing our proposed revisions!