Table of Contents

[1. Needs Summary 1](#_Toc482195410)

[2. Program Description 2](#_Toc482195411)

[2A. General Description of the Program 2](#_Toc482195412)

[2B. Proposed Program of Study for Computer Science 2](#_Toc482195413)

[2C. Curriculum Matrices 4](#_Toc482195414)

[2C.i. Curriculum Matrix Aligning Education Courses with Arkansas Teaching Standards 21](#_Toc482195415)

[2C.i.i. Curriculum Matrix Aligning Content Courses with Computer Science Competencies 35](#_Toc482195416)

[2.D Tess Matrix 41](#_Toc482195417)

[2.D.i Competencies for Teacher Excellence and Support System 46](#_Toc482195418)

[2E. Course Syllabi for all Courses listed in the Program of Study 57](#_Toc482195419)

[2E.i. Syllabi for Professional Education Courses, supporting Arkansas Teacher Standards and TESS Competencies 57](#_Toc482195420)

[2E.i.i. Syllabi for Professional Education Courses, supporting Arkansas Teacher Standards and TESS Competencies 109](#_Toc482195421)

[2Ei.i.i. Syllabi for Courses supporting the Computer Science Competencies 147](#_Toc482195422)

[2E.i.i.i.i Elective Content Courses 161](#_Toc482195423)

[2F. Teacher Candidate Competencies for Knowledge and Use of Educational Technology 180](#_Toc482195424)

[2G. Common Assessments Required in the Program 181](#_Toc482195425)

[2Gi. Samples of Assessments and Rubrics 181](#_Toc482195426)

[2Gi.5 Sample Assessments from Computer Science Courses and UAteach Research Methods 250](#_Toc482195427)

[2Gi.5a CSCE 2004: Programming Foundations I, Programming Assignment & Rubric 250](#_Toc482195428)

[4Gi.5b CSCE 2014: Programming Foundations II, Programming Assignment & Rubric 254](#_Toc482195429)

[4Gi.5c CSCE 2114: Digital Design, Programming Assignment 256](#_Toc482195430)

[2Gii. Relative Placing where Assessments occur throughout the Program 269](#_Toc482195431)

[2Gii.1 Pre-licensure Checklist (includes suggested times for completing Praxis requirements) 269](#_Toc482195432)

[2Gii.2 The UAteach courses with the assessments mentioned above occur approximately in this timeframe (students with fewer than4 years may double up on certain courses.) 271](#_Toc482195433)

[2Giii. How Assessment Data will be Collected and used for Program Improvement. 271](#_Toc482195434)

[2H. Field Experience: Course Practicums and Semester Internship 271](#_Toc482195435)

# 1. Needs Summary

Rationale for Computer Science Education **Program of Study** at University of Arkansas

In support of Governor Hutchison’s initiative for K-12 students in Arkansas to become computer literate and to have the opportunity to learn computer programming and consider computer science as a viable career path, the University of Arkansas UAteach program would like to play an important part in this initiative by preparing future Computer Science teachers. We are proposing a new program of study that leads to initial teacher licensure in Computer Science (grades 4-12). Since the State of Arkansas added Computer Science as an initial licensure area in 2015, Arkansas Tech has had a Computer Science licensure program of study approved by the state, and Henderson State and Hendrix are in the application process. We believe that the state’s flagship university should be next!

Since 2012, the UAteach program has been preparing secondary math and science pre-service teachers, who earn a bachelor’s degree in their content area, a minor in secondary education through the UAteach program, and are recommended for teacher licensure in either Mathematics, Biology, Chemistry, or Physics. With approval of this proposed program of study, the UAteach program would add a 5th area of licensure: Computer Science, Grades 4-12.

We currently have 3 Computer Science majors taking UAteach courses who are interested in teaching both Computer Science and Mathematics. At this time, the only path for them to take to receive Computer Science licensure is to either change their majors to Mathematics or to work toward a double major, and complete our UAteach program for initial licensure in Math, then ‘test out of’ Computer Science by taking the Praxis Exam. If our program of study proposal is approved, these students, and others who follow in their footsteps, will be able to earn their initial teacher licensure in Computer Science by taking the courses that meet the state competencies that are laid out in this proposal, regardless of their choice of bachelor’s degree. We believe that this approach will entice students who enjoy computer science to consider teaching as another option for their future. And with an “*if you build it, they will come”* philosophy, we believe that the presence of a Computer Science teacher licensure program at the University of Arkansas will inherently elevate attention given to this important career.

In the fall of 2016, University of Arkansas had:

* 127 Computer Engineering B.S. majors
* 280 Computer Science B.S. majors
* 46 Computer Science B.A. majors

We see our main target audience as the B.A. Computer Science majors and would recruit from this group, hoping to interest at least 15% of them in taking our introductory ‘try out teaching’ course. With possible interest from other majors, we would like to see 10 students per year enroll in the UAteach courses with the intent of becoming licensed to teach Computer Science.

# 2. Program Description

## 2A. General Description of the Program

Our proposed program of study for Computer Science teacher licensure is purposely designed to be flexible in order to allow students of a variety of majors to participate, rather than be tied to a Computer Science degree. Although we expect Computer Science B.A. majors to be our most likely candidates with their 32 hours of free electives, we are hopeful that some Mathematics, Engineering majors, or other majors who are interested in a Computer Science minor could also be persuaded to pursue teaching Computer Science as a career option. Because Computer Science aligns well with the discipline of Mathematics, we have included an opportunity of ‘required’ electives within the program of study allowing students who are interested in teaching both Computer Science and Mathematics to choose 1 or 2 Mathematics electives over Computer Science electives. This would encourage a Computer Science major to earn a minor in Mathematics, and would encourage a Mathematics major interested in teaching to pursue the Computer Science licensure by allowing Mathematics courses to count. Yet, if a student opts for Computer Science courses for the 2 electives, they benefit from being able to choose their area of interest, for instance, software over hardware focus.

Our process for determining the courses in the program of study included conversations with faculty and students in the Department of Computer Science, Department of Mathematics, UAteach program, and Department of Curriculum & Instruction (both Secondary Education faculty and Career and Technical Education). For disciplinary content, the program of study would require 15 credit hours of specified Computer Science courses, 6 additional credit hours of Computer Science or Mathematics electives from a list of courses that support the content competencies, and 3 credit hours in Research Methods. Students would complete 23 credit hours of undergraduate teacher preparation courses, including a 1 semester teaching internship, through the existing UAteach courses, joining students who are working toward secondary Mathematics, Biology, Chemistry, or Physics licensure.

## 2B. Proposed Program of Study for Computer Science

|  |  |
| --- | --- |
|  | **REQUIRED Education COURSES**  *These 6 courses meet TESS and Arkansas Teacher Standards competencies* |
| ARSC 1201 | Inquiry Approach to Teaching |
| ARSC 1221 | Inquiry-based Lesson Design |
| STEM 2103 | Knowing & Learning |
| STEM 2203 | Classroom Interactions |
| STEM 3303 | Project-based Instruction |
| STEM 4409\*\* | Supervised Clinical Teaching (Internship) |

|  |  |
| --- | --- |
|  | **Elective Courses: Education**  Students **must choose 1 elective** from this list to deepen their knowledge in an additional area of study |
| CATE 4073 | Teaching Programming in Secondary Schools |
| STEM 4333 | Perspectives on Science and Mathematics |
| SEED 5313 | Theories of Learning Mathematics |
| MATH 2903\* | Functions, Foundations & Models |

|  |  |
| --- | --- |
|  | **REQUIRED Content COURSES**  These 6 courses meet 97% of the Computer Science competencies |
| CSCE 2004 | Programming Foundations I |
| CSCE 2014 | Programming Foundations II |
| CSCE 2114 | Digital Design |
| CSCE 3193 | Programming Paradigms |
| BIOL/CHEM/PHYS 3273 | Research Methods (UAteach) |
| STEM 4409\*\* | Supervised Clinical Teaching (Internship)  *(\*\*included in both lists as it contributes to both sets of competencies)* |

|  |  |
| --- | --- |
|  | **Elective Content Courses:**  **Computer Science and Math**  Students **must choose 2 electives** from this list to deepen their knowledge in additional areas of study. These Computer Science courses were chosen to provide further support of the CS competencies. Math courses were chosen to encourage students to seek both Computer Science and Math teacher licensure. |
| CSCE 2214 | Computer Organization |
| CSCE 3513 | Software Engineering |
| CSCE 3613 | Operating Systems |
| CSCE 4133 | Algorithms |
| CSCE 4523 | Database Management |
| MATH 2564 | Calculus II |
| MATH 2903\* | Functions, Foundations & Models  *(\*appears in both electives lists, but will not count twice)* |
| MATH 3773 | Foundations of Geometry |

## 2C. Curriculum Matrices

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **All Licensure Areas** | **Course Alignment with Arkansas Teaching Standards** | | | | | |
| **Note: UAteach emphasis on field experience in 5 of these courses readily supports students' development of TES** | | | | | **Sof ATS competencies** |
| ARSC 1201 | ARSC 1221 | STEM 2103 | STEM 2203 | STEM 3303 | STEM 4409 |
| **Standard #1 Learner**  **Development** | Step 1 | Step 2 | Knowing &  Learning | Classroom  Interactions | Project-based  Instruction | Semester Internship |
| Performances |  |  |  |  |  |  |
| 1 (a) assesses … | X | X | X | X | X | X |
| 1 (b) developmentally-appropriate ... |  | X | X | X | X | X |
| 1 c) collaborates … |  |  |  |  | X | X |
| Essential Knowledge |  |  |  |  |  |  |
| 1 (d) how learning occurs ... |  |  | X | X | X | X |
| 1 (e) instructional decisions-learners' strengths & needs | X | X | X | X | X | X |
| 1 (f) identifies readiness for learning … |  | X |  | X |  | X |
| 1 (g) language & culture | X | X | X | X |  | X |
| Critical Dispositions |  |  |  |  |  |  |
| 1 (h) learners' differing needs … | X | X | X | X | X | X |
| 1 (i) learners' strengths and misconceptions  … | X | X | X | X | X | X |
| 1 (j)promoting learners' growth … | X | X | X | X | X | X |
| 1 (k) values input … |  |  | X | X | X | X |
| **Standard #2 Learning**  **Differences** | S1 | S2 | KL | CI | PBI | Internship |
| Performances |  |  |  |  |  |  |
| 2 (a) creates opportunities for students to demonstrate their learning in different ways … | X | X | X | X |  | X |
| 2 (b) provisions for individual students … |  |  |  | X |  | X |
| 2 (c) designs instruction to build on learners' prior knowledge ... | X | X |  | X | X | X |
| 2 (d) multiple perspectives to the discussion of content … | X | X |  | X | X | X |
| 2 (e) tools of language development … |  |  |  | X |  | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 2 (f) accesses resources … |  |  |  |  |  | X |
| Essential Knowledge |  |  |  |  |  |  |
| 2 (g) identifies differences … |  |  | X | X | X | X |
| 2 (h) students with exceptional needs … | X | X | X | X |  | X |
| 2 (i) second language acquisition processesinstructional strategies … | X |  |  | X |  | X |
| 2 (j) learners being assets for learning based on their individual experiences, abilities, … | X | X | X | X | X | X |
| 2 (k) diverse cultures-incorporate learners' experiences … | X | X | X | X |  | X |
| Critical Dispositions |  |  |  |  |  |  |
| 2 (l) believes that all learners can achieve … | X | X | X | X | X | X |
| 2 (m) respects learners as individuals | X | X | X | X | X | X |
| 2 (n) makes learners feel valued | X | X | X | X | X | X |
| 2 (o) values diverse language |  |  |  | X |  |  |
| **Standard #3 Learning**  **Environments** | S1 | S2 | KL | CI | PBI | Internship |
| Performances |  |  |  |  |  |  |
| 3 (a) collaborates-positive learning climate  … |  |  |  |  |  | X |
| 3 (b) engage learners in collaborative & self-directed learning … |  |  |  |  | X | X |
| 3 (c) values & expectations for respectful interactions … |  |  |  |  | X | X |
| 3 (d) manages the learning environment … | X | X |  | X | X | X |
| 3 (e) variety of methods to engage learners  … |  |  | X |  | X | X |
| 3 (f ) respect for cultural backgrounds & differing perspectives … | X | X |  | X | X | X |
| 3 (g) use of interactive technologies … |  | X |  | X | X |  |
| 3 (h) collaborate-effective interpersonal communication skills |  |  |  |  | X | X |
| Essential Knowledge |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 (i) motivation & engagement |  |  | X | X | X | X |
| 3 (j) work productively & cooperatively to achieve learning goals | X | X |  | X | X | X |
| 3 (k) establish safe & productive learning environment | X | X |  | X | X | X |
| 3 (l) communicate effectively in different environments | X | X | X | X |  | X |
| 3 (m) how to use technologies … |  | X |  | X | X | X |
| Critical Dispositions |  |  |  |  |  |  |
| 3 (n) working with learners, colleagues, families, & communities-supportive learning environments |  |  |  |  |  | X |
| 3 (o) role of learners in promoting each others' learning … |  |  |  | X | X | X |
| 3 (p) supporting learners-exploration & purposeful learning ... | X | X |  | X | X | X |
| 3 (q) respectful communication … | X | X |  | X | X | X |
| 3 (r) thoughtful & responsive listener & observer … | X | X | X | X | X | X |
| **Standard #4 Content**  **Knowledge** | S1 | S2 | KL | CI | PBI | Internship |
| Performances |  |  |  |  |  |  |
| 4 (a) uses multiple representations & explanations … | X | X |  | X | X | X |
| 4 (b) learning experiences-analyze ideas from diverse perspectives … | X | X | X | X | X | X |
| 4 (c) applying methods of inquiry & standards of evidence … | X | X |  | X | X | X |
| 4 (d)learner reflection on prior content knowledge-makes connections … | X | X | X |  | X | X |
| 4 (e) learner misconceptions | X | X | X | X | X | X |
| 4 (f) evaluates & modifies instructional resources & curriculum materials … | X | X |  | X | X | X |
| 4 (g) supplementary resources & technologies-relevance for all learners | X | X |  | X | X | X |
| 4 (h) academic language in their content … | X | X | X | X |  | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 4 (i) resources to evaluate the learners' content knowledge in their primary language … |  |  |  |  |  | X |
| Essential Knowledge |  |  |  |  |  |  |
| 4 (j) ways of knowing that are central to the discipline … | X | X | X | X | X | X |
| 4(k) misconceptions in learning the discipline & how to guide learners that are central to the discipline … | X | X | X | X | X |  |
| 4 (l) academic language of the discipline0how to make it accessible to learners … | X | X |  | X | X | X |
| 4 (m) integrate culturally relevant content  … | X |  |  |  |  | X |
| 4 (n) deep knowledge of student content standards & learning progression … | X | X | X | X | X | X |
| Critical Dispositions |  |  |  |  |  |  |
| 4 (o) new ideas & understandings in the field … | X | X | X | X |  |  |
| 4 (p) multiple perspectives-critical analysis  … | X | X | X | X |  |  |
| 4 (q) potential of bias in representation of the discipline … |  |  |  | X |  |  |
| 4 (r) work toward each learners' mastery ... | X | X | X | X | X | X |
| **Standard #5 Application of**  **Content** | S1 | S2 | KL | CI | PBI | Internship |
| Performances |  |  |  |  |  |  |
| 5 (a) implements projects analyzing complexities … |  |  |  |  | X |  |
| 5 (b) applying content knowledge to real world problems … | X |  |  |  | X |  |
| 5 © tools & resources to maximize content learning … | X |  |  |  | X | X |
| 5 (d) questioning & challenging  assumptions-innovation & problem solving  … | X | X |  |  | X |  |
| 5 (e) communication skills … |  | X |  |  | X |  |
| 5 (f) generating & evaluating new ideas … | X | X |  |  | X |  |
| 5 (g) diverse social & cultural perspectives … |  |  |  |  | X |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 5 (h) literacy development across content areas … |  |  |  |  | X |  |
| Essential Knowledge |  |  |  |  |  |  |
| 5 (i) ways of knowing in the discipline … |  |  |  |  | X | X |
| 5 (j) interdisciplinary themes … | X | X |  |  | X |  |
| 5 (k) evaluate issues of ethics & quality | X | X |  |  |  | X |
| 5 (l) digital & interactive technologies | X | X |  |  | X | X |
| 5 (m) critical thinking process … | X | X |  |  | X |  |
| 5 (n) communication modes & skills … | X | X |  |  |  | X |
| 5 (o) creative thinking process … |  | X |  |  | X |  |
| 5 (p) access resources to build global awareness … |  |  |  |  | X |  |
| Critical Dispositions |  |  |  |  |  |  |
| 5 (q) disciplinary knowledge as a lens to address local & global issues … |  |  |  | X |  |  |
| 5 ® values knowledge outside own content area … |  |  | X | X | X |  |
| 5 (s) flexible learning environments that encourage learner exploration … | X | X |  | X | X |  |
| **Standard #6 Assessment** | S1 | S2 | KL | CI | PBI | Internship |
| Performances |  |  |  |  |  |  |
| 66 (a) formative & summative assessment … (b) assessments that match learning | X | X | X | X | X | X |
| objectives … | X | X |  | X | X | X |
| 6 © examine test & other performance data to understand each learner's progress  & to guide planning … |  |  | X |  |  | X |
| 6 (d) descriptive feedback to guide progress  … | X | X |  | X | X | X |
| 6 (e) multiple ways of demonstrating knowledge-assessment process … | X | X |  | X | X | X |
| 6 (f) learners examining their own thinking  … | X | X |  |  | X | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 6 (g) multiple types of assessment data to identify students' learning needs & to develop differentiated learning experiences | X | X | X |  |  | X |
| 6 (h) appropriate accommodations in assessments … |  |  |  |  |  | X |
| 6 (i) technology to support assessment … |  |  | X |  |  |  |
| Essential Knowledge |  |  |  |  |  |  |
| 6 (j) formative & summative applications … |  |  | X | X | X | X |
| 6 (k) design, adapt, or select appropriate assessments … | X | X | X | X | X | X |
| 6 (l) analyze assessment data … | X | X | X | X |  | X |
| 6 (m) engage learners in analyzing their own assessment results … |  |  | X |  |  |  |
| 6 (n) effective descriptive feedback for learners … |  |  |  | X | X | X |
| 6 (o) evaluate & report learner progress against standards … |  |  |  | X |  | X |
| 6 (p) prepare learners for assessment … |  |  | X |  |  | X |
| Critical Dispositions |  |  |  |  |  |  |
| 6 (q) developing learners' capacity to review & communicate about their own  progress & learning | X | X | X |  |  |  |
| 6 ® aligning instruction & assessment … | X | X |  | X | X | X |
| 6 (s) providing timely & effective descriptive feedback | X | X |  |  | X | X |
| 6 (t) multiple types of assessment … | X | X | X | X | X | X |
| 6 (u) accommodations in assessment … |  |  | X |  |  | X |
| 6 (v) ethical use of various assessments … | X | X | X |  |  | X |
| **Standard #7 Planning for**  **Instruction** | SI | S2 | KL | CI | PBI | Internship |
| Performances7 (a) selects & creates learning experiences |  |  |  |  |  |  |
| … | *X* | *X* | *X* | *X* | *X* | *X* |
| 77 (b) student's learning goals … (c) appropriate sequencing of learning |  | *X* | *X* | *X* | *X* | *X* |
| experiences … | *X* | *X* |  | *X* | *X* | *X* |

7 (d) plans for instruction based on

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| formative & summative assessment data, 7 (e) plans collaboratively with | *X* | *X* | *X* | *X* |  | *X* |
| professionals 7 (f) adjusts plans to meet each student's |  |  |  |  |  | X |
| learning needs … | X | X |  | X |  | X |
| Essential Knowledge |  |  |  |  |  |  |
| 7 (g) content standards … | X | X |  | X | X | X |
| 7 (h) integrating cross-disciplinary skills … |  |  |  |  | X |  |
| 7 (i) learning theory, human development, cultural diversity, & individual differences |  |  | X | X | X | X |
| 7 (j) plan instruction-responsive-strength & needs … |  | X | X | X |  | X |
| 7 (k) range of evidence-based instructional strategies, resources, & technological tools | X | X | X | X | X | X |
| 7 (l) adjust plans based on assessment information … | X | X | X | X | X | X |
| 7 (m) access resources & collaborate … |  | X | X |  |  | X |
| Critical Dispositions |  |  |  |  |  |  |
| 7 (n) respects learners' diverse strengths plan effective instruction … |  | X | X | X | X | X |
| 7 (o) planning a collegial activity | X | X |  | X | X | X |
| 7 (p) short-and-long term planning … | X | X |  | X | X | X |
| 7 (q) plans must always be open to adjustment & revision … | X | X | X | X | X | X |
| **Standard # 8 Instructional**  **Strategies** | S1 | S2 | KL | CI | PBI | Internship |
| Performances8 (a) appropriate strategies & resources to |  |  |  |  |  |  |
| adapt instruction …8 (b) continuously monitors student |  | *X* | *X* | *X* | *X* | *X* |
| learning8 (c) design & implement relevant learning | *X* | *X* |  | *X* | *X* | *X* |
| experiences …8 (d) varies his/her role in the instructional |  |  | *X* |  |  | *X* |
| process …8 (e) multiple models & representations of |  | *X* |  | *X* | *X* | *X* |
| concepts & skill …8 (f) higher order questioning skills & |  | X | X | X | X | X |
| technology tools …8 (g) range of learning skills & technology | X | X | X | X |  |  |
| tools …8 (h) variety of instructional strategies to | X | X |  | X | X | X |
| support & expand learners' communication |  | X |  | X | X | X |
| 8 (i) asks questions to stimulate discussion | X | X |  | X | X | X |

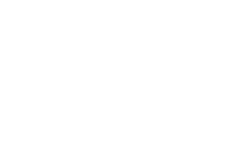
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| --- | --- | --- | --- | --- | --- | --- |
| Essential Knowledge |  |  |  |  |  |  |
| 8 (j) understands the cognitive processes | X | X | X | X | X | X |
| 8 (k) apply a range of instructional strategies |  |  | X | X | X | X |
| 8 (l) differentiate instruction & engage all learners in complex thinking & meaningful tasks |  | X | X | X | X | X |
| 8 (m) multiple forms of communication … | X | X | X | X | X | X |
| 8 (n) wide variety of resources, including human & technological … | X | X |  | X | X | X |
| 8 (o) content & skill development-media & technology … | X | X |  | X | X |  |
| Critical Dispositions |  |  |  |  |  |  |
| 8 (p) strengths & needs of diverse learners  … |  | X | X | X | X | X |
| 8 (q) multiple forms of communication … |  | X | X | X |  | X |
| 8 (r) new & emerging technologies promote student learning … |  |  |  | X | X | X |
| 8 (s) adapting instruction to learner responses, ideas, & needs … | X | X | X | X | X | X |
| **Standard #9 Professional**  **Learning and Ethical Practice** | S1 | S2 | KL | CI | PBI | Internship |
| Performances9 (a) ongoing learning opportunities to |  |  |  |  |  |  |
| develop knowledge & skills … | *X* | *X* |  | *X* | *X* | *X* |
| 99 (b) professional learning experiences … (c) a variety of data to evaluate the | *X* | *X* |  | *X* |  | *X* |
| outcome9 (d) actively seeks professional, | *X* | *X* |  | *X* |  | *X* |
| community, & technology resources … | *X* | *X* |  | *X* |  | *X* |
| 99 (e) reflects on his/her personal biases … (f) ethical use of information & |  |  |  | X |  |  |
| technology |  | X |  | X |  | X |
| Essential Knowledge |  |  |  |  |  |  |
| 9 (g) reflect on his/her practice ... | X | X |  | X | X | X |
| 9 (h) how to use learner data to analyze practice & differentiate instruction … | X | X |  | X |  | X |
| 9 (i) how personal identity, worldview, & prior experience affect perceptions & expectations | X | X |  | X |  | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 9 (j) laws related to learners' rights & teacher responsibilities ... |  |  |  | X |  | X |
| 9 (k) build & implement a plan for professional growth … | X | X |  | X |  | X |
| Critical Dispositions |  |  |  |  |  |  |
| 9 (l) takes responsibility for student learning | X | X |  | X | X | X |
| 9 (m) understanding own frames of reference |  |  |  | X |  |  |
| 9 (n) current education policy & research as source of analysis & reflection to improve practice | X | X |  | X | X | X |
| 9 (o) codes of ethics, professional standards of practice, & relevant law & policy… |  |  |  | X |  | X |
| **Standard #10: Leadership and**  **Collaboration** | S1 | S2 | KL | CI | PBI | Internship |
| Performances10 (a) active role on the instructional |  |  |  |  |  |  |
| team…10 (b) plan & jointly facilitate learning on |  | *X* |  |  |  | *X* |
| how to meet diverse needs …10 (c) engages collaboratively in the school- |  |  |  |  |  | *X* |
| wide effort …10 (d) works collaboratively with learners & |  | *X* |  |  |  | *X* |
| their families …10 (e) connections with community |  |  |  |  |  |  |
| resources… |  | X |  |  |  | X |
| 1010 (f) professional learning … (g) technological tools-to build local- |  | X | X |  |  | X |
| learning communities …10 (h) uses & generates meaningful |  |  |  |  |  | X |
| research on education issues |  | X | X |  |  |  |
| 1010 (i) model effective practice … (j) advocates to meet the needs of |  |  |  |  |  | X |
| learners … |  |  |  |  |  |  |
| 10 (k) leadership roles … |  |  |  |  |  |  |
| Essential Knowledge |  |  |  |  |  |  |
| 10 (l) organizations-work with others across the system to support learners … |  |  |  |  |  | X |
| 10 (m) alignment of family, school, & community spheres of influence enhances student learning … |  |  |  |  |  | X |
| 10 (n) collaborative interaction … |  |  |  |  | X | X |
| 10 (o) high expectations for student learning |  |  |  |  |  | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Critical Dispositions |  |  |  |  |  |  |
| 10 (p) supporting the mission of school as one of advocacy for learners |  | X |  |  |  | X |
| 10 (q) respects families' beliefs, norms, & high expectations … |  |  |  |  |  | X |
| 10 (r) initiative to grow & develop ... |  | X |  |  | X | X |
| 10 (s) |  |  |  |  | X | X |
| 10(t) |  | X |  |  |  |  |
|  |  |  |  |  |  |  |
| 11/30/2016 |  |  |  |  |  |  |

### 2C.i. Curriculum Matrix Aligning Education Courses with Arkansas Teaching Standards

**Arkansas Teaching Standards**



The Arkansas Department of Education has adopted the 2011 Model Core Teaching Standards developed by Interstate Teacher Assessment and Support Consortium (InTASC) to replace the Arkansas Standards for Beginning Teachers (1995). InTASC is a program of the Council of Chief State School Officers (CCSSO).These new **Arkansas Teaching Standards** are to be used in identifying competencies for all teachers and for advising teacher preparation programs in all Arkansas colleges and universities.

The standards have been grouped into four general categories to help users organize their thinking about the standards (Model Core Teaching Standards: A Resource for State Dialog, InTASC, 2011):

**The Learner and Learning**

Teaching begins with the learner. To ensure that each student learns new knowledge and skills, teachers must understand that learning and developmental patterns vary among individuals, that learners bring unique individual differences to the learning process, and that learners need supportive and safe learning environments to thrive. Effective teachers have high expectations for each and every learner and implement developmentally appropriate, challenging learning experiences within a variety of learning environments that help all learners meet high standards and reach their full potential. Teachers do this by combining a base of professional knowledge, including an understanding of how cognitive, linguistic, social, emotional, and physical development occurs, with the recognition that learners are individuals who bring differing personal and family backgrounds, skills, abilities, perspectives, talents and interests. Teachers collaborate with learners, colleagues, school leaders, families, members of the learners’ communities, and community organizations to better understand their students and maximize their learning. Teachers promote learners’ acceptance of responsibility for their own learning and collaborate with them to ensure the effective design and implementation of both self-directed and collaborative learning.

**Standard #1: Learner Development.** The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.

**Standard #2: Learning Differences.** The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.

**Standard #3: Learning Environments.** The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.

Content

Teachers must have a deep and flexible understanding of their content areas and be able to draw upon content knowledge as they work with learners to access information, apply knowledge in real world settings, and address meaningful issues to assure learner mastery of the content.

Today’s teachers make content knowledge accessible to learners by using multiple means of communication, including digital media and information technology. They integrate cross- disciplinary skills (e.g., critical thinking, problem solving, creativity, communication) to help learners use content to propose solutions, forge new understandings, solve problems, and imagine possibilities. Finally, teachers make content knowledge relevant to learners by connecting it to local, state, national, and global issues.

**Standard #4: Content Knowledge.** The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.

**Standard #5: Application of Content.** The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.

Instructional Practice

Effective instructional practice requires that teachers understand and integrate assessment, planning, and instructional strategies in coordinated and engaging ways. Beginning with their end or goal, teachers first identify student learning objectives and content standards and align assessments to those objectives. Teachers understand how to design, implement and interpret results from a range of formative and summative assessments. This knowledge is integrated into instructional practice so that teachers have access to information that can be used to provide immediate feedback to reinforce student learning and to modify instruction. Planning focuses on using a variety of appropriate and targeted instructional strategies to address diverse ways of learning, to incorporate new technologies to maximize and individualize learning, and to allow learners to take charge of their own learning and do it in creative ways.

**Standard #6: Assessment.** The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.

**Standard #7: Planning for Instruction.** The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

**Standard #8: Instructional Strategies.** The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.

Professional Responsibility

Creating and supporting safe, productive learning environments that result in learners achieving at the highest levels is a teacher’s primary responsibility. To do this well, teachers must engage in meaningful and intensive professional learning and self-renewal by regularly examining practice through ongoing study, self-reflection, and collaboration. A cycle of continuous self- improvement is enhanced by leadership, collegial support, and collaboration. Active engagement in professional learning and collaboration results in the discovery and implementation of better practice for the purpose of improved teaching and learning. Teachers also contribute to improving instructional practices that meet learners’ needs and accomplish their school’s mission and goals. Teachers benefit from and participate in collaboration with learners, families, colleagues, other school professionals, and community members. Teachers demonstrate leadership by modeling ethical behavior, contributing to positive changes in practice, and advancing their profession.

**Standard #9: Professional Learning and Ethical Practice.** The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.

**Standard #10: Leadership and Collaboration.** The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.

**Standard #1: Learner Development**

***The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.***

**Performances**

1(a) The teacher regularly assesses individual and group performance in order to design and modify instruction to meet learners’ needs in each area of development (cognitive, linguistic, social, emotional, and physical) and scaffolds the next level of development.

1(b) The teacher creates developmentally appropriate instruction that takes into account individual learners’ strengths, interests, and needs and that enable each learner to advance and accelerate his/her learning.

1(c) The teacher collaborates with families, communities, colleagues, and other professionals to promote learner growth and development.

**Essential Knowledge**

1(d) The teacher understands how learning occurs--how learners construct knowledge, acquire skills, and develop disciplined thinking processes--and knows how to use instructional strategies that promote student learning.

1(e) The teacher understands that each learner’s cognitive, linguistic, social, emotional, and physical development influences learning and knows how to make instructional decisions that build on learners’ strengths and needs.

1(f) The teacher identifies readiness for learning, and understands how development in any one area may affect performance in others.

1(g) The teacher understands the role of language and culture in learning and knows how to modify instruction to make language comprehensible and instruction relevant, accessible, and challenging.

**Critical Dispositions**

1(h) The teacher respects learners’ differing strengths and needs and is committed to using this information to further each learner’s development.

1(i) The teacher is committed to using learners’ strengths as a basis for growth, and their misconceptions as opportunities for learning.

1(j) The teacher takes responsibility for promoting learners’ growth and development.

1(k) The teacher values the input and contributions of families, colleagues, and other professionals in understanding and supporting each learner’s development.

**Standard #2: Learning Differences**

***The teacher uses understanding of individual differences and diverse cultures/communities to ensure inclusive learning environments that enable each learner to meet high standards.***

**Performances**

2(a) The teacher designs, adapts, and delivers instruction to address each student’s diverse learning strengths and needs and creates opportunities for students to demonstrate their learning in different ways.

2(b) The teacher makes appropriate and timely provisions (e.g., pacing for individual rates of growth, task demands, communication, assessment, and response modes) for individual students with particular learning differences or needs.

2(c) The teacher designs instruction to build on learners’ prior knowledge and experiences, allowing learners to accelerate as they demonstrate their understandings.

2(d) The teacher brings multiple perspectives to the discussion of content, including attention to learners’ personal, family, and community experiences and cultural norms.

2(e) The teacher incorporates tools of language development into planning and instruction, including strategies for making content accessible to English language learners and for evaluating and supporting their development of English proficiency.

2(f) The teacher accesses resources, supports, and specialized assistance and services to meet particular learning differences or needs.

**Essential Knowledge**

2(g) The teacher understands and identifies differences in approaches to learning and performance and knows how to design instruction that uses each learner’s strengths to promote growth.

2(h) The teacher understands students with exceptional needs, including those associated with disabilities and giftedness, and knows how to use strategies and resources to address these needs.

2(i) The teacher knows about second language acquisition processes and knows how to incorporate instructional strategies and resources to support language acquisition.

2(j) The teacher understands that learners bring assets for learning based on their individual experiences, abilities, talents, prior learning, and peer and social group interactions, as well as language, culture, family, and community values.

2(k) The teacher knows how to access information about the values of diverse cultures and communities and how to incorporate learners’ experiences, cultures, and community resources into instruction.

**Critical Dispositions**

2(l) The teacher believes that all learners can achieve at high levels and persists in helping each learner reach his/her full potential.

2(m) The teacher respects learners as individuals with differing personal and family backgrounds and various skills, abilities, perspectives, talents, and interests.

2(n) The teacher makes learners feel valued and helps them learn to value each other.

2(o) The teacher values diverse languages and dialects and seeks to integrate them into his/her instructional practice to engage students in learning.

**Standard #3: Learning Environments**

***The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.***

**Performances**

3(a) The teacher collaborates with learners, families, and colleagues to build a safe, positive learning climate of openness, mutual respect, support, and inquiry.

3(b) The teacher develops learning experiences that engage learners in collaborative and self-directed learning and that extend learner interaction with ideas and people locally and globally.

3(c) The teacher collaborates with learners and colleagues to develop shared values and expectations for respectful interactions, rigorous academic discussions, and individual and group responsibility for quality work.

3(d) The teacher manages the learning environment to actively and equitably engage learners by organizing, allocating, and coordinating the resources of time, space, and learners’ attention.

3(e) The teacher uses a variety of methods to engage learners in evaluating the learning environment and collaborates with learners to make appropriate adjustments.

3(f) The teacher communicates verbally and nonverbally in ways that demonstrate respect for and responsiveness to the cultural backgrounds and differing perspectives learners bring to the learning environment.

3(g) The teacher promotes responsible learner use of interactive technologies to extend the possibilities for learning locally and globally.

3(h) The teacher intentionally builds learner capacity to collaborate in face-to-face and virtual environments through applying effective interpersonal communication skills.

**Essential Knowledge**

3(i) The teacher understands the relationship between motivation and engagement and knows how to design learning experiences using strategies that build learner self-direction and ownership of learning.

3(j) The teacher knows how to help learners work productively and cooperatively with each other to achieve learning goals.

3(k) The teacher knows how to collaborate with learners to establish and monitor elements of a safe and productive learning environment including norms, expectations, routines, and organizational structures.

3(l) The teacher understands how learner diversity can affect communication and knows how to communicate effectively in differing environments.

3(m) The teacher knows how to use technologies and how to guide learners to apply them in appropriate, safe, and effective ways.

**Critical Dispositions**

3(n) The teacher is committed to working with learners, colleagues, families, and communities to establish positive and supportive learning environments.

3(o) The teacher values the role of learners in promoting each other’s learning and recognizes the importance of peer relationships in establishing a climate of learning.

3(p) The teacher is committed to supporting learners as they participate in decision making, engage in exploration and invention, work collaboratively and independently, and engage in purposeful learning.

3(q) The teacher seeks to foster respectful communication among all members of the learning community.

3(r) The teacher is a thoughtful and responsive listener and observer.

**Standard #4: Content Knowledge**

***The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.***

**Performances**

4(a) The teacher effectively uses multiple representations and explanations that capture key ideas in the discipline, guide learners through learning progressions, and promote each learner’s achievement of content standards.

4(b) The teacher engages students in learning experiences in the discipline(s) that encourage learners to understand, question, and analyze ideas from diverse perspectives so that they master the content.

4(c) The teacher engages learners in applying methods of inquiry and standards of evidence used in the discipline.

4(d) The teacher stimulates learner reflection on prior content knowledge, links new concepts to familiar concepts, and makes connections to learners’ experiences.

4(e) The teacher recognizes learner misconceptions in a discipline that interfere with learning, and creates experiences to build accurate conceptual understanding.

4(f) The teacher evaluates and modifies instructional resources and curriculum materials for their comprehensiveness, accuracy for representing particular concepts in the discipline, and appropriateness for his/her learners.

4(g) The teacher uses supplementary resources and technologies effectively to ensure accessibility and relevance for all learners.

4(h) The teacher creates opportunities for students to learn, practice, and master academic language in their content.

4(i) The teacher accesses school and/or district-based resources to evaluate the learner’s content knowledge in their primary language.

**Essential Knowledge**

4(j) The teacher understands major concepts, assumptions, debates, processes of inquiry, and ways of knowing that are central to the discipline(s) s/he teaches.

4(k) The teacher understands common misconceptions in learning the discipline and how to guide learners to accurate conceptual understanding.

4(l) The teacher knows and uses the academic language of the discipline and knows how to make it accessible to learners.

4(m) The teacher knows how to integrate culturally relevant content to build on learners’ background knowledge.

4(n) The teacher has a deep knowledge of student content standards and learning progressions in the discipline(s) s/he teaches.

**Critical Dispositions**

4(o) The teacher realizes that content knowledge is not a fixed body of facts but is complex, culturally situated, and ever evolving. S/he keeps abreast of new ideas and understandings in the field.

4(p) The teacher appreciates multiple perspectives within the discipline and facilitates learners’ critical analysis of these perspectives.

4(q) The teacher recognizes the potential of bias in his/her representation of the discipline and seeks to appropriately address problems of bias.

4(r) The teacher is committed to work toward each learner’s mastery of disciplinary content and skills.

**Standard #5: Application of Content**

***The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.***

**Performances**

5(a) The teacher develops and implements projects that guide learners in analyzing the complexities of an issue or question using perspectives from varied disciplines and cross-disciplinary skills (e.g., a water quality study that draws upon biology and chemistry to look at factual information and social studies to examine policy implications).

5(b) The teacher engages learners in applying content knowledge to real world problems through the lens of interdisciplinary themes (e.g., financial literacy, environmental literacy).

5(c) The teacher facilitates learners’ use of current tools and resources to maximize content learning in varied contexts.

5(d) The teacher engages learners in questioning and challenging assumptions and approaches in order to foster innovation and problem solving in local and global contexts.

5(e) The teacher develops learners’ communication skills in disciplinary and interdisciplinary contexts by creating meaningful opportunities to employ a variety of forms of communication that address varied audiences and purposes.

5(f) The teacher engages learners in generating and evaluating new ideas and novel approaches, seeking inventive solutions to problems, and developing original work.

5(g) The teacher facilitates learners’ ability to develop diverse social and cultural perspectives that expand their understanding of local and global issues and create novel approaches to solving problems.

5(h) The teacher develops and implements supports for learner literacy development across content areas.

**Essential Knowledge**

5(i) The teacher understands the ways of knowing in his/her discipline, how it relates to other disciplinary approaches to inquiry, and the strengths and limitations of each approach in addressing problems, issues, and concerns.

5(j) The teacher understands how current interdisciplinary themes (e.g., civic literacy, health literacy, global awareness) connect to the core subjects and knows how to weave those themes into meaningful learning experiences.

5(k) The teacher understands the demands of accessing and managing information as well as how to evaluate issues of ethics and quality related to information and its use.

5(l) The teacher understands how to use digital and interactive technologies for efficiently and effectively achieving specific learning goals.

5(m) The teacher understands critical thinking processes and knows how to help learners develop high level questioning skills to promote their independent learning.

5(n) The teacher understands communication modes and skills as vehicles for learning (e.g., information gathering and processing) across disciplines as well as vehicles for expressing learning.

5(o) The teacher understands creative thinking processes and how to engage learners in producing original work.

5(p) The teacher knows where and how to access resources to build global awareness and understanding, and how to integrate them into the curriculum.

**Critical Dispositions**

5(q) The teacher is constantly exploring how to use disciplinary knowledge as a lens to address local and global issues.

5(r) The teacher values knowledge outside his/her own content area and how such knowledge enhances student learning.

5(s) The teacher values flexible learning environments that encourage learner exploration, discovery, and expression across content areas.

**Standard #6: Assessment**

***The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher and learner decision-making.***

**Performances**

6(a) The teacher balances the use of formative and summative assessment as appropriate to support, verify, and document learning.

6(b) The teacher designs assessments that match learning objectives with assessment methods and minimizes sources of bias that can distort assessment results.

6(c) The teacher works independently and collaboratively to examine test and other performance data to understand each learner’s progress and to guide planning.

6(d) The teacher engages learners in understanding and identifying quality work and provides them with effective descriptive feedback to guide their progress toward that work.

6(e) The teacher engages learners in multiple ways of demonstrating knowledge and skill as part of the assessment process.

6(f) The teacher models and structures processes that guide learners in examining their own thinking and learning as well as the performance of others.

6(g) The teacher effectively uses multiple and appropriate types of assessment data to identify each student’s learning needs and to develop differentiated learning experiences.

6(h) The teacher prepares all learners for the demands of particular assessment formats and makes appropriate accommodations in assessments or testing conditions, especially for learners with disabilities and language learning needs.

6(i) The teacher continually seeks appropriate ways to employ technology to support assessment practice both to engage learners more fully and to assess and address learner needs.

**Essential Knowledge**

6(j) The teacher understands the differences between formative and summative applications of assessment and knows how and when to use each.

6(k) The teacher understands the range of types and multiple purposes of assessment and how to design, adapt, or select appropriate assessments to address specific learning goals and individual differences, and to minimize sources of bias.

6(l) The teacher knows how to analyze assessment data to understand patterns and gaps in learning, to guide planning and instruction, and to provide meaningful feedback to all learners.

6(m) The teacher knows when and how to engage learners in analyzing their own assessment results and in helping to set goals for their own learning.

6(n) The teacher understands the positive impact of effective descriptive feedback for learners and knows a variety of strategies for communicating this feedback.

6(o) The teacher knows when and how to evaluate and report learner progress against standards.

6(p) The teacher understands how to prepare learners for assessments and how to make accommodations in assessments and testing conditions, especially for learners with disabilities and language learning needs.

**Critical Dispositions**

6(q) The teacher is committed to engaging learners actively in assessment processes and to developing each learner’s capacity to review and communicate about their own progress and learning.

6(r) The teacher takes responsibility for aligning instruction and assessment with learning goals.

6(s) The teacher is committed to providing timely and effective descriptive feedback to learners on

their progress.

6(t) The teacher is committed to using multiple types of assessment processes to support, verify, and document learning.

6(u) The teacher is committed to making accommodations in assessments and testing conditions, especially for learners with disabilities and language learning needs.

6(v) The teacher is committed to the ethical use of various assessments and assessment data to identify learner strengths and needs to promote learner growth.

**Standard #7: Planning for Instruction**

***The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.***

**Performances**

7(a) The teacher individually and collaboratively selects and creates learning experiences that are appropriate for curriculum goals and content standards, and are relevant to learners.

7(b) The teacher plans how to achieve each student’s learning goals, choosing appropriate strategies and accommodations, resources, and materials to differentiate instruction for individuals and groups of learners.

7(c) The teacher develops appropriate sequencing of learning experiences and provides multiple ways to demonstrate knowledge and skill.

7(d) The teacher plans for instruction based on formative and summative assessment data, prior learner knowledge, and learner interest.

7(e) The teacher plans collaboratively with professionals who have specialized expertise (e.g., special educators, related service providers, language learning specialists, librarians, media specialists) to design and jointly deliver as appropriate learning experiences to meet unique learning needs.

7(f) The teacher evaluates plans in relation to short- and long-range goals and systematically adjusts plans to meet each student’s learning needs and enhance learning.

**Essential Knowledge**

7(g) The teacher understands content and content standards and how these are organized in the curriculum.

7(h) The teacher understands how integrating cross-disciplinary skills in instruction engages learners purposefully in applying content knowledge.

7(i) The teacher understands learning theory, human development, cultural diversity, and individual differences and how these impact ongoing planning.

7(j) The teacher understands the strengths and needs of individual learners and how to plan instruction that is responsive to these strengths and needs.

7(k) The teacher knows a range of evidence-based instructional strategies, resources, and technological tools and how to use them effectively to plan instruction that meets diverse learning needs.

7(l) The teacher knows when and how to adjust plans based on assessment information and learner responses.

7(m) The teacher knows when and how to access resources and collaborate with others to support student learning (e.g., special educators, related service providers, language learner specialists, librarians, media specialists, community organizations).

**Critical Dispositions**

7(n) The teacher respects learners’ diverse strengths and needs and is committed to using this information to plan effective instruction.

7(o) The teacher values planning as a collegial activity that takes into consideration the input of learners, colleagues, families, and the larger community.

7(p) The teacher takes professional responsibility to use short- and long-term planning as a means of assuring student learning.

7(q) The teacher believes that plans must always be open to adjustment and revision based on learner needs and changing circumstances.

**Standard #8: Instructional Strategies**

***The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.***

**Performances**

8(a) The teacher uses appropriate strategies and resources to adapt instruction to the needs of individuals and groups of learners.

8(b) The teacher continuously monitors student learning, engages learners in assessing their progress, and adjusts instruction in response to student learning needs.

8(c) The teacher collaborates with learners to design and implement relevant learning experiences, identify their strengths, and access family and community resources to develop their areas of interest.

8(d) The teacher varies his/her role in the instructional process (e.g., instructor, facilitator, coach, audience) in relation to the content and purposes of instruction and the needs of learners.

8(e) The teacher provides multiple models and representations of concepts and skills with opportunities for learners to demonstrate their knowledge through a variety of products and performances.

8(f) The teacher engages all learners in developing higher order questioning skills and metacognitive processes.

8(g) The teacher engages learners in using a range of learning skills and technology tools to access, interpret, evaluate, and apply information.

8(h) The teacher uses a variety of instructional strategies to support and expand learners’ communication through speaking, listening, reading, writing, and other modes.

8(i) The teacher asks questions to stimulate discussion that serves different purposes (e.g., probing for learner understanding, helping learners articulate their ideas and thinking processes, stimulating curiosity, and helping learners to question).

**Essential Knowledge**

8(j) The teacher understands the cognitive processes associated with various kinds of learning (e.g., critical and creative thinking, problem framing and problem solving, invention, memorization and recall) and how these processes can be stimulated.

8(k) The teacher knows how to apply a range of developmentally, culturally, and linguistically appropriate instructional strategies to achieve learning goals.

8(l) The teacher knows when and how to use appropriate strategies to differentiate instruction and engage all learners in complex thinking and meaningful tasks.

8(m) The teacher understands how multiple forms of communication (oral, written, nonverbal, digital, visual) convey ideas, foster self-expression, and build relationships.

8(n) The teacher knows how to use a wide variety of resources, including human and technological, to engage students in learning.

8(o) The teacher understands how content and skill development can be supported by media and technology and knows how to evaluate these resources for quality, accuracy, and effectiveness.

**Critical Dispositions**

8(p) The teacher is committed to deepening awareness and understanding the strengths and needs of diverse learners when planning and adjusting instruction.

8(q) The teacher values the variety of ways people communicate and encourages learners to develop and use multiple forms of communication.

8(r) The teacher is committed to exploring how the use of new and emerging technologies can support and promote student learning.

8(s) The teacher values flexibility and reciprocity in the teaching process as necessary for adapting instruction to learner responses, ideas, and needs.

**Standard #9: Professional Learning and Ethical Practice**

***The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.***

**Performances**

9(a) The teacher engages in ongoing learning opportunities to develop knowledge and skills in order to provide all learners with engaging curriculum and learning experiences based on local and state standards.

9(b) The teacher engages in meaningful and appropriate professional learning experiences aligned with his/her own needs and the needs of the learners, school, and system.

9(c) Independently and in collaboration with colleagues, the teacher uses a variety of data (e.g., systematic observation, information about learners, research) to evaluate the outcomes of teaching and learning and to adapt planning and practice.

9(d) The teacher actively seeks professional, community, and technological resources, within and outside the school, as supports for analysis, reflection, and problem-solving.

9(e) The teacher reflects on his/her personal biases and accesses resources to deepen his/her own understanding of cultural, ethnic, gender, and learning differences to build stronger relationships and create more relevant learning experiences.

9(f) The teacher advocates, models, and teaches safe, legal, and ethical use of information and technology including appropriate documentation of sources and respect for others in the use of social media.

**Essential Knowledge**

9(g) The teacher understands and knows how to use a variety of self-assessment and problem-solving strategies to analyze and reflect on his/her practice and to plan for adaptations/adjustments.

9(h) The teacher knows how to use learner data to analyze practice and differentiate instruction accordingly.

9(i) The teacher understands how personal identity, worldview, and prior experience affect perceptions and expectations, and recognizes how they may bias behaviors and interactions with others.

9(j) The teacher understands laws related to learners’ rights and teacher responsibilities (e.g., for educational equity, appropriate education for learners with disabilities, confidentiality, privacy, appropriate treatment of learners, reporting in situations related to possible child abuse).

9(k) The teacher knows how to build and implement a plan for professional growth directly aligned with his/her needs as a growing professional using feedback from teacher evaluations and observations, data on learner performance, and school- and system-wide priorities.

**Critical Dispositions**

9(l) The teacher takes responsibility for student learning and uses ongoing analysis and reflection to improve planning and practice.

9(m) The teacher is committed to deepening understanding of his/her own frames of reference (e.g., culture, gender, language, abilities, ways of knowing), the potential biases in these frames, and their impact on expectations for and relationships with learners and their families.

9(n) The teacher sees him/herself as a learner, continuously seeking opportunities to draw upon current education policy and research as sources of analysis and reflection to improve practice.

9(o) The teacher understands the expectations of the profession including codes of ethics, professional standards of practice, and relevant law and policy.

**Standard #10: Leadership and Collaboration**

***The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.***

**Performances**

10(a) The teacher takes an active role on the instructional team, giving and receiving feedback on practice, examining learner work, analyzing data from multiple sources, and sharing responsibility for decision making and accountability for each student’s learning.

10(b) The teacher works with other school professionals to plan and jointly facilitate learning on how to meet diverse needs of learners.

10(c) The teacher engages collaboratively in the school-wide effort to build a shared vision and supportive culture, identify common goals, and monitor and evaluate progress toward those goals.

10(d) The teacher works collaboratively with learners and their families to establish mutual expectations and ongoing communication to support learner development and achievement.

10(e) Working with school colleagues, the teacher builds ongoing connections with community resources to enhance student learning and well-being.

10(f) The teacher engages in professional learning, contributes to the knowledge and skill of others, and works collaboratively to advance professional practice.

10(g) The teacher uses technological tools and a variety of communication strategies to build local and global learning communities that engage learners, families, and colleagues.

10(h) The teacher uses and generates meaningful research on education issues and policies.

10(i) The teacher seeks appropriate opportunities to model effective practice for colleagues, to lead professional learning activities, and to serve in other leadership roles.

10(j) The teacher advocates to meet the needs of learners, to strengthen the learning environment, and to enact system change.

10(k) The teacher takes on leadership roles at the school, district, state, and/or national level and advocates for learners, the school, the community, and the profession.

**Essential Knowledge**

10(l) The teacher understands schools as organizations within a historical, cultural, political, and social context and knows how to work with others across the system to support learners.

10(m) The teacher understands that alignment of family, school, and community spheres of influence enhances student learning and that discontinuity in these spheres of influence interferes with learning.

10(n) The teacher knows how to work with other adults and has developed skills in collaborative interaction appropriate for both face-to-face and virtual contexts.

10(o) The teacher knows how to contribute to a common culture that supports high expectations for student learning.

**Critical Dispositions**

10(p) The teacher actively shares responsibility for shaping and supporting the mission of his/her school as one of advocacy for learners and accountability for their success.

10(q) The teacher respects families’ beliefs, norms, and expectations and seeks to work collaboratively with learners and families in setting and meeting challenging goals.

10(r) The teacher takes initiative to grow and develop with colleagues through interactions that enhance practice and support student learning.

10(s) The teacher takes responsibility for contributing to and advancing the profession. 10(t) The teacher embraces the challenge of continuous improvement and change.

### 2C.i.i. Curriculum Matrix Aligning Content Courses with Computer Science Competencies

*Note: The required content courses satisfy 97% of the Computer Science competencies. Computer Science faculty have indicated that of the 3 ‘un-met’ competencies, one can only be satisfied by their Cryptography class that is not offered on a regular basis and the other 2 can only be met by courses that are not required for the B.A. in Computer Science, but can be taken as electives. We chose not to require these courses, but 2 of them are on the list of electives.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science Grades 4-12** | **Course Alignment with ADE Content Competencies** | | | | | | | | | | | | | | | | |
| University of Arkansas Courses | **P.F. I** | **P.F. II** | **P.P.** | **D.D.** |  | **Intern** | **R.M.** |  | **C.O.** | **S.E.** | **O.S.** | **Algo** | **D.M.** |  | **Cal II** | **F.F.M.** | **Geom** |
|  | CSCE | CSCE | CSCE | CSCE |  | STEM | B/C/P |  | CSCE | CSCE | CSCE | CSCE | CSCE |  | MATH | MATH | MATH |
| **1. Computational Thinking** | 2004 | 2014 | 3193 | 2114 |  | 4409 | 3273 |  | 2214 | 3513 | 3613 | 4133 | 4523 |  | 2564 | 2903 | 3773 |
|  | *Required* | *Required* | *Required* | *Required* | | *Required* | *Required* | | *Students choose 2 content electives from these CSCE or Math courses.* | | | | | | | |  |
| 1.1 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.2 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 1.3 | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.4 |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.5 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.6 | X | X |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.7 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.8 |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.9 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.10 | X | X | X | X |  |  |  |  | X |  |  |  |  |  |  |  |  |
| 1.11 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.12 | X | X | X | X |  |  |  |  | X |  |  |  |  |  |  |  |  |
| 1.13 |  |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 1.14 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.15 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.16 |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 1.17 |  | X |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |
| 1.18 |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.19 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.20 | X | X |  | X |  |  |  |  | X |  | X |  |  |  |  |  |  |
| 1.21 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.22 |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |
| 1.23 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.24 |  |  | X | X |  |  |  |  | X |  |  |  |  |  |  |  |  |
| 1.25 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.26 |  | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1.27 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| **2. Collaboration** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 2.1 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 2.2 |  | X | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 2.3 |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| **3. Computing Practice &Programming** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 3.1 | X | X | X |  |  |  |  |  |  | X |  | X | X |  |  |  |  |
| 3.2 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.3 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.4 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.5 |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.6 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.7 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.8 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.10 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.11 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.12 | X | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.13 | X | X | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 3.14 |  |  | X |  |  |  |  |  | X |  | X |  |  |  |  |  |  |
| 3.15 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.16 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3.17 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.18 | X | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 3.19 |  |  |  |  |  |  | X |  |  |  |  |  | X |  |  |  |  |
| **4. Computers & Communication Devices** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 4.1 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4.2 |  |  |  | X |  |  |  |  | X |  | X |  |  |  |  |  |  |
| 4.3 |  |  |  | X |  |  |  |  | X |  | X |  |  |  |  |  |  |
| 4.4 |  |  |  | X |  |  |  |  | X |  | X |  |  |  |  |  |  |
| 4.5 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 4.6 | X | X | X |  |  |  |  |  |  | X | X | X | X |  |  |  |  |
| **5. Community, Global, and Ethical Impacts** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 5.1 | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5.2 | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5.3 |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 5.4 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5.5 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 5.6 | X | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5.7 |  |  | X |  |  |  |  |  |  | X |  |  | X |  |  |  |  |
| 5.8 |  |  | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 5.9 |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 5.10 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 5.11 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 5.12 | X |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 5.13 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 5.14 |  |  | X |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| 5.15 |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| 5.16 | X | X | X | X |  |  |  |  | X | X | X | X | X |  |  |  |  |
| 5.17 | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5.18 | X | X | X |  |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 5.19 |  |  | X |  |  |  |  |  |  | X | X |  |  |  |  |  |  |
| 5.20 |  |  | X | X |  |  |  |  | X | X | X | X | X |  |  |  |  |
| 5.21 |  |  | X |  |  | X |  |  |  | X |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **6. Disciplinary Literacy** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 6.1 |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| 6.2 |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |
| **7. Disciplinary Literacy** | 2004 | 2014 | 3193 | 2114 |  | Intern | RM |  | 2214 | 3513 | 3613 | 4133 | 4523 |  |  |  |  |
| 7.1 |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 7.2 |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 7.3 | X | X |  | X |  |  | X |  | X |  |  |  |  |  |  |  |  |
| 7.4 | X | X | X | X |  | X |  |  | X | X | X | X | X |  |  |  |  |
| 7.5 | X | X | X | X |  |  |  |  | X | X | X | X | X |  |  |  |  |
| 7.6 | X | X | X |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 7.7 | X | X | X |  |  |  | X |  |  | X |  |  | X |  |  |  |  |
| 7.8 | X | X |  | X |  |  | X |  | X |  |  |  |  |  |  |  |  |
| 7.9 | X | X |  | X |  |  | X |  | X |  |  |  |  |  |  |  |  |
| 7.10 | X | X |  | X |  |  | X |  | X |  |  |  |  |  |  |  |  |
| 7.11 | X | X |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 7.12 | X | X |  | X |  |  | X |  | X | X | X | X | X |  |  |  |  |
| 7.13 |  |  |  | X |  |  | X |  | X | X | X | X | X |  |  |  |  |
| 7.14 |  |  |  |  |  | X | X |  |  |  |  |  |  |  |  |  |  |
| 7.15 |  |  | X | X |  | X | X |  |  | X |  |  |  |  |  |  |  |
| 7.16 |  |  |  |  |  | X | X |  |  |  |  |  |  |  |  |  |  |
| 7.17 |  |  |  | X |  |  | X |  | X | X | X | X | X |  |  |  |  |
| 7.18 |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |
| 7.19 | X | X |  |  |  |  | X |  | X |  |  |  |  |  |  |  |  |

## 2.D Tess Matrix

University of Arkansas UAteach Math, Science, & Computer Science Teacher Preparation

Course Alignment with Teacher Excellence and Support System

Note: UAteach emphasis on field experience in 5 of these courses readily supports students’ development of TESS competencies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Section I: Framework for Teaching** | ARSC 1201 | ARSC 1221 | STEM 2103 | STEM 2203 | STEM 3303 | STEM 4409 |
| **Domain 1: Planning and Preparation** | Step 1 | Step 2 | Knowing & Learning | Classroom Interactions | Project-based Instruction | Semester Internship |
| 1.a Knowledge of Content and Pedagogy | X | X | X | X | X | X |
| 1.b Knowledge of Students | X | X | X | X | X | X |
| 1.c Instructional Outcomes | X | X |  | X | X | X |
| 1.d Knowledge of Resources | X | X |  | X | X | X |
| 1.e Designing Coherent Instruction | X | X |  | X | X | X |
| 1.f Designing Student Assessment | X | X | X | X | X | X |
| **Domain 2: The Classroom Environment** | S1 | S2 | KL | CI | PBI | Internship |
| 2.a Environment of Respect and Rapport | X | X | X | X | X | X |
| 2.b Culture for Learning | X | X | X | X | X | X |
| 2.c Managing Classroom Procedures | X | X |  | X | X | X |
| 2.d Managing Student Behavior | X | X | X | X | X | X |
| 2.e Organizing Physical Space |  |  |  | X | X | X |
| **Domain 3: Instruction** | S1 | S2 | KL | CI | PBI | Internship |
| 3.a Communicating With Students | X | X | X | X | X | X |
| 3.b Questioning and Discussion Techniques | X | X | X | X | X | X |
| 3.c Engaging Students in Learning | X | X | X | X | X | X |
| 3.d Using Assessment in Instruction | X | X | X | X | X | X |
| 3.e Flexibility and Responsiveness | X | X | X | X | X | X |
| **Domain 4: Professional Responsibilities** | S1 | S2 | KL | CI | PBI | Internship |
| 4.a Reflecting on Teaching | X | X |  | X | X | X |
| 4.b Maintaining Accurate Records |  | X |  | X |  | X |
| 4.c Communicating with Families |  |  |  |  |  | X |
| 4.d Professional Community |  |  |  | X |  | X |
| 4.e Developing Professionally |  |  |  | X | X | X |
| 4.f Professionalism |  |  |  | X | X | X |
| **Section II: Law and Process** |  |  |  |  |  |  |
| **1. TESS Objectives** | S1 | S2 | KL | CI | PBI | Internship |
| 1.1 |  |  |  | X |  | X |
| 1.2 |  |  |  | X |  | X |
| 1.3 |  |  |  | X |  | X |
| 1.4 |  |  |  | X |  | X |
| 1.5 |  |  |  | X |  | X |
| 1.6 |  |  |  | X |  | X |
| **2. TESS Teacher Requirements** | S1 | S2 | KL | CI | PBI | Internship |
| 2.1 |  |  |  | X |  | X |
| 2.2 |  |  |  | X |  | X |
| 2.3 |  |  |  | X |  | X |
| **3. Framework for Teaching Design** | S1 | S2 | KL | CI | PBI | Internship |
| 3.1 |  |  |  |  |  | X |
| 3.2 |  |  |  |  |  | X |
| 3.3 |  |  |  |  |  | X |
| 3.4 |  |  |  |  |  | X |
| **4. TESS Evidence Collection** | S1 | S2 | KL | CI | PBI | Internship |
| 4.1 |  |  |  |  |  | X |
| 4.2 |  |  |  |  |  | X |
| 4.3 |  |  |  |  |  | X |
| 4.4 |  |  |  |  |  | X |
| 4.5 |  |  |  |  |  | X |
| 4.6 |  |  |  |  |  | X |
| **5. TESS Rubric Formula** | S1 | S2 | KL | CI | PBI | Internship |
| 5.1 |  |  |  |  |  | X |
| **6. Arkansas TESS Teacher Tracks** | S1 | S2 | KL | CI | PBI | Internship |
| 6.1 |  |  |  |  |  | X |
| 6.2 |  |  |  |  |  | X |
| 6.3 |  |  |  |  |  | X |
| 6.4 |  |  |  |  |  | X |
| **7. Professional Growth Plan** | S1 | S2 | KL | CI | PBI | Internship |
| 7.1 |  |  |  |  |  | X |
| 7.2 |  |  |  |  |  | X |
| 7.3 |  |  |  |  |  | X |
| 7.4 |  |  |  |  |  | X |
| **8. Mentor Process** | S1 | S2 | KL | CI | PBI | Internship |
| 8.1 |  |  |  |  |  | X |
| 8.2 |  |  |  |  |  | X |
| 8.3 |  |  |  |  |  | X |
| 8.4 |  |  |  |  |  | X |
| *11/30/2016* |  |  |  |  |  |  |

|  |  |
| --- | --- |
| **Section 1. Framework for Teaching** |  |
| **Domain 1: Planning and Preparation** | * 1. Demonstrating Knowledge of Content and Pedagogy      + Content knowledge      + Prerequisite relationships      + Content pedagogy   2. Demonstrating Knowledge of Students      + Child development      + Learning process      + Special needs      + Student skills, knowledge, and proficiency      + Interests and cultural heritage   3. Setting Instructional Outcomes      + Value, sequence, and alignment      + Clarity      + Balance      + Suitability for diverse learners   4. Demonstrating Knowledge of Resources      + For classroom      + To extend content knowledge      + For students   5. Designing Coherent Instruction      + Learning activities      + Instructional materials and resources      + Instructional groups      + Lesson and unit structure   6. Designing Student Assessments      + Congruence with outcomes      + Criteria and standards      + Formative assessments * Use for planning |

### 2.D.i Competencies **for** Teacher Excellence and Support System

|  |  |
| --- | --- |
| **Domain 2: Classroom Environment** | * 1. Creating an Environment of Respect and Rapport      + Teacher interaction with students      + Student interaction with students   2. Establishing a Culture for Learning      + Importance of content      + Expectations for learning and achievement      + Student pride in work   3. Managing Classroom Procedures      + Instructional groups      + Transitions      + Materials and supplies      + Non-instructional duties      + Supervision of volunteers and paraprofessionals   4. Managing Student Behavior      + Expectations      + Monitoring behavior      + Response to misbehavior   5. Organizing Physical Space      + Safety and accessibility * Arrangement of furniture and resources |
| **Domain 3: Instruction** | * 1. Communicating With Students      + Expectations for learning      + Directions and procedures      + Explanations of content      + Use of oral and written language   2. Using Questioning and Discussion Techniques      + Quality of questions      + Discussion techniques      + Student participation   3. Engaging Students in Learning      + Activities and assignments      + Student groups      + Instructional materials and resources      + Structure and pacing   4. Using Assessment in Instruction      + Assessment criteria      + Monitoring of student learning      + Feedback to students      + Student self-assessment and monitoring   5. Demonstrating Flexibility and Responsiveness      + Lesson adjustment      + Response to students * Persistence |

|  |  |
| --- | --- |
| **Domain 4: Professional Responsibilities** | * 1. Reflecting on Teaching      + Accuracy      + Use in future teaching   2. Maintaining Accurate Records      + Student completion of assignments      + Student progress in learning      + Non-instructional records   3. Communicating with Families      + About instructional program      + About individual students      + Engagement of families in instructional program   4. Participating in a Professional Community      + Relationships with colleagues      + Participation in school projects      + Involvement in culture of professional inquiry      + Service to school   5. Growing and Developing Professionally      + Enhancement of content knowledge and pedagogical skill      + Receptivity to feedback from colleagues      + Service to the profession   6. Showing Professionalism      + Integrity/ethical conduct      + Service to students      + Advocacy      + Decision-making * Compliance with school/district regulations |
| **Section II. Law and Process** |  |
| **1. TESS Objectives (Arkansas Code §6-17-2802)** | * 1. Understands that TESS provides a transparent and consistent teacher evaluation system that ensures effective teaching and promotes professional learning   2. Understands that TESS provides feedback and a support system supporting teachers improvement in professional knowledge and skills, as well as improving student learning   3. Understands that TESS provides a basis for making teacher employment decisions   4. Understands that TESS provides links between evaluation procedures and curricular standards, professional development, targeted instructional support   5. Understands that TESS informs policymakers on |

|  |  |
| --- | --- |
|  | benefits of a consistent evaluation and support system in regard to improving student achievement  1.6 Understands that TESS increases the awareness of parents and guardians of students concerning the effectiveness of teachers |
| **2. TESS Teacher Requirements** | * 1. Understands that each employed teacher shall be evaluated in writing.   2. Understands that a teacher shall participate in TESS. Such participation includes, but is not limited to      + Classroom Observations      + Pre-Observation Conferences      + Post Observation Conferences   3. Understands that each teacher shall collaborate in good faith on the teacher’s professional growth plan. |
| **3. Framework for Teaching Design** | * 1. Understands that good teaching can be defined and observed and creates evidence.   2. Understands that teacher practice is what teachers do and how well they do the work of teaching.   3. Understands that results are what teachers accomplish and how well their students learn.   4. Understands that good teaching is consistent and based in pedagogical practice unique to every teacher, every class, and every school. |
| **4. TESS Evidence Collection** | * 1. Understands that direct observation means the evaluator is physically present in the school or venue where the school/district teacher or leader is present and leading and/or managing.   2. Understands that indirect observation means the evaluator is observing systems that operate without the teacher or leader present.   3. Understands that artifacts include materials that document the school /district teacher or leader’s practice.   4. Understands that school data means teacher and students performance data or overall school performance data.   5. Understands that evidence should be factual, representative, and relevant. Such evidence may include      + statements, actions, or behaviors * artifacts prepared by the teacher, students, or others * verbatim scripting of teacher or student comments * non-evaluative statements of observed teacher or student behavior * numeric information about time, student participation, resource use, etc. * an observed aspect of environment. |

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|  | * 1. Understands that a teacher’s collection and analysis of data regarding student learning demonstrates the following:      + Quality of learning outcomes as indicated by their…        - Being stated clearly, as learning outcomes, not activities        - Representing important, rather than trivial, learning      + Evidence of student learning that is aligned with the outcomes      + Quality of analysis of student learning gains, as indicated        - Including sensible rationale for assignment of students to groups        - Being convincing and substantiated by the evidence      + Quality of reflection on the experience, as indicated by…        - Accuracy of the reflection        - Likelihood that reflection will lead to thoughtful modifications of practice |
| **5. TESS Rubric Formula** | 5.1 Understands that the TESS classroom teacher rubric evaluates teachers on best practices using four level descriptors: unsatisfactory, basic, proficient, or distinguished. |
| **6. Arkansas TESS Teacher Tracks** | Demonstrates an understanding of the following tracks for evaluation:   * 1. Track 1 Probationary / Novice (A first year teacher is both a novice and probationary teacher):      + Year 1: Summative Evaluation        - Formal Observation – Pre and Post Conference        - Informal Observation – May be conducted        - Collaborative PGP – Develop PGP        - Summative Evaluation Meeting – summative rating results over all components      + Year 2: Summative Evaluation        - Formal Observation – Pre and Post Conference        - Informal Observation – May be conducted        - Collaborative PGP – Develop PGP        - Summative Evaluation Meeting – summative rating results over all components      + Year 3: Summative Evaluation        - Formal Observation – Pre and Post Conference        - Informal Observation – May be conducted        - Collaborative PGP – Develop PGP |

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|  | o Summative Evaluation Meeting – summative rating results over all components   * 1. Track 2 Interim Teacher Appraisal Process      + 2A: Summative Evaluation        - Formal Observation – Pre and Post Conference        - Informal Observation – May be conducted        - Collaborative PGP – Develop PGP        - Summative Evaluation Meeting – summative rating results over all components      + 2B1: Interim Appraisal        - Informal Observations – focusing on PGP growth components        - Collaborative PGP – review and/or revise        - End of Year Review – professional practice rating      + 2B2: Interim Appraisal        - Informal Observations – focusing on PGP growth components        - Collaborative PGP – review and/or revise        - End of Year Review – professional practice rating      + 2B3: Interim Appraisal        - Informal Observations – focusing on PGP growth components        - Collaborative PGP – review and/or revise        - End of Year Review – professional practice rating   2. Track 3 Intensive Support Status      + Collaborative Intensive PGP – review and/or revise often      + May include informal and formal observations      + Frequent teacher and evaluator conferences        - Teacher may remain in this track for two semesters; and two additional semesters may be added if improvement is observed.   3. Understands that TESS does not conflict with, nor replace the Arkansas Teacher Fair Dismissal Act (ATFDA) |
| **7. Professional Growth Plan (PGP)** | * 1. Understands that the PGP is a major component of TESS   2. Understands that the PGP identifies professional learning outcomes to advance the teacher’s professional skills   3. Understands that the PGP clearly links professional development activities and the teacher’s individual professional learning needs identified through the evaluation process |

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|  | * 1. Understand that the PGP requires at least ½ of the professional development hours required by law or rule are related to one or more of the following:      + Teacher’s content area      + Instructional strategies applicable to the teacher’s content area      + The teacher’s identified needs |
| **8. Mentor Process** | 8.1 Understands that each mentor/novice teacher pair will be provided frequent meeting time face-to-face and/or electronically on at-least a once a month basis to spend together for mentoring.  8.2 Understands that each novice teacher will be paired with a mentor who is matched as closely to grade and subject level as possible.   * 1. Understands that the goal of mentoring is to provide continuous professional growth for the novice teacher.   2. Understands that mentors assist the novice teacher in      + the implementation of the goals in the Professional Growth Plan, which is developed by the novice teacher and his or her administrator      + identification and celebration of strength areas      + procurement of resources (both human and material) * identification of professional development opportunities * in-class coaching sessions, which provide growth opportunities for the novice teacher with rich, professional conversation between the novice teacher and the mentor |

## 2E. Course Syllabi for all Courses listed in the Program of Study

### 2E.i. Syllabi for Professional Education Courses, supporting Arkansas Teacher Standards and TESS Competencies

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|  | **REQUIRED Education COURSES**  These 6 courses meet the TESS and Arkansas Teacher Standards competencies |
| ARSC 1201 | Inquiry Approach to Teaching |
| ARSC 1221 | Inquiry-based Lesson Design |
| STEM 2103 | Knowing & Learning |
| STEM 2203 | Classroom Interactions |
| STEM 3303 | Project-based Instruction |
| STEM 4409 | Supervised Clinical Teaching (Internship) |

#### ARSC 1201 Inquiry Approach to Teaching

UAteach Step 1: Inquiry Approaches to Teaching

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| **Instructor** (Mathematics) | **Instructor** (Science) | **Instructor** (Science) |
| **Instructor:** Dr. Kim McComas  *Math Teacher Advisor*  **Office Phone**: (479) 575-3280  (479) 935-5334 cell  **Office Hours:**  ½ hour before and after classes  **E-mail:** [kmccomas@uark.ed](mailto:kmccomas@uark.ed)u | **Instructor:** Ms. Michelle Childress *Physics/Chemistry Teacher Advisor*  **Office Phone:** (479) 575-3280  (479) 935-7150 cell  **Office Hours:**  ½ hour before and after classes  **Email:** mjc1219@uark.edu | **Instructor:** Dr. Peggy Ward  *Biology Teacher Advisor*  **Office Phone:** (479) 575-3280  (479) 216-0229 cell  **Office Hours:**  ½ hour before and after classes  **Email:** pdward@uark.edu |

Class Location: **UAteach House**, **946 W. Clinton Drive (UTCH) 575-3280 Sheri Vaughan, Assistant Director**

Note: there is NO STUDENT PARKING at the UAteach house,

except for temporary pick up and drop off of teaching materials – violators may be towed!

Blackboard Website: [**learn.uark.edu**](https://learn.uark.edu)UAteach website: **teach.uark.edu**

*Blackboard works best when using Mozilla Firefox browser and Chrome. Blackboard Support says it does not work as well on Safari and Internet Explorer. Blackboard Support (575-6804) is very helpful. You can call or go by their office in Gibson Annex, and they are available in the evening.*

Course Prerequisite: An interest in exploring teaching math or science

**Course Description/Overview**

This course will provide students with:

* An opportunity to explore teaching in science or mathematics as a career
* Experiences in teaching in middle schools classrooms
* An introduction to the theory and practice that is necessary to design and deliver excellent instruction

Students will attend class on campus each week, where they will learn to design and deliver inquiry-based science/mathematics lessons. Students, working in pairs, will observe a mentor teacher twice in a local middle school classroom, then present lessons in that classroom three times during the semester. The mentor teacher will remain in the classroom at all times, providing immediate and ongoing feedback to improve instruction as the semester progresses. Considering travel time to and from the school, a minimum of a 2-hour block of time is needed for each visit. Field practicum assignments are based on the schedules and transportation needs of the students, and schedules of mentors.

**Course Objectives**

*By participating in class activities, assignments, and field experience, the prospective educator will be able to:*

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| Objectives | Connections to Arkansas Teaching Standards  And TESS Competencies |
| Demonstrate science or mathematics content knowledge in the planning and teaching of upper elementary grade lessons. | Standard #4: Content Knowledge. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.  TESS 1a. Demonstrating Knowledge of Content and Pedagogy  TESS 3a. Communication with Students |
| Utilize exemplary sources of and appropriate resources (including appropriate technologies) for inquiry-based science and mathematics lessons. | Standard #4: Content Knowledge.  Standard #8: Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.  TESS 1.d. Demonstrating Knowledge of Resources  TESS 1.e. Designing Coherent Instruction |
| Write performance objectives aligned with national and state standards and assessments of those objectives for each lesson. | Standard #6: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.  Standard #7: Planning for Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.  TESS 1.c. Setting Instructional Outcomes  TESS 1.f. Designing Student Assessments |
| Design and implement inquiry-based lessons using the 5E Instructional Model. | Standard #4: Content Knowledge.  Standard #7: Planning for Instruction.  Standard #8: Instructional Strategies.  TESS 1.c. Setting Instructional Outcomes  TESS 1.e. Designing Coherent Instruction  TESS 1.f. Designing Student Assessments |
| Develop basic classroom management techniques based on mentor’s classroom routines and practices, as well as from Step 1 class discussion. | TESS 2.a. Creating an Environment of Respect and Rapport  TESS 2.c. Managing Classroom Procedures  TESS 2.d. Managing Student Behavior |
| Demonstrate awareness of diversity within classrooms, special needs and English language learners, discuss the implications for teaching and learning, and explore strategies for achieving instructional equity. | Standard #2: Learning Differences. The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.  TESS 1.b. Demonstrating Knowledge of Students  TESS 1.c. Setting Instructional Outcomes  TESS 3.e. Demonstrating Flexibility and Responsiveness |
| Develop and use probing questions to elicit feedback to determine students’ misconceptions, alternative conceptions, and acquisition of knowledge. | Standard #4: Content Knowledge.  Standard #5: Application of Content. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.  Standard #6: Assessment.  TESS 3.b. Using Questioning and Discussion Techniques  TESS 3.d. Using Assessment in Instruction |
| Write reflections on the 3 teaching experiences based on personal experience, formative assessment during the lessons, and mentor and/or instructor feedback, with suggestions for revising lessons. | Standard #1: Learner Development. The teacher understands how learners grow and develop, recognizing the patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.  Standard #9: Professional Learning and Ethical Practice. The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.  TESS 3.e. Demonstrating Flexibility and Responsiveness  TESS 4.a. Reflecting on Teaching |
| Demonstrate proficiency in the use of technology for professional productivity and student engagement with instruction. | Standard #8: Instructional Strategies.  TESS 1.d. Demonstrating Knowledge of Resources  TESS 3.c. Engaging Students in Learning |
| Plan for and implement safe instructional practices. | Standard #7: Planning for Instruction.  TESS 1.e. Designing Coherent Instruction  TESS 2.e. Organizing Physical Space |
| Reflect on personal interest in teaching. | Standard #9: Professional Learning and Ethical Practice.  TESS 4. a. Reflecting on Teaching |

**Instructional Emphasis**

In this course, students focus on lesson preparation and practice, as well as on thoughtful reflection on their classroom observations and teaching experiences. Step 1 instruction emphasizes inquiry-based learning using the 5E Instructional Model, developed in the late 1980s by the BSCS Center for Curriculum Development. Useful information about this model can be found in The BSCS 5E Instructional Model: Origins and Effectiveness available at <http://www.bscs.org/bscs-5e-instructional-model>.

**Students are expected to:**

* Attend all classes
* Keep a folder of all course handouts and lesson plans
* Check university e-mail daily (we only meet once a week, and often need to communicate in between classes.)
* Work responsibly with a partner (Attendance is important so that your partner does not work alone.)
* Clean up and return materials after each class activity and practicum lesson.
* Always conduct yourself in a professional manner, following Guidelines of Professionalism and the Tenets of Scholar-Practitioner
* Become proficient in instructional technology that aids in the delivery of their lessons.
* Complete all assignments as listed in this syllabus.
* Check your grades on Blackboard

Assignments/Grading Policy

|  |  |
| --- | --- |
| **Assignment/Activity** | **Points Possible** |
|
| Participation and attendance  (3 point deduction for each absence) | 15 |
| Blackboard Quizzes: Syllabus (2) and Professionalism (2) | 4 |
| ***Reflections submitted on Blackboard***  Observation 1 Reflection (3)  Observation 2 Reflection (3)  Lesson 1 Reflection (4)  Lesson 2 Reflection (4)  Lesson 3 Reflection (4) | 18 |
| Lesson 1 *(progress documented on check-off sheet)* | 11 |
| Lesson 2 *(progress documented on check-off sheet)* | 11 |
| Lesson 3 *(progress documented on check-off sheet)* | 11 |
| 5 Article readings: ”Read, reflect, and reply” (3 points each) | 15 |
| Final presentation (finals week) –must attend full 2 hours | 12 |
| Professionalism (readiness for class, communication, cooperation, collaboration, proper dress and behavior in schools…) | 3 |
| **Total Points Possible** | **100** |

**Participation Grade:**

Students will earn 15% of their grade for class participation. Full participation points require arriving to each class session on time and staying until the session ends. **If you are absent, 3 points will be deducted from your participation points.** The class meets only once per week, and there are no textbooks. Missing class means you will miss essential information and experiences (lesson planning, practice time, partner accountability, model lessons, etc.), and you will inconvenience your partner and miss the opportunity to plan your lessons together in class. However, because absences are sometimes unavoidable, in the event you must be absent, please do the following:

* Contact the instructor via email
* Contact your teaching partner to coordinate any lesson planning

**Blackboard Online Quizzes**

During weeks 1& 2, access Blackboard and take the designated quizzes. You will find them located in the Content Folder on Blackboard. The quizzes are meant to encourage you to be familiar with these important documents (syllabus and professionalism standards) and to help you get acclimated to Blackboard.

**Reflections**

The 2 Observation Reflection and 3 Lesson Reflection assignments are found in the Content Folder on Blackboard. Following each classroom observation or teaching session, you will respond to questions and submit a typed reflection on Blackboard by the end of the week. Always best to write your reflections as soon as possible while the experience is fresh in your mind.

**Lesson Plans (11 points per lesson)**

Write your lessons using a 5E Lesson Template, and follow the Lesson Check-off Sheet for a series of approvals, emailing your lesson plan as indicated to your instructor and to your mentor, etc. Choose one partner per lesson to be in charge of emailing and communicating recommended changes to the other partner. Always copy your instructor on emails to your mentor. After you have taught your lesson, you will hand in the lesson check-off sheet along with your mentor’s feedback form.

**5 Article Readings: “Read, Reflect, and Reply”**

During the week of assigned readings, on the Blackboard Discussion Board, students will 1) **read** specified articles, which are posted on Blackboard; 2) write a 2 paragraph r**eflection** based on the main idea of the reading and your personal perspective (experiences, opinions, thoughts…) about the topic, and 3) each student will **reply** to one other person’s post. Detailed directions are on Blackboard.

**Final Presentation (Final Exam Period):**

Each student team will showcase a part of one of their 3 lessons.

**Professionalism:**

It is important that emerging professionals always be aware of how they conduct themselves as professionals in a public arena. Professionalism consists of many attributes including being prepared for class, communicating clearly and respectfully, working hard to cooperate and get along with others even when you have a difference of opinion, sharing work responsibilities equitably when working within a group dynamic, and adhering to all the professional guidelines. The instructor will award professionalism points based on observations during class, in the field, feedback from the mentor, partner collaboration.

**Cell Phones** - As an aspect of professionalism and a mindset that your full attention should be directed toward the class, **all cell phones should be put away during class time.** If you feel you must take a phone call or text, please quietly excuse yourself from the classroom to do so – those should only be emergency situations.

**Grading Scale**

90 -- 100 = A

80 -- 89 = B

70 -- 79 = C

60 -- 69 = D

Below 60 = F

**Late Work**

The instructors reserve the right to not accept assignments that are turned in late without permission, or to reduce the grade when turned in late. Please communicate any issues you have with your instructors.

Practicum (‘field experience’)

1. You will observe your mentor teacher’s class twice during the first part of the semester.
2. You and a teaching partner will teach three hands-on science/mathematics lessons in a local elementary school. Class time is scheduled for you to prepare these lessons, and you will be given the resources for the topic that your mentor has requested you teach.
3. Written lesson plans will be turned in and revised prior to teaching the lesson. You must practice all lessons before going out to teach. You will also send each lesson plan as an e-mail attachment to your mentor teacher at the school before you teach the lesson. Please “copy” your instructor on all emails with your mentor, and “copy” your partner when emailing your instructor or mentor about the lesson you are mutually planning.
4. For security reasons, all schools require that you sign in at the front office of the school each day that you visit and wear a visitor badge – most schools scan your driver’s license the first time you come.
5. Dress appropriately and professionally when going to schools. Your cell phone should remain off while you are in the school.
6. Your mentor teacher will give you written feedback at the end of each lesson taught. You are responsible for providing a “hard copy” of the feedback form to your mentor teacher before you start to teach your lesson (extra copies are usually kept in your bin folder). You are responsible for getting that form from your mentor teacher before you leave the class, or confirm that the teacher will email it to you.
7. If you need to reschedule a lesson with your mentor, you must email your instructor of the change.
8. If an emergency arises and you have to miss your scheduled teaching day, notify your partner and the mentor teacher immediately. Remember that you mentor teacher will unlikely have time to check a cell phone during the day, nor an email, so if you do not reach your mentor right away, call the school directly and ask that a message gets delivered to your mentor immediately. Also call/text your instructor’s cell, and if she is not available, notify Sheri at the UAteach house number 575-3280. If one of you can’t teach that day, your partner should teach the lesson alone if the mentor requests, but it is preferable to re-schedule the lesson. Make sure both partners have a copy of the lesson plan, and be sure to carry your contact sheet with necessary phone numbers: mentor teacher (if the mentor offers), school, instructor, and partner. One of the Step 1 instructors, or a teaching assistant, will come to the school to observe one of your lessons in order to provide more feedback.

**Special Notes**

* The UAteach program is dedicated to increasing the number of quality math and science teachers. For Fall 2016, as an incentive for students to ‘try out’ math and science teaching, Step 1 tuition is refunded to **math or science majors** who receive a C or higher in the course. The refund is deposited to your student account.
* **Inclement weather**: Sign up for the university’s RazALERT Emergency Notification System on your UAConnect account. However, your field placement school may close even when the University has not closed, particularly rural districts. Check school websites for closing information, or call the school.  **The expectation is that you will use sound judgment concerning your safety – do not drive if you feel uncomfortable!**
* **Center for Educational Access:** please let your instructor know if you need accommodations!

**Academic Honesty and Integrity**

Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy,’ which may be located at <http://provost.uark.edu/245.php> Students with questions about how these policies apply to a particular course or assignment must immediately contact their instructor. Students who violate university rules on academic honesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University.

**Four Tenets of a Scholar-Practitioner in Teaching**

All candidates pursuing teaching licensure in conjunction with the College of Education and Health Professions are expected to consider and apply the principles of the conceptual framework known as *Scholar-Practitioners*, throughout their program of studies*.* The scholar-practitioner reflects a professional who is **knowledgeable** about subject matter and pedagogy; **skillful** in teaching and managing classrooms and schools; **supportive** and caring about students, families, school staff and the community, diversity; and constantly inquiring to improve themselves as a **professional** to increase the success of students, schools and the community.

#### ARSC 1221 Inquiry – based Lesson Design

UAteach Step 2 – Inquiry-Based Lesson Design (ARSC 1221)

**SYLLABUS**

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| **ARSC 1221**  **Tuesday 11:00-12:15** | | |
| **Instructor (Science)** | **Instructor (Math)** | **Instructor (Science)** |
| Instructor: Michelle J. Childress  Office Phone: (479) 575-3280  Office Hours: 10:30-11:00 and 12:15-12:45 or by appointment  Email: [mjc1219@uark.edu](mailto:pdward@uark.edu) | Dr. Kim McComas  Office Phone: (479) 575-3280  Cell: (479) 935-5334  Office Hours: 10:30-11:00 and 12:15-12:45 or by appointment  Email: [kmccomas@uark.edu](mailto:kmccomas@uark.edu) | Instructor: Peggy Ward  Office Phone: (479) 575-3280  Office Hours: By appointment  E-mail: [pdward@uark.edu](mailto:pdward@uark.edu) |

Class Location: **946 W. Clinton Dr**.  **Fayetteville, AR – 72701 (UTCH)**

*There is no student parking at the UAteach House*

Course Prerequisite(s): **Step 1 and** **an interest in exploring teaching**

Blackboard Website: [**https://learn.uark.edu**](https://learn.uark.edu)

**Recommended Supplies:**

USB flash drive (especially in case wireless is not sending to printers)

Folder for keeping handouts and lesson plans organized

Course Requirements: **Students must be able to:**

Create and work with Microsoft® Word documents

Check e-mail daily

Attach Microsoft® Word documents to e-mail messages

Check the Blackboard course Web site weekly

If assistance is needed to meet these requirements, please see your instructor. Help is always available upon request**.**

**Course Description/Overview**

This course will provide students with:

* an opportunity to explore teaching in science or mathematics as a career
* early field experiences in teaching
* an introduction to the theory and practice that is necessary to design and deliver excellent instruction
* Students will attend one and a quarter (1.25) hours of class on campus each week and learn to design and deliver excellent science/mathematics lessons. To obtain first-hand experience with an inquiry-based curriculum, students will work closely with a UAteach Master Teacher to design and develop three inquiry-based lesson plans. UAteach students are also assigned to work with a mathematics /science Mentor Teacher in a local middle school to observe twice and then teach a thematic unit of three inquiry-based lessons. The mentor teacher will remain in the classroom at all times and provide immediate feedback on the quality of the instruction. Field assignments are based on the schedules and transportation needs of the students. Students will utilize a team approach and work in pairs of two to design, develop, and implement inquiry-based lesson plans.

**This course is a continuation of Step I: Inquiry Approach to Teaching and emphasizes writing good 5E lesson plans, with a focus on the importance of using appropriate questioning and assessment strategies throughout the lessons, and utilizing appropriate technology during at least one of the lessons. Students develop written assessments for performance objectives, and will collect student work. Each UAteach student will select the work of 5 students to follow throughout the course of 3 lessons, and write an analysis of those students’ thinking about the concepts taught. Students will modify one of the lessons taught, taking into account the results of the assessments, their reflection on how successful the lesson was, and feedback from observers (Mentor Teacher, Instructor, or Teaching Assistant) to present briefly on final exam day.**

**Course Objectives**

*By participating in class activities, assignments, and field experience, the prospective educator will be able to:*

Demonstrate science and mathematics content knowledge in the design and teaching of middle school lessons aligned with district curriculum and state standards.

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| Objectives | Connections to Arkansas Teaching Standards  And TESS Competencies |
| Utilize exemplary sources of inquiry-based mathematics or science lessons. | Standard #4: Content Knowledge. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.  Standard #8: Instructional Strategies. The teacher understand and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.  TESS 1.d. Demonstrating Knowledge of Resources  TESS 1.e. Designing Coherent Instruction |
| Identify the unique attributes of adolescent students and implement teaching strategies that are effective in the middle school environment. | Standard #2: Learning Differences. The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.  TESS 1.b. Demonstrating Knowledge of Students  TESS 1.c. Setting Instructional Outcomes  TESS 3.e. Demonstrating Flexibility and Responsiveness |
| Design and teach an inquiry-based unit of three lessons using the 5E Instructional Model. | Standard #4: Content Knowledge  Standard #7: Planning for Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.  Standard #8: Instructional Strategies.  TESS 1.c. Setting Instructional Outcomes  TESS 1.e. Designing Coherent Instruction  TESS 1.f. Designing Student Assessments |
| Plan for and implement safe classroom practices. | Standard #7: Planning for Instruction.  TESS 1.e. Designing Coherent Instruction  TESS 2.e. Organizing Physical Space |
| Discuss strategies for achieving instructional equity. | Standard #7: Planning for Instruction.  Standard #9: Professional Learning and Ethical Practice. The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.  TESS 1.b. Demonstrating Knowledge of Students  TESS 3.e. Demonstrating Flexibility and Responsiveness  TESS 4.a. Reflecting on Teaching |
| Design and teach lessons that incorporate the use of technology. | Standard #4: Content Knowledge.  Standard #8: Instructional Strategies.  TESS 1.d. Demonstrating Knowledge of Resources.  TESS 1.e. Designing Coherent Instruction. |
| Use probing questions to elicit feedback on students’ acquisition of knowledge. | Standard #4: Content Knowledge  Standard #5: Application of Content. The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.  Standard #6: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.  TESS 3.b. Using Questioning and Discussion Techniques  TESS 3.d. Using Assessment in Instruction |
| Use pre- and post-assessments aligned to performance objectives to evaluate student learning, to provide instructive feedback to middle school students, and as a basis for revising lesson plans. | Standard #6: Assessments  Standard #7: Planning for Instruction  TESS 1.c. Setting Instructional Outcomes  TESS 1.f. Designing Student Assessments |
| Provide instructive feedback to peers. | Standard #10: Leadership and Collaboration. The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.  TESS 4.d. Participating in a Professional Community  TESS 4.e. Growing and Developing Professionally |
| Write reflections on the 3 teaching experiences based on personal experience, formative assessment during the lessons, and mentor and/or instructor feedback, with suggestions for revising lessons. | Standard #1: Learner Development. The teacher understands how learners grow and develop, recognizing the patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.  Standard #9: Professional Learning and Ethical Practice.  TESS 3.e. Demonstrating Flexibility and Responsiveness  TESS 4.a. Reflecting on Teaching |
| Assess commitment to pursue teaching as a career path. | Standard #10. Leadership and Collaboration.  TESS 4.e. Growing and Developing Professionally |
|  |  |

**Expectations**

**Attendance**: Students are expected to attend all classes, and sign in every class period to document attendance. Prompt and consistent attendance is critical to success in this class. During class students will: 1) observe and learn from demonstration lessons, 2) develop and practice lessons with your partner, and 3) get feedback from the instructors and other members of the class regarding your lessons. Because the course meets only once per week and there are no texts, missing class means you will miss essential information and experiences. Students must sign in every class period on the designated form. Failure to sign in may result in no participation points for that particular day.

Since most Step 2 students will be working with a partner, the workload for each lesson should be shared equally. If you are not in class, you inconvenience your partner by forcing him or her to work with you outside of class. If you miss a class, it is your responsibility to communicate with your partner about how to coordinate the next lesson. Don’t leave your partner guessing about why you are not in class, or how and when you will get together! **Failure to communicate in a timely manner with your partner and your instructor could result in point deductions on your lesson plan packet.**

In the event of an emergency, which results in an absence, please be courteous and do the following:

* Contact the instructor
* Make arrangements to get any handouts that were distributed.
* Contact your teaching partner to coordinate the next lesson.

Field Experience

* You will observe your mentor teacher’s class twice during the early part of the semester, and, using a writing prompt, write a thorough reflection describing your experiences.
* Dress appropriately and professionally when going to schools. Follow the teacher dress code, which can be found on Blackboard.
* For security reasons, all schools require that you **sign in and out** at the front office each day that you visit. TAKE YOUR DRIVER’S LICENSE – most schools will enter you into their system the first time you come.
* You and a teaching partner will teach three hands-on science/mathematics lessons in a local middle school. The lessons will be chosen in conjunction with your master teacher and your mentor teacher from the approved UAteach lesson bank.
* Written lesson plans will be turned in and revised prior to teaching the lesson. You will practice all lessons before going out to teach. You will also send a final revised and approved lesson plan as an e-mail attachment to your mentor teacher at the middle school where you are teaching and to your UAteach master teacher before you teach the lesson –at least two days in advance of teaching the lesson. (Note: For full credit, you must copy your partner, the master teacher, and your mentor on the email.)
* Your mentor teacher will give you written feedback at the end of each lesson taught, but you are responsible for giving the appropriate form to your mentor teacher before you start to teach your lesson. Your mentor teacher will also write a final evaluation of your progress, which will be completed electronically and filed in the UAteach office.
* Report immediately to the instructor and/or appropriate team members any problems you have, including the need for additional supplies.
* If an emergency arises and you have to miss your scheduled teaching day, notify your partner, your mentor teacher and your instructor as soon as you know- call the school office to let the teacher know if you cannot come at the last minute. Your partner should be prepared to teach the lesson alone if necessary, but often the mentor is willing to let you re-schedule so that both of you can have the experience. (NOTE: If you have unexpected transportation problems, call the UAteach house to see if someone can take you to teach your lesson. Note: DO NOT fail to keep your scheduled teaching assignment unless you have an extreme emergency!)
* One of your UAteach Master Teachers will observe at least one of the lessons you teach.

**Technology Proficiency:** You will be required to have technological literacy when you teach, so you are required to demonstrate some basic technology proficiency in this course. As you progress through the program you will acquire more advanced skills and learn more about how to integrate technology into instruction. These skills will be documented in your program file so that we can certify that you have completed the technology proficiencies required for teacher certification.

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| |  |  |  | | --- | --- | --- | | **Assignment** | **Points Possible** | **Your Scores** | | Class Participation & Attendance  (15 points per class) | 180 |  | | Syllabus and Professionalism Quizzes (BB) | 20 |  | | 2 Article Readings | 50 |  | | Observation #1 | 25 |  | | Observation #2 + Pre-Assessment | 50 |  | | Lesson 1 and Reflection | 150 |  | | Lesson 2 and Reflection | 150 |  | | Lesson 3 and Reflection | 150 |  | | Analysis of Student Thinking | 125 |  | | Final Presentation | 100 |  | | Total Points | 1000 | /1000 | |

Assignments that are not submitted by the due date may lose up to 10% of total points possible each week late.

**Grading Scale**

90 -- 100 = A

80 -- 89 = B

75 -- 79 = C

70 -- 74 = D

Below 70 = F

**Limited Tuition Reimbursement Incentive:** The UAteach program is dedicated to increasing the number of quality math and science teachers. As an incentive for students to ‘try out’ math and science teaching, Step 1 or Step 2 tuition is refunded to students whose major is in one of our secondary licensure areas (mathematics, biology, chemistry, or physics) and receive a C or higher

in the course.

**Other Information**

**Professionalism:** It is important that emerging professionals always be aware of how they conduct themselves as professionals in a public arena. Professionalism consists of many attributes including being prepared for class, being on time, communicating clearly and respectfully, cooperating and get along with others even when you have a difference of opinion, sharing work responsibilities equitably when working within a group dynamic, and adhering to all the professional guidelines.

**Four Tenets of a Scholar-Practitioner in Teaching**

All candidates pursuing teaching licensure in conjunction with the College of Education and Health Professions are expected to consider and apply the principles of the conceptual framework known as *Scholar-Practitioners*, throughout their program of studies*.* The scholar-practitioner reflects a professional who is **knowledgeable** about subject matter and pedagogy; **skillful** in teaching and managing classrooms and schools; **supportive** and caring about students, families, school staff and the community, diversity; and constantly inquiring to improve themselves as a **professional** to increase the success of students, schools and the community.

**Academic Honesty and Integrity:**

Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy,’ which may be located at <http://provost.uark.edu/245.php> Students with questions about how these policies apply to a particular course or assignment must immediately contact their instructor. Students who violate university rules on academic honesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Please be familiar with the Academic Integrity Policy.

**Inclement weather**: If you haven’t already done so, you need to sign up for the university’s RazALERT Emergency Notification System on your ISIS account. However, your field placement school may close even when the University has not closed, particularly in rural districts. Check school websites for closing information. **At any point in time, the expectation is that you will use sound judgment concerning your personal safety**

#### STEM 2103 – Knowing and Learning



***College of Education and Health Professions***

***Department of Curriculum and Instruction***

**Course Number**: **STEM 2103**

**Course Title**: ***Knowing and Learning in Science and Mathematics***

**Credits:** 3

**Semester**: Fall 2016

**Time:**  12:30pm- 1:45pm Tuesday, Thursday

**Room:** UTCH 0100

**Professor**: Stephen R. Burgin, Ph.D.

**Office**: 312 Peabody Hall

**Office Hours:** 12pm-2pm Monday; 2pm-4pm Tuesday, Thursday

**Telephone**: 479-575-4283

**E-mail:** srburgin@uark.edu

**Web Site:** teacharkansas.uark.edu

**Short Description:** This course draws on scholarship in educational psychology to provide a firm foundation for the teaching of science and mathematics by exploring what it means to know and understand in these disciplines, and how that influences instructional methods and assessment.

**Extended Description:** The goal of this course is to develop a powerful tool kit of approaches to mathematics and science instruction based on learning theory. This course focuses on issues of what it means to learn and know science and mathematics. What are the standards for knowing we will use? How are knowing and learning structured, and how does what we know change and develop? For the science and mathematics educator, what are the tensions between general, cross-disciplinary characterizations of knowing (e.g., intelligence) and the specifics of coming to understand powerful ideas in mathematics and science? What are the links between knowing and developing in learning theory, and the content and evolution of scientific ideas? What are the connections between kinds of assessments and theories of knowing? How are various uses of technology associated with specific approaches to learning?

The work of such theorists as Piaget, Bruner, Ausubel, Vygotsky, as well as theories relating to motivation, memory, and identity, among others, will be explored. Students will see that teaching practices 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.

**Prerequisite(s):** Successful completion of ARSC 1221 Step 2: Inquiry-based Lesson Design or approval of instructor

**Relationship to the Knowledge Base:** Practical strategies for initial teacher preparation at the secondary level and a historical and theoretical foundation to enhance scholarship in pedagogy. This class is designed as part of the UAteach Program for the Preparation of Secondary Science and Mathematics teachers but is open to other interested students on request.

**Required Text:**

National Research Council (2000). How People Learn. Washington, DC: National Academy Press.

**Course Objectives**:

Upon completion of this course, you should know and/or be able to do the following:

| Students will be able to… | Evidence of Student Learning: | Connections to Arkansas Teaching Standards  And TESS Competencies |
| --- | --- | --- |
| construct models of knowing and learning to guide classroom practice. | * meaningful contributions to class discussions * comments posted about analysis of readings * analysis of clinical interviews * written examinations * lesson plan enactment | Standard #1: Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.  Standard #8: Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.  TESS 1.b. Demonstrating Knowledge of Students  TESS 3.d. Using Assessment in Instruction |
| articulate various standards for knowing science and mathematics and articulate the implications of these standards for assessment, including standardized assessment. | * meaningful contributions to class discussions * comments posted about analysis of readings * analysis of clinical interviews * written examinations * lesson plan enactment | Standard #7: Planning for Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.  TESS 1.f. Designing Student Assessments  TESS 3.a. Communicating With Students  TESS 3.d. Using Assessment in Instruction |
| articulate what it means to know and learn relative to cognitive structures and describe how what people know changes and develops. | * meaningful contributions to class discussions * comments posted about analysis of readings * analysis of clinical interviews * written examinations | Standard #1: Learner Development.  Standard #8: Instructional Strategies.  TESS 1.b. Demonstrating Knowledge of Students |
| describe various paradigms for evaluating science and mathematics understanding. | * meaningful contributions to class discussions * comments posted about analysis of readings * written examinations | Standard #6: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.  TESS 1.b. Demonstrating Knowledge of Students  TESS 1.f. Designing Student Assessments  TESS 3.b. Using Questioning and Discussion Techniques  TESS 3.d. Using Assessment in Instruction |
| use the clinical interview method to make sense of someone's reasoning about a topic in science or mathematics. | * report including transcription and analysis of clinical interviews * rubric given to students before clinical interview to clarify what will be assessed | Standard #3: Learning Environments. The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.  Standard #2: Learning Differences. The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.  TESS 1.a. Demonstrating Knowledge of Content and Pedagogy  TESS 3.e. Demonstrating Flexibility and Responsiveness |
| express informed opinions on current issues and tensions in education, especially as they relate to mathematics and science instruction. | * meaningful contributions to class discussions * comments posted about analysis of readings * written examinations | Standard #10: Leadership and Collaboration. The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.  TESS 4.d. Participating in a Professional Community |

**Four Tenets of Scholar-Practitioner in Teaching**

All candidates pursuing teaching licensure in conjunction with the College of Education and Health Professions are expected to consider and apply the principles of the conceptual framework known as *Scholar-Practitioners*, throughout their program of studies*.* The scholar-practitioner reflects a professional who is knowledgeable about subject matter and pedagogy; skillful in teaching and managing classrooms and schools; caring about students, families, school staff and the community; and constantly inquiring to better the profession and increase the success of students, schools and the community. The Scholar-Practitioner is **knowledgeable, skillful, caring and inquiring**  and is defined by the following seven tenets:

1. One who accesses, uses, or generates knowledge

2. One who plans, implements, and models best practices

3. One who understands, respects, and values diversity

4. One who is a developing professional and a lifelong learner

5. One who communicates, cooperates, and collaborates with others

6. One who makes decisions based upon ethical standards and professional criteria

7. One who is knowledgeable about teachers and teaching, learners and learning, and schools and schooling

**Grades will be based on the following:**

**Course Requirements & Assessments**:

1. **Class participation/Attendance (10%)**

Attendance and participation are expectations in this course. I take this course very seriously. When you miss class, or come to class unprepared you are in essence limiting your ability to effectively interact with your current and future students. Points will be deducted from this category based on my discretion. 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.

1. **Reading Responses and other Homework Assignments (10%)**

Readings (and discussions) are a significant part of the course; make sure you have access to both the readings and your notes on the reading while in class. All readings, in addition to those from the text, will be available through the University of Arkansas Library, other online sources or posted on Blackboard. You are expected to enhance classroom discussions by completing the assigned readings before class. Contributing to an online reading discussion forum will be required prior to most class meetings. On occasion, other homework assignment tasks will be required.

1. **Lesson Plan Enactment (15%)**

You will identify an activity to be used in secondary STEM education from professional literature or other sources. You will then critically evaluate the effectiveness of that activity based on learning theories discussed in class and the utility of the activity to reveal student understandings. You will then modify/add to/redesign/etc. the lesson/activity and present it to the class during a microteaching experience.

1. **Mid-Term Exam (20%)**

This is a comprehensive exam, sampling from all material covered in the course to this point.

1. **My Thirteenth Winter Reflection Project (10%)**

This semester, you will be reading a book about a unique student’s experience as a seventh grade learner. You will select excerpts from the book and will personally reflect on the significance of those passages to both your past experience and your future teaching.

1. **IPads and Students with Special Needs Project (10%)**

You and a partner will select an App that you think would be beneficial when teaching math or science to students with special needs. You will write a short paper on the App you select and will give a brief presentation to the class.

1. **Clinical Interviews and Analysis (25%)**

You will interview learners about their ideas regarding core disciplinary concepts and/or a problem solving task/activity in STEM. First you will interview both a novice (low-achieving) and an expert (high-achieving) elementary or middle school student from a current or past field experience. Second, you will interview both a novice (underclassmen, non-major, etc.) and expert (major upper class student, graduate student, etc.) adult (over 18). You will then analyze and report on the interview findings in the form of a research poster that will be presented during our exam period.

**Grading Scale**

A 90 - 100%

B 80 – 89%

C 70 – 79%

D 60 – 69%

F Below 60%

Late assignments will be penalized 10% per day late

**Class Cancellation:** We will hold class each week according to the schedule provided in this syllabus. Of course, you should make personal decisions regarding your ability to safely come to class based on weather conditions where you live and travel; however, class will only be cancelled by the instructor who will use email to communicate a decision. If the University is closed, our class will not meet and you may not receive further word from the instructor. Please listen for UA closing announcements on local media.

**The Grade of Incomplete**: A grade of IN can be assigned **only** if there is work not completed because of a documented illness or other emergency occurring after the 12th week of the semester. Arrangements for the IN and removal of the IN are the responsibility of the student by **advance** agreement with the instructor.

**Students with Disabilities:** University of Arkansas Academic Policy Series 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access (contact 479–575–3104 or visit http://cea.uark.edu for more information on registration procedures).

**Academic Dishonesty:** Academic dishonesty involves acts that may subvert or compromise the integrity of the educational or research process at the University of Arkansas, when such acts have been performed by a UA student. Academic dishonesty includes, but is not limited to, any act by which a student gains or attempts to gain an academic advantage for him/herself or another by misrepresenting his/her or another’s work or by interfering with the independent completion, submission, or evaluation of academic work. Academic dishonesty may include those acts defined as research or scholarly misconduct; such academic integrity issues are subject to review under this policy as well as under the University’s *Research and Scholarly Misconduct Policy*. Which policy applies to particular allegations is addressed in more detail below; if necessary, the Research Integrity Officer, in consultation with the student’s dean, shall determine which policy is most appropriate for a given case.

As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.

Each University of Arkansas student is required to be familiar with and abide by the university’s Academic Integrity Policy and Academic Sanction Rubric at provost.uark.edu/245.php. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

Tentative Course Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Topics | Reading | Assignments (not including reading responses/homework) |
| 8/23 | Introduction and Course Overview |  |  |
| 8/25 | What is learning? | HPL Chapter 1 |  |
| 8/30 | What is STEM learning? | Duschl (2008). Science Education in Three-Part Harmony |  |
| 9/1 | Expert versus Novice Learners  Interview techniques | HPL Chapter 2 | 7. Interview Topic and associated literature |
| 9/6 | Nature versus Nurture  Designing interview questions  Conceptual and Procedural Knowledge | Ginsburg (1997). Entering the Child’s mind: The Clinical Interview. |  |
| 9/8 | What is knowing?  Interview practice | Zakkis & Hazzan (1999). Interviewing in Mathematics Education Research;  Kern & Crippen (2008). Mapping for Conceptual Change. | 7. Interview Protocol 1 |
| 9/13 | Behaviorism  (Skinner, Thorndike, Watson) | Skinner (1976) |  |
| 9/15 | Development  (Piaget)  Multiple Intelligences  (Gardner)  Learning Styles | Kamii (1996). Piaget’s theory and the teaching of arithmetic. | 3. Lesson Plan Enactment Identification |
| 9/20 | Constructivism  (Vygotsky) | Driver et al. (1994). Constructing Scientific Knowledge in the Classroom |  |
| 9/22 | Situated Learning Theory  STEM Learning Environments | Lave & Wenger (1991). Situated Learning. Chapter 1. | 3. Lesson Plan Enactment Learning Theory Reflection |
| 9/27 | Classroom Management | HPL Chapter 6 |  |
| 9/29 | Conceptual Change Theory  Misconceptions in Science | Posner et al. (1982). Accommodation of a Scientific Conception: Toward a Theory of Conceptual Change;  Johnstone (2010). You can’t get there from here. |  |
| 10/4 | Effective STEM Teaching | HPL Chapter 7 |  |
| 10/6 | Learning Cycles in STEM Education | Eisenkraft (2003). Expanding the 5E Model. |  |
| 10/11 | Midterm Review |  |  |
| 10/13 |  |  | 4. Midterm Exam |
| 10/18 | Fall Break- No Class |  |  |
| 10/20 | Inquiry  (Dewey, Bruner) | Barrow (2006). A Brief History of Inquiry: From Dewey to Standards;  Bell et al. (2005). Simplifying Inquiry Instruction. |  |
| 10/25 | Argument Driven Inquiry | Sampson et al. (2009)- Science  Choppin (2007)- Math |  |
| 10/27 | Students with Special Needs in Math and Science | My Thirteenth Winter;  Steele and Steele (2003) or Grumbine & Alden (2006) | 7. Interview Set 1 |
| 11/1 | Technology in STEM Education  Modeling in STEM Education  Model Eliciting Activities | My Thirteenth Winter; Krajcik & Merritt (2012). Engaging Students in Scientific Practices: What does Constructing and Revising Models Look Like in the Science Classroom?  Fello & Paquette (2009)- Math  Licata (1999)- Science |  |
| 11/3 | Diversity in STEM Education  Critical Theories | Calabrese Barton (1998). Reframing “Science for All” through the Politics of Poverty. | 3. Lesson Plan Enactment Revisions |
| 11/8 | Implications of Deficit Models in STEM Education | Norman et al. (2001). The Black-white “Achievement Gap” as a Perennial Challenge of Urban Science Education;  Willingham (2010). Ask the cognitive scientist: Is it true that some people just can’t do math? | 5. My Thirteenth Winter Reflection |
| 11/10 |  |  | 3. Lesson Plan Enactment Microteaching |
| 11/15 |  | . | 3. Lesson Plan Enactment Microteaching |
| 11/17 |  |  | 3. Lesson Plan Enactment Microteaching |
| 11/22 |  |  | 3. Lesson Plan Enactment Microteaching |
| 11/24 | Thanksgiving- No Class |  |  |
| 11/29 |  |  | 6. IPad project presentations |
| 12/1 | Interview Analysis  Memory Theory | Brinkmann (2003). Mind Mapping as a Tool in Mathematics Education. | 7. Interview Set 2 |
| 12/6 | Assessment of STEM Learning  Measurements of Intelligence | Britton (2011). Using Formative and Alternative Assessments to Support Instruction and Measure Student Learning;  Sternberg et al. (1998). Teaching for successful intelligence raises school achievement. |  |
| 12/8 | Motivation: Self-Efficacy Theory, Goal Orientation, Regulation, Attribution Theory | Palmer (2005). A Motivational View of constructivist-informed teaching.  Dweck (2007). The perils and promises of praise |  |
| 12/13 | Scheduled Exam Period (1-3pm) |  | 7. Clinical Interview Research Poster Presentations |

#### STEM 2203 – Classroom Interactions

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***College of Education and Health Professions***

***Department of Curriculum and Instruction***

**Course Number**: **STEM 2203**

**Course Title**: ***Classroom Interactions***

*Syllabus updated Jan 19, 2016*

**Semester**: Spring 2016

**Time:**  3:30-4:45pm Tuesday/Thursday

**Room:** UAteach House (UTCH) 946 W. Clinton Dr. 575-3280

**Professor**: Dr. Stephen Burgin

Office: Peabody Hall, 312

Office Phone: (479) 575-4283

E-Mail: srburgin@uark.edu

Office Hours: T-Th: 1:00 - 3:00PM

W: 1:00-4:00PM (*Or By Appointment*)

**Practicum Support:** Stephen Burgin (Physical Science) cell: 757-373-6040

Kim McComas (Mathematics) cell: 479-935-5334 kmccomas@uark.edu

Peggy Ward (Biology) cell: 479-216-0229 [pdward@uark.edu](mailto:pdward@uark.edu)

**Web Site:** teach.uark.edu

**Course website**:

Our page on Blackboard (learn.uark.edu) will be used as the archive of record for the course. Updates to the syllabus, announcements, discussion forums and practicum grades will be posted to Blackboard. If you have any problems using Blackboard, call their support number 575-6804, or drop by their office in the Gibson Annex.

**Course Description:**

This course examines the interplay between teachers, students, and content, and how such interactions enable students to develop deep conceptual understanding of science and mathematics in secondary schools. Students learn a variety of instructional strategies to engage students of diverse backgrounds, acknowledging that quality instruction should reach all learners.

An important focus of Classroom Interactions is on building students’ awareness and understanding of equity issues and their effects on learning. Students are provided frameworks for thinking about equity in the classroom and larger school settings, and they learn strategies for teaching students of diverse backgrounds equitably. Additionally, the course introduces ways in which curricula and technologies are used in classroom settings to build relationships among teachers and students and enhance the learning of science and mathematics. In essence, Classroom Interactions is centered on a close examination of the interplay between teachers, students, and content. Students learn how content and pedagogy combine to make effective teaching.

**Recommended Text:**

Salend, S. J. (2011). Creating Inclusive Classrooms: Effective and Reflective Practices. 7th edition. Pearson.

**Supplemental Readings:**

Readings including excerpts from the recommended text will be available through blackboard.

**Prerequisite:** ARSC 1201 and ARSC 1221

**COURSE GOALS:**

* To make prospective teachers aware of equity and diversity issues in classroom teaching and ways of ensuring that all students have an opportunity to learn.
* To make prospective teachers knowledgeable about the legalities of special education and the strategies for teaching students in an inclusive classroom.
* To make prospective teachers aware of multiple models of teaching and lesson planning.
* To deepen students’ pedagogical knowledge for teaching mathematics and science.
* To encourage prospective teachers to implement effective use of technology in science or mathematics instruction.
* To have prospective teachers to explore ways of probing student understanding through authentic assessment and student artifacts and enhancing student understanding through lesson plans built around models of how people learn.
* To provide strategies for prospective teachers to create environments in which students are active learners, show willingness to take intellectual risks, develop self-confidence, and value knowledge in math and science through appropriate classroom management strategies.
* To familiarize students with what it means to be a professional as a teacher.

**COURSE OBJECTIVES:**

*By participating in class activities, assignments, and field experience, the prospective educator will be able to:*

|  |  |
| --- | --- |
| Objectives | Connections to Arkansas Teaching Standards  And TESS Competencies |
| * Observe, analyze, and discuss how students' knowledge and skills can be built using a variety of instructional strategies (including direct instruction, inquiry teaching, and use of small groups), understand what each model requires of teachers. | Standard #1: Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.  Standard #8: The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.  TESS 1.e. Designing Coherent Instruction  TESS 3.c. Engaging Students in Learning |
| * Be aware of the diversity that exists in a classroom and know strategies for differentiating instruction to make learning accessible to all students. | Standard #2: Learning Differences. The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.  Standard #7: Planning for Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.  TESS 1.b. Demonstrating Knowledge of Students  TESS 2.a. Creating an Environment of Respect and Rapport |
| * Create and evaluate tasks to build students' content knowledge and assess students' content knowledge based on evidence including video and written artifacts. | Standard #4: Content Knowledge. The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.  Standard #6: Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher’s and learner’s decision making.  Standard #7: Planning for Instruction.  TESS 1.a. Demonstrating Knowledge of Content and Pedagogy  TESS 1.f. Designing Student Assessments |
| * Observe and analyze classroom instruction and data on student participation and performance with regard to equitable and diverse participation (whether all students have an opportunity to learn). | Standard #7: Planning for Instruction.  TESS 1.c. Setting Instructional Outcomes  TESS 3.b. Using Questioning and Discussion Techniques |
| * Plan and teach multi-day high school mathematics/science lessons on an assigned topic in a manner that is consistent with the Four Tenets of Scholar-Practitioner in Teaching and the Code of Ethics and Standard Practices for Arkansas Educators. | Standard #4: Content Knowledge.  Standard #7: Planning for Instruction.  Standard #9: Professional Learning and Ethical Practice. The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.  TESS 1.a. Demonstrating Knowledge of Content and Pedagogy  TESS 1.f. Designing Student Assessments  TESS 2.c. Managing Classroom Procedures  TESS 3.c. Engaging Students in Learning |
| * Write reflections on the 3 teaching experiences based on personal experience, formative assessment during the lessons, and mentor and/or instructor feedback, with suggestions for revising lessons. | Standard #9: Professional Learning and Ethical Practice.  TESS 4.a. Reflecting on Teaching  TESS 1.f. Designing Student Assessments  TESS 3.e. Demonstrating Flexibility and Responsiveness |
| * Become more aware of your own strengths and weaknesses in teaching, especially relating to questioning techniques and facilitation of group interaction, as you analyze video of your multi-day lessons. | Standard #9: Professional Learning and Ethical Practice.  Standard #8: Instructional Strategies.  TESS 3.b. Using Questioning and Discussion Techniques  TESS 4.a. Reflecting on Teaching  TESS 4.e. Growing and Developing Professionally |
| * Employ relevant technologies in teaching (e.g., presentation, computer simulation, and graphical analysis & representation software, excel, TI-Inspire and Navigator); analyze how technology can affect classroom interactions. | Standard #7: Planning for Instruction.  Standard #8: Instructional Strategies.  TESS 1.d. Demonstrating Knowledge of Resources  TESS 3.c. Engaging Students in Learning |
| * Create a portion of their preliminary portfolios (Chalk and Wire) and demonstrate beginning competency as measured by the Four Tenets of Scholar-Practitioner, and the Code of Ethics and Standard Practices for Arkansas Educators. | Standard #9: Professional Learning and Ethical Practice.  TESS 4.a. Reflecting on Teaching  TESS 4.d. Participating in a Professional Community |

**Evaluation:**

All assignments will be graded on a 100-point scale. Specific descriptions and rubrics for major assignments will be posted on blackboard. Grades (or category averages) will be weighted as follows:

**In-Class (55% of total grade)**

In-Class Attendance/Participation (including small assignments) 10%

Equity Video (groups) 10%

Technology Demonstration (pairs) 10%

* TI-Nspire (Math)
* Vernier LabQuest Probeware (Science)

Reading Quizzes. 10 unannounced quizzes. Two will be dropped. 10%

Exam 15%

**Practicum (45% of total grade)**

Lesson Plan 1A/1B and Lesson Plan 2 15%

* Lesson Plan 1A/1B (5E/Cooperative Learning)
* Lesson Plan 2 (Your Choice/Questioning

Lesson Analysis 1A/1B and Lesson Analysis 2 20%

* Video Reflections, Analysis of Student Learning, Suggestions for Revision, Summary of Lessons Learned/etc.

Lesson Analysis Presentation including video clips (Final) 10%

***TOTAL 100%***

**Grading Scale**

A 90.0 – 100%

B 80.0 – 89.9%

C 70.0 – 79.9%

D 60.0 – 69.9%

F 59.9 – 0.0%

**Attendance/Participation**

Attendance and academic participation are important. Students are expected to attend class regularly. You cannot participate if you are absent, and participation cannot be made up. Missing class, regardless of the reason, will adversely affect your grade. Additionally, excessive absences from class may result in denial of admission to the UAteach program. If there is an in-class assignment on the day you are absent, you will not be able to make this up. ***Participation includes submission to the Chalk and Wire portfolio, and registering for the Praxis II Principles of Learning and Teaching.***

**Statement of Academic Honesty**

We will fully adhere to the University of Arkansas Academic Policy as stated in the Student Handbook. “As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.”

“Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy’ which may be found at [http://provost.uark.edu/](https://exchange.uark.edu/owa/redir.aspx?C=621c4f206e194be9adbf390eb19f4c23&URL=http%3a%2f%2fprovost.uark.edu%2f) Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.”

Please be aware that plagiarism in any form will not be tolerated. Copying the work of another student or a published source and submitting it as your own without proper citation will result in a score of 0% for the assignment and the matter will be referred to the Office of Academic Integrity for further action. **Students are encouraged to consult the instructor if they have questions regarding these matters.**

**Cancellation:** We will hold class each week according to the schedule provided to you. Of course, you should make personal decisions regarding your ability to safely come to class based on weather conditions where you live and travel; however, class will only be cancelled by the instructor who will use email to communicate a decision. If the University is closed, our class will not meet and you may not receive further word from the instructor. Please listen for UA closing announcements on local media.

**The Grade of Incomplete**: A grade of IN can be assigned **only** if there is work not completed because of a documented illness or other emergency occurring after the 12th week of the semester. Arrangements for the IN and removal of the IN are the responsibility of the student by **advance** agreement with the instructor.

**Students with Disabilities:** University of Arkansas Academic Policy Series 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access (contact 479–575–3104 or visit http://cea.uark.edu for more information on registration procedures).

**Code of Ethics for Arkansas Educators**

The Code of Ethics for Arkansas Educators defines minimum standards of ethical conduct for all licensed educators, approved by the State Board of Education. The ADE Rules Governing the Code of Ethics for Arkansas Educators further define these standards and provides a process for investigating alleged violations.

*Standard 1:* An educator maintains a professional relationship with each student, both in and outside the classroom.

*Standard 2:* An educator maintains competence regarding skills, knowledge, and dispositions relating to his/her organizational position, subject matter, and/or pedagogical practice.

*Standard 3:* An educator honestly fulfills reporting obligations associated with professional practices.

*Standard 4:* An educator entrusted with public funds and property, including school sponsored activity funds, honors that trust with honest, responsible stewardship.

*Standard 5:* An educator maintains integrity regarding the acceptance of any gratuity, gift, compensation or favor that might impair or appear to influence professional decisions or actions and shall refrain from using the educator’s position for personal gain.

*Standard 6:* An educator keeps in confidence information about students and colleagues obtained in the course of professional service, including, secure standardized test materials and results, unless disclosure serves a professional purpose or is allowed or required by law.

*Standard 7:* An educator refrains from using, possessing and/or being under the influence of alcohol, tobacco, or unauthorized drugs or substances while on school premises or at school-sponsored activities involving students.

Tentative Course Schedule

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Topics/Agenda | Reading | Major Assignments |
| 1/19 | Introduction and Course Overview |  |  |
| 1/21 | Diversity  Accommodations | Rousseau & Tate (2003)- Math  Lynch (2001)- Science |  |
| 1/26 | Identity  Gender  Stereotypes  Classroom Management | Gresalfi & Cobb (2006)  Boaler et al. (2000)  Rothstein (2004) |  |
| 1/28 | In Class Equity Videos | Salend (2011) Chapter 1 | Equity Videos |
| 2/2 | Model Eliciting Activities | Fello & Paquette (2009)- Math  Licata (1999)- Science |  |
| 2/4 | Argument Driven Inquiry | Sampson et al. (2009)- Science  Choppin (2007)- Math |  |
| 2/9 | Lesson 1A/1B Planning/Prep |  | Observation 1 This Week |
| 2/11 | Lesson 1A/1B Check-in  Cooperative Learning | Johnson et al. (1994)  Felder & Brent (2001) |  |
| 2/16 | Lesson 1A/1B Check-in  Cooperative Learning | DeJarnette & Gonzalez (2014)- Math  Lin (2006)- Science  Pratt (2003) -Science | Observation 2 This Week |
| 2/18 | Lesson 1A/1B Check-in  Cooperative Learning | Salend (2011) Chapter 4 |  |
| 2/23 | Lesson 1A/1B Practice |  |  |
| 2/25 | Professional Ethics | TBA | Lesson 1A/1B Plan Due |
| 3/1 | Legal Issues related to Special Education | Every Student Succeeds Act NPR Commentary | Lesson 1A/1B Teaching Next Two Weeks  Code of Ethics Reflection |
| 3/3 | Accountability Issues (Norm-referenced versus Criterion-referenced assessments) | TBA |  |
| 3/8 | Funds of Knowledge  Deficit Thinking | Kahle (1996)  Valencia (1997) |  |
| 3/10 | Dyslexia-Dysgraphia  Learning Disabilities  Physical Impairments  Gifted and Talented | Grover et al. (1994)  TBA |  |
| 3/15 | Questioning | Rowe (1986)  Chin (2007)- Science  Wimer et al. (2001)- Math |  |
| 3/17 | Predict-Observe-Explain | Settlage & Southerland (2007). Chapter 4  Kim & Kasmer (2007) | Lesson 1A/1B Analysis Due |
| 3/22 | Spring Break |  | Lesson 2 Planning Over Break |
| 3/24 | Spring Break |  |  |
| 3/29 | Lesson 2 Check-in  Discourse Analysis | Scott et al. (2006)  Chin (2006)  Manouchehri & Lapp (2003) |  |
| 3/31 | Lesson 2 Check-in |  | Lesson 2 Plan Due |
| 4/5 | Assessment | TBA | Lesson 2 Teaching Next Two Weeks |
| 4/7 | Assessment | TBA |  |
| 4/12 | Dr. Burgin Out of Town  Differentiated Instruction | Salend (2011)- Chapter 8, 11 |  |
| 4/14 | Dr. Burgin Out of Town  Technology Demonstration Planning | TBA |  |
| 4/19 | Technology | TBA | Lesson 2 Analysis Due |
| 4/21 | In Class Exam |  | Exam |
| 4/26 | Teacher Beliefs | TBA |  |
| 4/28 | In Class Technology Demonstrations |  | Technology Demonstrations |
| 5/3 | Community/Demographics/SES | Education Trust (2008)  Rivers and Sanders (2002) |  |
| 5/5 | Teacher Beliefs Revisited | Reigle-Crumb & Humphries (2012) |  |
| 5/10 | Scheduled Exam Period (3:15-5:15pm)  In Class Lesson Analysis Presentations |  | Lesson Analysis Presentations |

#### STEM 3303 – Project Based Instruction (PBI)

College of Education and Health Professions Department of Curriculum and Instruction UAteach Program

STEM 3303: Project-Based Instruction (PBI) Course Syllabus

**Fall 2016**

**Course Number:** Stem 3303

**Course Title:** Project Based Instruction (PBI)

Credits: **3**

**Time:** T/R 3:30-4:45 PM

**Room:** UAteach House, 946 W. Clinton Dr.

**Instructor:** Peggy Ward

**Office:** UAteach

**Email:** [pdward@uark.edu](mailto:pdward@uark.edu)

**Phone:** O- (479) 575-3280

C- (479) 216-0229

**Office Hours:** T/R UAteach House 4:45-5:45

**Practicum Support** Mathematics: Kim McComas (c) 479-935-5334

Prerequisites:

Background Checks Completed

Admission to Teacher Education

Successful completion of Praxis PLT

UAConnect Degree Audit

STEM 2103: Knowing and Learning

STEM 2203: Classroom Interactions

Application for Graduation (on UAConnect)- Recommended

Course Textbooks and other Resources:

There is no required textbook for this course; however, the following books are recommended for background information and for your personal library:

Larmer, J., Ross, D., Mergendoller, J. R., & Buck Institute for Education. (2009). PBL starter kit: To-the-point advice, tools and tips for your first project. Novato, CA: Buck Institute.

Markham, T. (2003). Project based learning handbook: A guide to standards-focused project based learning for middle and high school teachers. Buck Institute for Education.

Supplemental readings will be available through the Mullins Library ([libinfo@uark.edu](mailto:libinfo@uark.edu)) or made available through the course website (<https://sites.google.com/site/pbiuateach/>)

PBI Google Site. The syllabus, course schedule, and other resources are available on the course website ((<https://sites.google.com/site/pbiuateach/>). This website will be updated frequently. If you have questions about it contact your instructor ([pdward@uark.edu](mailto:pdward@uark.edu)).

Blackboard. Our page on Blackboard (learn.uark.edu) will be used as the archive of record for the course. You will use Blackboard to upload your assignments, participate in discussion forums, and keep up with your grades in the course. If you have any problems using Blackboard, call their support number 575-6804, or drop by their office in the Gibson Annex

Course Description:

The Project-Based Instruction (PBI) course is based on the premise that project-based instruction engages learners in exploring authentic, important, and meaningful questions of real concern to secondary students. Project-based instruction promotes equitable and diverse participation and engages high school students in learning. They learn fundamental science and mathematical concepts and principles that they can apply to their daily lives.

Whereas in Classroom Interactions, preservice teachers gain experience designing a sequence of several lessons that they teach to a high school class, in PBI, they design a full unit of connected lessons—a skill that is required in Apprentice Teaching. Preservice teachers synthesize a number of the major principles and themes about teaching and learning as they develop an intellectually challenging project-based instructional unit.

Despite its name, PBI incorporates a variety of instructional approaches, focusing on differentiating between project-based instruction and other inquiry-based methods.

Course Goals:

The overall goal of this course is to help mathematics and science pre-service teachers develop the knowledge, dispositions, and skills needed to be effective teachers in middle and high schools.

Course Objectives:

* Discuss and critique the merits of project-based instruction in terms of students’ cognitive development, content-specific participatory practices, equity, and motivation.
* Reflect on applications of educational theory as it relates to classroom practice in the area of project-based instruction.
* Compare, contrast, and evaluate project-based and other instructional approaches, both in general and for particular instructional goals.
* Evaluate the usefulness of technology in achieving learning objectives and select appropriate resources for student use based on the relationship of salient features of the technology to learning objectives.
* Use inquiry methods with high school students to teach math/science lessons.
* Be familiar with the history of project-based instruction, as well as with commonly perceived strength and critiques; describe examples of project-based instruction in math or science and analyze those examples in terms of several well-studied, field-tested models for PBI.
* Use PBL (Project Based Learning) design principles to develop an interdisciplinary, two- to three-week project-based unit for secondary STEM courses that explicitly links to district, state, and/or national content and inquiry standards.
* Create and evaluate alternative assessments appropriate for project-based instruction.
* Discuss lab safety and liability issues related to project based instruction and wet-lab or field environments (Occupational Safety and Health Administration (OSHA) regulations, how to read materials safety data sheets, safe disposal of chemicals, etc.).
* Use relevant technology to develop projects, and integrate technology into curricular units.

Preservice teachers in PBI are also required to spend 2-4 hours observing their mentor teacher’s classroom and getting to know the students. Preservice teachers will be provided with classroom teacher contact information and schedules to better plan these observations. They will record their observations and respond to specific focus questions. Preservice teachers are also encouraged to develop a working relationship with their mentors and the and pursue opportunities to spend additional time in the classroom if such experiences are warranted and if the mentor issues you an invitation to do this.

**Teaching Experiences.** Preservice teachers will be provided with opportunities to work in classrooms teaching 4 project-based lessons that could be used to introduce a project-based instructional unit. These teaching opportunities will occur at local middle and high schools. Draft lessons are due two weeks prior to the teach dates so that review and revision can occur in a timely fashion.

**Dress Code:** Professional dress and grooming are expected from all candidates. Each candidate will confer with the partnership team regarding appropriate dress for the cohort setting. Failure to abide by this code could result in suspension from the clinical experience. Furthermore, because the teacher candidates are always on a virtual interview for future employment, they should dress to convey a desire to impress potential employers.

**Course Evaluation**

**Grading**. Student grades are based on participation in discussions, successful completion of classroom observations, teaching lessons, a final project-based unit, and a completed grant proposal. Grades are determined as follows:

|  |  |  |
| --- | --- | --- |
| **Assignment** | **Points possible** | **Percent of grade** |
| In-class, online, and other participation (including weekly readings) | 100 | 10 |
| Field observations and reflections (4) (Guided reflection prompts) provided) | 100 | 10 |
| Field Experience: Lesson development, implementation, and reflection (4) | 400 | 40 |
| PBI Project Unit (Unit guidelines provided separately) | 300 | 30 |
| Final Project Presentation | 50 | 5 |
| Grant Project | 50 | 5 |
| **Total** | **1000** | **100** |

Note: Late work will be deducted by a minimum of 10% for each week late unless you have made prior arrangements with the instructor and negotiated a change in the due date.

Grading Scale

**Letter Grade Description**

A (90-100%) Represents superior ability or attainment significantly beyond all minimum (required) expectations

B (80-89.9%) Represents good ability or attainment which meets and exceeds many minimum (required) expectations

C (70-79.9%) Represents ability or attainment which is acceptable and meets all minimum (required) expectations

D (60-69.9%) Any grade below a C is unacceptable and will require repeating the course. F (Below 60%)

Bibliography and Suggested Resources

Krajcik, Joseph S. and Czerniak, Charlene M. Teaching Science in Elementary and Middle

School: A Project-Based Approach. 2007, 3rd ed, Taylor & Francis, Inc. Publisher. ISBN-13: 9780805862065,

Read chapter 3: What is a Driving Question?

For Science Majors:

Doran, R. Chan, F. Tamir, P and Lenhardt, C. Science Educator’s Guide to Laboratory Assessment. 2002, NSTA Press Book. ISBN: 978-0-87355-210-3 http://www.nsta.org/store/product\_detail.aspx?id=10.2505/9780873552103

For Math/Engineering Majors:

Thomas, Angelo and K. Patricia Cross. Classroom Assessment Techniques: A Handbook for College Teachers, 1993, 2nd ed, Jossey-Bass Publisher, ISBN-10: 1555425003

Polman, J.L. Designing project-based science: Connecting learners through guided inquiry.

2000, New York: Teachers College Press. Paperback ISBN: 080773912X

Boaler, J. Experiencing School Mathematics: Traditional and Reform Approaches to Teaching

and Their Impact on Student Learning (Paperback), 2002, Lawrence Erlbaum Associates; ISBN 0-8058-4005-2

Bransford, J., Brown, A., and Cocking, R. (Eds.). (1999). How people learn: Brain, mind, experience, and school. Washington, D.C.: National Academy Press.

Articles

Barron, B. J. S., Scwartz, D.L., Vye, N.J., Moore, A., Petrosino, A., Zech, L., Bransford, J.D., and CTGV (1998). Doing with understanding: lessons from research on problem-and-project-based learning. The Journal of the Learning Sciences, 7(3&4), 271-312.

Hartnell-Young (2006) Teachers as designers in computer-supported communities of practice.

International Electronic Journal For Leadership in Learning, 10(3).

Petrosino, A.J. (2004). Integrating curriculum, instruction, and assessment in project-based instruction: A case study of an experienced teacher. Journal of Science Education and Technology, 13(4), 447-460.

Windschitl, M. (2000). Framing constructivism in practice as the negotiation of dilemmas: An

analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers. Review of Educational Research, 72(2), 131-176.

"Diplomas for (Would-Be) Dropouts: Project Learning Serves the Most At-Risk Students | Edutopia." K-12 Education & Learning Innovations with Proven Strategies That Work | Edutopia. Web. 20 Aug. 2010. <[http://www.edutopia.org/at-risk-students-project-learning>](http://www.edutopia.org/at-risk-students-project-learning).

"Powerful Learning: Studies Show Deep Understanding Derives from Collaborative Methods | Edutopia." K-12 Education & Learning Innovations with Proven Strategies That Work | Edutopia. Web. 20 Aug. 2010. <[http://www.edutopia.org/inquiry-project-learning-research>](http://www.edutopia.org/inquiry-project-learning-research).

Additional Reading

Boaler, J. (1997). Experiencing school mathematics: Teaching styles, sex, and settings.

Buckingham, UK: Open University Press.

Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Fundaments of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. Theory into Practice, 31(2), 132-141.

Krajcik, J. S., Blumenfeld, P. C., Marx, R. W., Bass, K. M., Fredricks, J., & Soloway, E. (1998).

Inquiry in Project-Based Science Classrooms: Initial Attempts by Middle School Students. The Journal of the Learning Sciences, 7(3/4), 313-350.

Cross, N. (2004). Expertise in design: an overview. Design Studies, 25(5), 427-441.

Mathematics and Science Standards (Links)

[Arkansas Mathematics Standards](http://www.arkansased.gov/divisions/learning-services/curriculum-and-instruction/curriculum-framework-documents/mathematics) (newly revised)

[Mathematical Practices](http://www.corestandards.org/Math/Practice/)

\*[Arkansas Science Standards](http://www.arkansased.gov/divisions/learning-services/curriculum-and-instruction/curriculum-framework-documents/science)

[Next Generation Science Standards](http://www.nextgenscience.org/)

[Science and Engineering Practices](http://www.nextgenscience.org/sites/default/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf)

Arkansas is currently transitioning from the old Curriculum Frameworks to the new Arkansas Science Standards, which are based on the Next Generation Science Standards (NGSS) ([http://www.nextgenscience.org](http://www.nextgenscience.org/)). As prospective science teachers you need to be know and understand the NGSS. Therefore, all your lessons should reference these rather than the old Curriculum Frameworks.

University Policies

**Special Needs.** University of Arkansas Academic Policy 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately within two weeks of the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access Room 104 in the Arkansas Union (Contact 479–575–3104 or visit [http://cea.uark.edu](http://cea.uark.edu/) for more information on registration procedures).

Academic Honesty.

As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy.

Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy’ which may be found at honesty.uark.edu/policy. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

Please be sure and familiarize yourself with the Academic Integrity Policy (<http://provost.uark.edu/245.php>) and Academic Integrity Sanction Rubric (<http://provost.uark.edu/246.php>).

**University Inclement Weather:** When the University has officially canceled classes because of inclement weather this class will not meet. At other times if you feel the weather is so bad that you would risk an accident to get to class, you are responsible for making your own best decisions in these instances.

For information regarding whether the university is closed for any reason use the following sources:

* See the [Inclement Weather](http://emergency.uark.edu/inclement-weather/index.php) website for more information.
* Call 479-575-7000 or university switchboard at 575-2000 for recorded announcements about closings
* Check voice mail for announcements
* Listen to KUAF Radio, 91.3 FM, or other local radio and television stations for announcements.
* Check the NWA Online News for current closings: [http://www.nwaonline.com](http://www.nwaonline.com/)
* If you haven’t already done so, you need to sign up for the university’s RazALERT Emergency Notification System on your UAConnect account.

**Emergency Preparedness.** Many types of emergencies can occur on campus. Instructions for specific emergencies such as severe weather, active shooter, or fire can be found at <http://emergency.uark.edu/>.

#### STEM 4409: SUPERVISED CLINICAL TEACHING COURSE SYLLABUS

FALL 2016

Instructor: Peggy Ward

Office: UTCH 109/ 946 W. Clinton Dr.

Email: [pdward@uark.edu](mailto:cwissehr@uark.edu)

Phone: (479) 575-3280 (ofc.)

(479) 216-0229 (cell)

Office Hours: By appointment

Course Title: Supervised Clinical Teaching (Apprenticeship) Course Number: STEM 4409

Credits: 9

Time: M 6:00-8:30 pm

Location: UTCH 100/ 946 W. Clinton Dr.

Course Textbooks & Other Requirements:

* Wong, H. K. & Wong, R. T. (2009) The first days of school: How to be an effective teacher (Book & DVD) 4th Edition. Mountain View, CA: Harry K. Wong Pub. ISBN-10: 0976423316
* Danielson, C. (2007). Enhancing professional practice: A framework for teaching (2nd. ed.). Alexandra, VA. ASCD
* Selected Readings (provided)
* Google Drive (docs & sites) Account
* [UAteach Internship](https://sites.google.com/site/uateachinternship/) Website
* Chalk & Wire Learning Assessment Portfolio. ISBN-281000000534B (TBA)

**Course Prerequisites:** Students should have (a) completed all requirements for their content area

bachelor degree, (b) passed all three Praxis exams required for their certification areas, (c) completed their preliminary portfolio evaluation on Chalk & Wire, (d) completed all required courses for their UAteach minor, (e) have an approved Background Check filed with the [ADEAELS](https://adeaels.arkansas.gov/AelsWeb/Search.aspx), (f) been accepted in the  [Teacher Education Program](https://forms.coehp.uark.edu/start?form=teaching), and (g) it is highly recommended that teacher candidates have completed an application for graduation before they begin their internship.

**Course Description**: Supervised Clinical Teaching, or teaching internship, is the apprenticeship experience for UAteach students preparing for careers as secondary mathematics and science teachers. The goal of of the apprenticeship is to provide teacher candidates the experiences, information, and coaching that will enable them to be successful teachers who are leaders in their schools and communities. The teaching internship consists of a semester-long full immersion teaching experience in conjunction with a required weekly seminar that will address experiences, questions and problems encountered in the field.

WEEKLY SEMINAR

**Instructional Emphasis:** The weekly seminar class meets once a week on campus for 2 1/2 hours. In a supportive environment teacher candidates share their experiences and work on solutions for difficulties they are experiencing. They learn about legal and logistical issues in teaching, become familiar with how the diverse components of a high school or middle school are organized into a highly effective system. The course attempts to fill in any gaps in students’ professional development and therefore focuses on classroom and time management strategies, parent/teacher communication strategies, school culture and dynamics that make up an effective middle school and high school system, as well as the legal and logistical issues in teaching. The weekly seminar also provides a guided time for students to work on lesson and unit plans they will use during their

teaching experiences, create their final teaching portfolio (designed to meet state certification requirements) and professional website. Finally, the course also provide opportunities for teacher candidates to develop their resumes, participate in mock interviews, and explore locate state employment information.

Weekly Seminar Expectations:

Attend all class sessions.

Participate in class discussions and activities.

Complete all assignments thoroughly and professionally

Meet all [licensure requirements](http://teacher-education.uark.edu/licensure/index.php) required by the state of Arkansas

**CLINICAL EXPERIENCE**

The clinical experience (i.e. internship) is an integral and vital part of the UAteach secondary education program. It is a full-time field experience that allows interning teachers to make further application of theoretical principles of teaching and learning. It is an opportunity to develop appropriate attitudes and understanding and to acquire knowledge skills, and techniques under the guidance of knowledgeable UAteach faculty who have significant secondary teaching experiences and experienced content specific mentor teachers. The student internship and field experiences reinforce and expand teaching strategies that students have developed through their coursework and previous field experiences.

The internship includes observations, modeling, co-teaching and teaching immersion. Teacher candidates are expected to actively observe and note policy at the beginning of the experience to prepare for the teaching phase, and gradually assume full teaching responsibilities in three-four classes for 10-12 weeks. Near the conclusion of the semester, the mentor teacher gradually resumes all teaching responsibilities, allowing time for the teacher candidates to observe other teachers in the building and/or district.

The clinical experience begins with the fall or spring semester of the partner school and ends with University Graduation.

**Teacher Candidate Expectations:** UAteach teacher candidates will adhere to the policies and guideline of the UAteach Program.

Teacher candidates will:

* Attend school every day, all day for the teacher clinical experience unless there is a serious illness or documented emergency clearly beyond the teacher candidate’s control.
* Eventually take on all of the duties of the mentor in all appropriate classes autonomously 10-12 weeks
* Assist the mentor teacher in performing certain duties, including bus, lunch, and playground; sponsoring or helping with classroom parties, sponsoring special field trips or other projects, and participating in team projects.
* Plan and teach three complete 3-4 week instructional units oin each class.
* Submit lesson plans in advance to the UAteach Master Teacher and the Mentor Teacher and revise as requested.
* Recognize and accept that the mentor teacher has the ultimate responsibility for what you may or may not do in the classroom.
* Demonstrate proficiencies in teaching and obtain documentation through observations and reflections.
* Make yourself available for regular planning and feedback sessions with your mentor teacher and your University instructor.
* Continuously assess your growth as a teacher. Use observational feedback to continually enhance your teaching skills.
* Know and follow the rules, regulations, and policies of the school.
* Maintain an ethical and professional attitude toward all members of the school community. This includes the use of any confidential information you may obtain through student records, conversations, etc.
* Attend regular faculty meetings.
* Meet the principal and administrative staff and become familiar with the school climate and culture.

PROFESSIONALISM

Professionalism requires a high level of mature judgment concerning confidential matters. Student records and information relating to parents, school, staff, and administrative personnel are professional concerns. Confidential matters relating to either school activities or to teacher or pupil behaviors are NOT to be discussed with persons outside the professional experience. Some examples of confidential matters would include, but are not limited to, students’ IQ scores, individual achievement test scores, psychological test information, or any other test results used to determine eligibility for special programs; names of students on free or reduced lunch; family information gained from parent-teacher conferences or from student records; student conduct, behavior, and/or discipline issues.

All teacher candidates will be judged by the quality of their teaching and by their conduct and overall disposition while representing the UAteach Program in the public schools. All teacher candidates must at all times behave at the highest professional level in this program. Failure to uphold the highest standards of behavior will result in removal from the clinical experience and the UAteach Program.

**Promptness and Attendance:** Promptness and regular attendance are a part of each candidate’s professional requirements. Adequate travel time should be allowed to arrive at the school setting on time. Absences and tardiness may result in a grade of incomplete, failure, or dismissal from the program.

Teacher candidates are to be present every day, all day for the teacher clinical experience unless there is a serious illness or documented emergency clearly beyond control. Should an absence be necessary, teacher candidates should inform the mentor teacher, the partnership school, and University supervisor prior to the assigned time of arrival at school. Absences due to illness or other emergency as described above may need to be made up at the end of the term at the discretion of the mentor teacher and university liaison.

Teacher candidates are expected to attend any and all activities as mutually agreed upon by the partnership team, which consists of the university supervisor, mentor, and school principal. Attendance at regular faculty meetings is expected. Teacher candidates will also attend all parent-teacher conferences which do not conflict with regularly scheduled University classes or cohort meetings. The teacher candidates gain insight by attending conferences which address all issues such as placement in special classes, retention, behavior modifications, and so on.

**Other Duties:** In addition to teaching assignments, teacher candidates are expected to assist mentor teachers in performing certain duties, including bus, lunch, and playground; sponsoring or helping with classroom parties, sponsoring special field trips or other projects, and participating in team projects. The commitment of teaching extends beyond the school day and often to weekends. Teacher candidates having campus or community commitments or job responsibilities that interfere with the quality of assigned work may be required to withdraw from the clinical experience.

**Communicating with Families:** Teacher candidates are expected to establish meaningful relationships with parents and families. They should formally introduce themselves and explain their role through written communication. Open communication should be established and maintained through notes, phone calls, and visits with knowledge and approval of the partnership school.

**Dress Code:** Professional dress and grooming are expected from all candidates. Each candidate will confer with the partnership team regarding appropriate dress for the cohort setting. Failure to abide by this code could result in suspension from the clinical experience. Furthermore, because the teacher candidates are always on a virtual interview for future employment, they should dress to convey a desire to impress potential employers.

**Professional Organizations/ Meetings:** Attendance at professional meetings and conferences is beneficial and a critical part of professional development and professional behavior. Mentors should model participation in professional organizations through active membership and attendance at professional meetings. Meetings and conferences outside the immediate purview of the partnership school and district are offered and teacher candidates are encouraged to attend. Teacher candidates will be granted professional leave to attend conferences and will not be counted absent or otherwise penalized.

Teacher candidates explore professional development opportunities beyond the classroom, including attending conferences, subscribing to education journals, joining professional organizations, and conducting presentations in educational settings. Teacher candidates are strongly encouraged to join the appropriate state and national professional organizations. Membership offers multiple benefits to emerging professionals including access to relevant disciplinary resources and a subscription to a professional journal. Joining a professional organization is significantly cheaper for students.

[Arkansas Science Teacher’s Association](http://arkscience.org/) (ASTA)

[National Science Teacher’s Association](http://www.nsta.org/newteachers/) (NSTA)

[National Council for Teachers of Mathematics](http://www.nctm.org/) (NCTM)

ACCREDITATION, POLICIES & PROCEDURES

**Council for the Accreditation of Educator Preparation (CAEP):** As mandated by the state of Arkansas, the University of Arkansas must maintain accreditation through CAEP in order to certify teachers in all of their program areas. Faculty members and teacher candidates are required to collect assessments needed to provide evidence that our graduates are qualified in their content areas, that they are competent teachers, and that they have a positive effect on student learning.

UAteach graduates are certified to teach specific content areas. Therefore, several of the assessments are related to their coursework and expertise in their respective disciplines. Many of the assessments also require evidence from their performance in their field placements.

**Teaching Standards and Competencies:** Secondary preservice science and math teachers must demonstrate knowledge and competency in their licensure areas.

UAteach participants must demonstrate knowledge Mathematics, Chemistry, Life Science, Physics, Physics/Math. See the [AR Educator Competencies](http://www.arkansased.gov/divisions/human-resources-educator-effectiveness-and-licensure/educator-preparation/educator-competencies) for these subjects.

[The Arkansas Teaching Standards (2012)](http://adesharepoint2.arkansas.gov/memos/Lists/Approved%20Memos/DispForm2.aspx?ID=589) identify competencies for all new teachers in all Arkansas colleges and universities.

Preservice math and science standards are held accountable for Council for Accreditation of Educator Preparation (CAEP).

Math: [NCTM CAEP Standards (2012)](http://www.nctm.org/uploadedFiles/Standards_and_Positions/CAEP_Standards/NCTM%20CAEP%20Standards%202012%20-%20Secondary.pdf)

Science: [2012 NSTA Preservice Science Standards](https://drive.google.com/file/d/0BzWrKkVFCLjESXZiaThYWnhtZEE/view?usp=sharing).

[Ethics for Arkansas Educators](http://www.arkansased.gov/divisions/human-resources-educator-effectiveness-and-licensure/professional-licensure-standards-board/code-of-ethics-for-arkansas-educators)- The Code of Ethics for Arkansas Educators defines minimum standards of ethical conduct for all licensed educators (effective 2008).

Passing Praxis I/CORE, Praxis II scores, and the Pedagogy or Principles of Learning and Teaching (PLT) scores must be available to the teacher licensing officer in room 338 GRAD ED

**Scholar-Practitioners:** Graduates from the University of Arkansas are expected to be scholar-practitioners who advocate for the learning of all children in diverse settings. The

scholar-practitioner reflects a professional who is knowledgeable about subject matter and pedagogy; skillful in teaching and managing classrooms and schools; supportive of students, families, school staff and the community; and a professional who continues to learn and who embodies ethical behavior. These four scholar-practitioner tenets are described below:

**Knowledgeable.** Professional educators must possess general knowledge, content knowledge, pedagogical knowledge, and professional knowledge to be effective. They must know how to access, use and generate knowledge. In order to be current, they must be inquiring and up to date on new knowledge in their content, pedagogy, and school systems.

**Skillful.** This includes the pedagogy required to be an effective teacher, administrator, or other school professional. Aspects of a skillful teacher are planning, implementing, and modeling best practices including best technology practices.

**Supportive**. Creating a supportive learning environment for all students and communicating that the educator is there to support student learning is another vital aspect of our graduates. This includes being supportive and responsive to the diverse backgrounds our students bring to the classroom and school. The ability to communicate and collaborate with groups of colleagues and others who contribute to the student’s education such as families and communities is also essential.

**Professional**. As scholars, candidates are expected to continue to inquire and seek to improve their practice. Candidates also participate in professional communities. This involves staying current with educational research and working with appropriate professional organizations to better the professions. The professional candidates demonstrates ethical behavior in all aspects of their multi-faceted

**Chalk and Wire:** Chalk & Wire is the software database program used by the UAteach program to compile and consolidate data from these assessments in order to complete reports as part of accreditation process. All UAteach students are required to purchase this program and keep it up to date each semester by submitting appropriate evidence of the Scholar Practitioner Model of Teaching and Learning. Students can purchase a C&W subscription from the UA Bookstore. If you are buying it for the first time and using it in this class only, you will need a semester’s subscription. If you have already purchased a C&W subscription, it should still be good. (NOTE: WAIT TO PURCHASE THIS UNTIL YOU ARE DIRECTED BY YOUR INSTRUCTOR)

**Teacher Excellence and Support System (TESS)**: The teacher education programs at the University of Arkansas have adopted the Charlotte Danielson Frameworks (see [Smart Card](https://docs.google.com/document/d/1ePfeFKbAx9UAmPa3CNd0wwBvCpA-H1mZwgV_VFQmF0o/edit?usp=sharing)) for evaluating preservice teacher performance. Each student is observed at least three times during the semester (two informal and one formal). Formal summative evaluations will be uploaded to Chalk & Wire and be used for assessment purposes. (See [Summative Evaluation Form](https://docs.google.com/document/d/1lKVg9rTTDtn6D8hSpAUwQqzi1dkdTXmFou0uPgVlxMU/edit?usp=sharing))

**Code of Ethics of the Education Profession:** UAteach and The College of Education and Health Professions Education Preparation Provider (EPP) adheres to the Code of Ethics of the Education Profession as established by the National Education Association. Teacher candidates are expected to adhere to the NEA’s code of Ethics for Teachers, Principle I and Principle II, the Ethics Code for Arkansas Educators, and the guidelines as established by the University of Arkansas and the College of Education and Health Professions. Violation of these principles may result probation, suspension, or dismissal of the internship. Principles I and II are described below:

**Principle I:** *Commitment to the Student.* The educator strives to help each student realize his or her potential as a worthy and effective member of society. The educator therefore works to stimulate the spirit of inquiry, the acquisition of knowledge and understanding, and thoughtful formulation of worthy goals.

In fulfillment of the obligation to the student, the educator –

* Shall not unreasonably restrain the student from independent action in the pursuit of learning.
* Shall not unreasonably deny the student’s access to varying points of view.
* Shall not deliberately suppress or distort subject matter relevant to the student’s progress.
* Shall make reasonable effort to protect the student from conditions harmful to learning or health and safety.
* Shall not intentionally expose the student to embarrassment or disparagement.
* Shall not on the basis of race, color, creed, sex, national origin, marital status, political or religious beliefs, family, social or cultural background, or sexual orientation, unfairly –(a) exclude any student from participation in any program, (b) deny benefits to any student, and (c) grant any advantage to any student.
* Shall not use professional relationship with students for private advantage.
* Shall not disclose information about students obtained in the course of professional service unless disclosure serves a compelling professional purpose or is required by law.

**Principle II:** Commitment to the Profession. The Education profession is vested by the public with a trust and responsibility requiring the highest ideals of professional service. In the belief that the quality of the services of the education profession directly influences the nation and its citizens, the educator shall exert every effort to raise professional standards, to promote a climate that encourages the exercise of professional judgment, to achieve conditions that attract persons worthy of the trust to careers in education, and to assist in preventing the practice of the profession by unqualified persons.

In fulfillment of the obligation to the profession, the educator –

* Shall not in an application for a professional position deliberately make a false statement or fail to disclose a material fact related to competency and qualifications.
* Shall not misrepresent his/her professional qualifications.
* Shall not assist any entry into the profession of a person known to be unqualified in respect to character, education, or other relevant attribute.
* Shall not knowingly make a false statement concerning the qualifications of a candidate for a professional position.
* Shall not assist a non-educator in the unauthorized practice of teaching.
* Shall not disclose information about colleagues obtained in the course of professional service unless disclosure serves a compelling purpose or is required by law.
* Shall not knowingly make false or malicious statements about a colleague.
* Shall not accept any gratuity, gift, or favor that might impair or appear to influence professional decisions or action.

The full document of the Code of Ethics may be found at [http://www.nea.org/code.html.](http://www.nea.org/code.html)

**Corporal Punishment**. Corporal punishment is the responsibility of the public school district. The teacher candidate must not be given the responsibility to administer corporal punishment nor serve as a witness to corporal punishment.

**Firearms and Restricted Items.** Teacher candidates are not permitted to have a firearm or other restricted items such as knives, mace, pepper spray, laser pointers, and so on in his/her bodily possession at any time while on school property. All school grounds are declared firearms, tobacco, alcohol and drug free. Smoking, the use of smokeless tobacco, the use of alcohol or any illegal drug(s) are prohibited at all times.

**Withdrawals.** If it becomes necessary for a teacher candidate to withdraw from the clinical experience, it is the responsibility of the teacher candidate to provide a written explanation to the mentor teacher and the University faculty. The teacher candidate is expected to follow standard University procedures to withdraw from school. In addition, a teacher candidate whose progress is considered unsatisfactory by the mentor teacher and the University faculty, if applicable, may be withdrawn from the clinical experience

by the Associate Dean of Academic Affairs. Should the teacher candidate be permitted to re-enroll in a clinical experience at a later date, he/she may be advised of additional coursework and/or additional requirements necessary before being allowed to re-enroll. Re-enrolling is neither guaranteed nor automatic.

**Grievance or Appeal Procedures.** During the clinical experience, problem situations may arise which require special attention. When such situations do arise, it is recommended that specific procedures be followed to resolve the problem at the level closest to the situation prior to moving to the next level. If a teacher candidate believes that a situation is becoming uncomfortable and could lead to a poor experience, he/she should first discuss these concerns with the mentor teacher and University supervisor. If

unresolved at that level, the principal and/or Program Director should be consulted. The third level involves the University of Arkansas Department Heads and the Associate Dean for Academic Affairs in the College of Education and Health Professions along with the public school superintendent.

Problems that remain unresolved may be appealed through the normal procedures established by the College of Education and Health Professions and the UAteach Program.

**Dismissal Policy.** Teacher candidates may be dropped from further study in the UAteach Program if at any time their performance is considered unsatisfactory as determined by the school/district, University instructor, or the Director of the UAteach Program. Academic dishonesty and failure to maintain a specified cumulative grade-point average may lead to immediate dismissal from the clinical experience program and/or University of Arkansas. Also failure to comply with the rules and regulations of the school district they are placed could lead to dismissal from the UAteach Program.

Academic dishonesty involves acts that may subvert or compromise the integrity of the educational process at the University of Arkansas. Included is an act by which a student gains or attempts to gain an academic advantage for himself/herself or another by misrepresenting his/her or another’s work or by interfering with the completion, submission, or evaluation of work. Each University of Arkansas student is required to be familiar with and abide by the University’s Academic Integrity Policy, (<http://provost.uark.edu/245.php>). Students who violate university rules on academic honesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Please be familiar with the Academic Integrity Sanction Rubric (<http://provost.uark.edu/246.php>). Students with questions about how these policies apply to a particular course or assignment must immediately contact their instructor.

Also, teacher candidates are expected to comply with rules, regulations, and expectations of the school/district in which they are placed. It is the teacher candidate’s responsibility to obtain a copy of the school manual, handbook, policy guidelines, or master contract for teachers, and become familiar with it. Upon request from the school where the teacher candidate is placed, the clinical experience may be terminated by the school’s administration at any time during the experience. If a teacher candidate is removed from the clinical experience setting under such circumstances, a subsequence placement is neither automatic nor guaranteed. This may also lead to immediate dismissal from the College of Education and Health Professions and the UAteach Program.

Any teacher candidate who has been convicted of a felony is not allowed to participate in the UAteach. program. Teacher candidates who have been arrested for crimes which could result in a felony conviction may be removed from their clinical experience placement pending legal resolutions. Please note that the Arkansas Department of Education will not issue a teaching license to individuals with a felony conviction.

**University Inclement Weather:** When the University has officially canceled classes because of inclement weather this class will not meet. At other times if you feel the weather is so bad that you would risk an accident to get to class, you are responsible for making your own best decisions in these instances.

For information regarding whether the university is closed for any reason use the following sources:

See the [Inclement Weather](http://emergency.uark.edu/inclement-weather/index.php) website for more information.

* Call 479-575-7000 or university switchboard at 575-2000 for recorded announcements about closings
* Check voice mail for announcements
* Listen to KUAF Radio, 91.3 FM, or other local radio and television stations for announcements.
* Check the NWA Online News for current closings: [http://www.nwaonline.com](http://www.nwaonline.com/)
* If you haven’t already done so, you need to sign up for the university’s RazALERT Emergency Notification System on your UAConnect account.

**Field Placement Inclement Weather:** Be advised and alert to the possibility that the public school where you are interning may close even when the University has not. For information regarding current school closings consult the following sources:

Check school websites for closing information

Consult the NWA online news for current school closings: [http://www.nwaonline.com](http://www.nwaonline.com/)

NOTE: At any point in time, the expectation is that you will use sound judgment concerning your personal safety.

COURSE EVALUATION

**Course Grades** are determined by the following assignments and criteria and are contingent upon teaching the specified number of days. More detail regarding specific grading criteria for each assignment will be provided.

|  |  |
| --- | --- |
| Weekly attendance & participation | 10% |
| Weekly Assignments (Internship Reports, resume, Teaching Philosophy, cover letters, Flinn Safety etc.) | 15% |
| Unit Plan & Assessment Assignment | 10% |
| E-Professional Portfolio (Evidence of Teaching Proficiency) | 15% |

|  |  |
| --- | --- |
| Completing the field expectations and submitting the three formative evaluations, two summative evaluations with passing scores on each of the four domains | 50% |
| Portfolio Assignment Submissions (You must turn in electronic copies of all assignments which will be used for the UA accreditation purposes. | Required for Graduation |
| Completion of the [AR Licensure Procedures](http://teacher-education.uark.edu/_resources/pdf/licensure/ar_licensure_checklist.pdf) | Required for Licensure |

**Late Work:** To encourage everyone to hand in all assignments, late work will be accepted but may be reduced by 10% for each week (or part of a week) of lateness.

**Students with Disabilities:** University of Arkansas Academic Policy 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately within two weeks of the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access Room 104 in the Arkansas Union (Contact 479–575–3104 or visit [http://cea.uark.edu](http://cea.uark.edu/) for more information on registration procedures).

### 2E.i.i. Syllabi for Professional Education Courses, supporting Arkansas Teacher Standards and TESS Competencies

|  |  |
| --- | --- |
|  | **Elective Courses: Education**  Students must choose 1 elective from this list to deepen their knowledge in an additional area of study |
| CATE 4073 | Teaching Programming in Secondary Schools |
| STEM 4333 | Perspectives on Science and Mathematics |
| SEED 5313 | Theories of Learning Mathematics |
| MATH 2903\* | Functions, Foundations & Models |

**CATE 4073: Introduction to Teaching Programming in the Secondary Schools**

**University of Arkansas College of Education and Health Professions**

**Department of Curriculum and Instruction**

**Program Affiliation:** Career and Technical Education, Business Technology Education and Technology and Engineering Education concentrations.

**Course Number and Title:** CATE 4073: Teaching Computer Programming in the Secondary Schools

**Catalog Description:** This course provides an introduction to the foundations of teaching methods for computer programming in the secondary schools. Methods of computer programming instruction will include teaching strategies in coding, developing computational thinking, problem-solving skills, and applying key programming concepts. This is an introductory level course. No prerequisites are required.

CATE 4073 may be taken for undergraduate or graduate credit.

**Prerequisites:** None

**Instructor:**

**Office:**

**Phone:**

**E-Mail:**

**Relationship to Knowledge Base**: This foundational course supports the “Specialty Studies” component by providing the career and technical education candidate with an in-depth study of teaching computer programming.

**Goals**: This course is designed to provide the candidate with an overview of the methods of teaching computer programming instruction, teaching strategies in coding, computational thinking, problem-solving skills, and applying key programming concepts in the classroom.

**Competencies:** Upon successful completion of this course, candidates will demonstrate knowledge, skills and dispositions in teaching computer programming in the following areas:

1. Develop the ability to write a computer program for creative expression or to solve a real-world problem;
2. Understand the basic design of a computer program;
3. Select and implement the appropriate programming language to solve a problem;
4. Evaluate a computer program and its functionality;
5. Understand multiple ways that digital data can be represented and interpreted;
6. Demonstrate the ability to work with and analyze large data sets;
7. Demonstrate the ability to design, process, and utilize media for desktop and mobile applications;
8. Understand and use computing tools and devices for a variety of purposes;
9. Collaborate in the creation of computational artifacts;
10. Explain the abstractions in the Internet and how the Internet functions;
11. Identify existing cybersecurity concerns and potential options to address these issues with the Internet and the systems built on it;
12. Analyze the beneficial and harmful effects of computing;
13. Explain the connections between computing and economic, social, cultural contexts, and global impact;
14. Utilize the vocabulary, primary concepts, definitions, and models ‎applicable to the secondary computer science classroom; and
15. Demonstrate an ability to use a variety of pedagogical strategies to ‎enhance logical thinking in secondary students.

**Course Outline:**

1. Developing Computer Programs
   1. program design
      1. developing flowcharts
      2. agile method
      3. back-log
      4. pseudo-codes
      5. algorithms
      6. abstractions
   2. writing programs with at least two different languages (Scratch, Java, Javascript, Python, App Inventor, Alice, C+, etc.)
      1. data types and variables
      2. arrays, lists, and sorts
      3. conditional branching and iteration
      4. functions and blocks
      5. events and parameters
      6. operations, operators, and random operation
         1. logic and sequence
      7. encapsulation and recursion
   3. program enhancement and modification
      1. debugging
      2. testing
2. Working with data
   1. representing digital data
      1. binary, decimal, octal, ASCII, and hexadecimal code
   2. examining large data
      1. usage, sorting, and analytics
3. Developing and processing media for desktop and mobile applications
   1. graphics
   2. sound
   3. video
   4. animations
4. Use of computer tools and devices
   1. hardware
   2. software
   3. networks
   4. mobile devices
5. Internet and World Wide Web
   1. structure
   2. coding
   3. cyber-security
   4. ethics (digital responsibility, fair-use)
6. Global impacts
   1. crowdsourcing, social media, data mining

**Evaluation:**

Learning assessments are designed to prepare the student to deliver course related material in the secondary computer science classroom. These assessments will also serve as continuing preparation to teach computer science. Grades for participating students will be calculated based on completion of the following assignments and activities:

1. Individually developed program (agile method)
2. Collaboratively developed program
3. Automated system project
4. Programming log
5. Portfolio/website development project
6. Midterm and final
7. Additional graduate student projects:
   1. develop a client initiated program
   2. develop a program to teach a concept
   3. develop an assistive technology application
   4. develop a program using an additional programming language or platform

**Grading Scale:** A=100-93; B=92-85; C=84-78; D=77-70; F-below 69.

**Academic Honesty:**

As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.

Each University of Arkansas student/candidate is required to be familiar with and abide by the University's 'Academic Integrity Policy' which may be found at<http://provost.uark.edu/> Candidates with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

**Attendance Policy:**

This course is reserved for candidates preparing to become professional teachers. Subsequently, the ethics and responsibilities of professional teachers will be expected of all participants. Candidates must attend class to receive the maximum benefit and to avoid leaving their professional responsibilities in the hands of classmates. Candidates will be allowed two “sick” days regardless if excused or unexcused, if needed. Additional absences will result in the lowering of one letter grade per absence in your final grade. Furthermore, two occasions of coming late to class or leaving early will be counted as one absence.

Candidates are expected to arrive early, stay focused and attentive during the class, and submit all required materials prior to the due date. Late work will not be accepted for full-credit.

**Professionalism**

All candidates are to complete their own work during the semester. Although candidates are allowed to share ideas and learn from one another throughout the semester, students are not allowed to copy another person’s work. All assignments must be original and completed individually unless working as a team on a given assignment.

Candidates are required to maintain professional decorum during class. Cell phones and other electronic devices must be turned off and out of sight during class. Talking on a phone, answering a phone, texting, or using a phone in any way within a group setting is unprofessional. Using a phone in this class (in any way) will impact your preparedness to be a professional teacher and your seriousness as a candidate in this teacher preparation program.

Inappropriate and disruptive classroom behavior (including the use of cell phones, iPads, laptops, and other electronic devices) will not be tolerated, and may result in the loss of points.

**Syllabus Change:**

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

**Research Base:**

**Required Text:** Developed Instructor Materials

**Course Resources:**

In addition to the University library, guest speakers, and journal articles distributed by the professor, the following reference materials will be used extensively:

Arkansas Department of Education, Computer Science and Mathematics Curriculum Framework, 2014

Arkansas Department of Education, Essentials of Computer Programming, Computer Science Curriculum Framework, 2015

Computer Science Principles Course Materials, Springdale High School, 2015

ETS PRAXIS Computer Science Study Companion, code 5651

**Internet Resources:**

There are numerous internet resources that have pre-developed curriculum.

STEM 4333 Perspectives in Science and Mathematics

UNIVERSITY OF ARKANSAS

*College of Education and Health Professions*

*Department of Curriculum and Instruction*

*January 18, 2017 Version*

Course Number: STEM 4333

Course Title: *Perspectives on Science and Mathematics (The Nature of Science)*

Credits: 3

Semester: Spring 2016

Time: Wednesdays 6-8:50 pm

Room: Peabody Hall (PEAH) 206

Professor: William F. McComas, Ph.D. and Stephen Burgin, Ph.D.

Office: 310 Peabody Hall (PEAH) (McComas) PEAH 312 (Burgin)

Telephone: 479-575-7525 (McComas) 757-373-6040

E-mail: [mccomas@uark.edu](mailto:mccomas@uark.edu) / srburgin@uark.edu

Web Site: <http://www.scienceeducation.org>

Course Description: The *Nature of Science* is a label given to content about “how science works” that we want to share with science learners. This content is rich and interesting and draws its knowledge base from the philosophy, history and sociology of science along with elements of the psychology of observations to provide an accurate description of how science functions. This course is designed for individuals who are interested in learning more about the methods and goals of science, the role of scientists and the place of science in society and how such issues can and should be reflected in science teaching and learning. We will read and discuss selections from the works of philosophers of science and from science educators from a philosophical perspective. We will explore the content of the nature of science and use that knowledge as a guide in improving science instruction and developing philosophically appropriate science curricula.

Course Objectives:

The course will focus on discussions and analyses of:

* the methods of science;
* science knowledge production and validation;
* the development and status of laws and theories in science;
* paradigms, revolutions, research programs and falsification;
* the big ideas in the nature of science that science learners should encounter;
* the psychological basis for scientific discovery and knowledge generation, and science teaching models that support education in the nature of science.

Prerequisite(s): None beyond an interest in learning more about how science works and how to teach this fascinating topic.

Required and Recommended Texts: You are expected to be able to access the set of reading outlined in the Syllabus of Readings. In most cases, these readings often come from larger works and as such may be somewhat incomplete in terms of illustrating the author’s total view of the subject. Therefore, you are encouraged to seek out the entire book or article and make your judgments based on that source rather than relying solely on the selection included here. In the course reader, I have provided both the entire original reference and the citations included with the original to help you explore topics of interest more deeply.

Strongly Suggested: The most current version of the American Psychological Association (APA) P*ublication manual of the American Psychological Association*. Washington, DC: American Psychological Association. Note; APA referencing style is used by most in the science education community.

Also, the following works on specific aspects of the nature of science (and mathematics) are recommended:

Carey. S. S. (1994). *A beginner’s guide to scientific method*. Belmont, CA: Wadsworth Pub Co.

Feynman, R. (1992). *The character of physical law*. Cambridge, MA: The MIT Press.

Martinez, A. A. (2012). *The cult of Pythagoras.* Pittsburgh, PA:Univ. of Pittsburgh Press.

Martinez, A. A. (2011). *Science secrets: The truth about Darwin’s finches, Einstein’s wife, and other myths..* Pittsburgh, PA:Univ. of Pittsburgh Press.

McComas, W.F. (Ed.) (1998). *The nature of science in science education: Rationales and strategies.* Boston: Kluwer (Springer) Academic Publishing Company.

National Academy of Sciences (1998). *Teaching about evolution and the nature of science*. Washington, DC: National Academy Press.

Powell, J. L. (1999). *Night comes to the Cretaceous: Comets, craters, controversy and the last days of the dinosaurs*. New York: Harcourt, Brace & Co.

Organization of the Course: The course readings group into major theme areas with the title of each section providing some clues regarding the focus of the reading set. The instructor will present mini-lectures focusing on the central theme of the readings set with student-based discussion. In all cases, it is critical that you come to class having read and carefully considered the assigned material so that you can contribute to an insightful discussion of it. Please note that the history of science will primarily be communicated through instructor-led presentations while the nature of science will be shared through presentations and the vital readings.

Grades are based on some of the following (See chart for specifics):

1. Class Participation; you will earn 3 points for each class session during which you contribute (of course, this is only possible if you are actually in the room!)
2. Paper POMS (Points of Most Significance) (Paper POMS); these are POMS inspired by an individual paper set and represent what you think are the most important points made by the authors of a given paper set or subset. There are three types of POMS, each with its point value.

* Type I SUMMARIZE - reflect on the major idea(s) within the CURRENT readings set (30 words maximum, 3 points maximum)(avoid focusing on just one article).
* Type II SYNTHESIZE – reflect on the major idea(s) within a current set of readings as these ideas relate to those in papers EARLIR in the course (30 words maximum, 4 points maximum).
* Type III APPLY - state a major implication for science teaching (*not* directly provided by the author) that you draw from a given readings set and discuss the means by which the implication can be put into practice (40 words maximum, 5 points maximum). The key is not to defend that we should teach NOS but to focus on how it should be taught.

Please review your POMS statements for clarity and sense (does the statement says what you want it to say and how clearly have you said it).

POMS are due each week there is a set of readings previously assigned, however the POMS may or may not be collected! You must write *3 POMS* statements *(of at least two types)* each week and be ready to provide them to the instructor on a single sheet of paper – either typed (preferably) or neatly printed. Indicate which type you have written next to the POMS statement. Each set of POMS collected and assessed will be worth 15 pts. What this means is that your POMS are evaluated as a percentage for your particular numerator earned and denominator possible (based on the type of POMS you write). The final percentage will be transformed into the 15 pts possible.

*In constructing POMS you are expected to use the reading material assigned but you may cite the extra materials too (and quote things from HOS part of the class too if you like).*

Total points possible for POMS will be about 90 (15 x 6 sets potentially assessed but this may change).

You may revise a POMS set any time *before* it is collected. Even when a POMS set is returned you may revise it (since it may be collected again). You may do this backward from the date of those POMS, but not forward. In other words, any set of POMS should refer only to readings that you would have encountered at the time of the original POMS. You should be prepared to hand in *any set of POMS up through the readings set assigned for the current class session.* See Rules and Hints of POMS for more information.

“Rules” and Helpful Hints for Writing POMS

Rule 1: Be careful about the word limits for individual POMS statements. You can write 30 words for a Type I and II and 40 words for a Type III.

Rule 2: For each POMS Indicate the type (I, II, or III) you intended to write. If your label and type don’t match, I will try to figure out what type it really is and award points appropriately.

Rule 3: You must write THREE POMS per set of readings although perhaps they won’t be collected. If you don’t write three, the missing ones will be awarded 0/3 points.

Rule 4: ALL POMS for a current set of readings must include a reference to AT LEAST ONE of the papers in that week's set.

Rule 5: Points may be lost if significant and obvious connections (citations) are omitted. For instance, you may lose points if you write a Type I POMS that logically could have been a Type II.

Rule 6: State author's name and paper number(s) to make your point (These names and numbers will not be counted for the word limit).

Rule 7: Where possible, cite the authors (by using paper numbers rather than APA style) who support or refute a position with which you would like to draw comparisons or conclusions.

Rule 8: There are a few exceptions, but avoid writing POMS that focus on insights from just one paper.

Rule 9: POMS should be typed or neatly handwritten on one side of a piece of paper with wide margins and spaces between each POMS. Put your name in the top right corner and the readings set (i.e. Set #4) related to the POMS in the top left corner.

1. Theory/Law Project (Individual); find at least five common reference books (dictionaries, encyclopedias, etc.) and five recent science textbooks (from a particular level like secondary biology). Look in the index, glossary, and table of contents for the terms “law” and “theory.” For data, list what you find. For analysis, summarize, analyze and otherwise make sense of what you have found by examining the consensus, utility and accuracy of the definitions and descriptions provided. Write up in lab report format (see example later). Due Week #6
2. Global POMS (Course POMS); these POMS are due at the beginning of the *last* session of the course and should consist of the over-arching ideas communicated within the entire readings package. In other words, these are the BIG ideas of the entire course. You should write eight of these global POMS, each one addressing one of the MAJOR themes of the *Nature of Science* exhibited in the total paper set. By definition, these are Type II POMS. Each global POMS is worth 4 points for a total of 32 points. Due Week #15
3. Final Examination; a traditional assessment of your knowledge, impressions and implications of the big ideas of this course. Time: TBA
4. NOS Lesson Plans + Presentation (150pts total) Preservice Teachers Only

This semester, preservice teacher candidates will be writing two lesson plans explicitly designed to impact secondary learners’ conceptions of NOS.

The first of these lessons will be an individual assignment that must focus on a NOS element(s) related to the *Tools and Products of Science*.

The second lesson plan will be completed in pairs and must focus on a NOS element(s) related to the *Human Elements Science* and/or *Science Knowledge and its Limitations*. This second lesson plan will be taught to the class in a microteaching experience at the end of the semester.

You might write lesson plans in any format (e.g., 5E, Burgin’s template, Danielson’s methods, the way your field-placement mentor teacher writes/has written lesson plans, etc.). Additionally, these lesson plans will be either an inquiry lesson, didactic lesson, laboratory lesson, or some combination thereof. Lesson plans can last anywhere from one class period to five class periods. You may pick an existing lesson/activity that you have found or known about to modify (be sure to include all references and acknowledgments of the sources of those pre-existing lessons), or you may create your own lesson from scratch. Know that regardless of the route you pick, significant revisions will be required for your lessons to focus explicitly on NOS in the context of the science discipline you select and aimed at specific NGSS standards. History of Science may be present but should not be the chief objective of your lessons. That should be reserved for NOS.

Individual Lesson Plan Proposal Due: Session #5 (10pts)

Final Individual Lesson Plan Due: Session #8 (50pts)

Group Lesson Plan Proposal Due: Session #10 (10pts)

Session #10- Lesson planning workshop

Final Group Lesson Plan Due Session #13 (50pts)

Lesson Presentations Session #14-15 (30pts)

1. NOS Lesson Evaluation (40 pts) Inservice Teachers Only

Each preservice teachers will carefully consider and evaluation (in a one-pager) the NOS lessons delivered in class by the preservice teachers. At this point, 40pts is a placeholder. More details will be provided later and will ultimately depend on how many of these one-pagers are written.

1. NOS in the Life and Work of Scientists; For this assignment, choose a rich biography of a scientist, read this biography and pick out all of the aspects of the nature of science illustrated. The key to this assignment is to tell us “how” this scientist does his/her work, how they interacted in the community of scientists or greater society, etc. As you read the book note what seem to be illustrations of how science functions. By the end of the semester, you can check these impressions against the NOS elements that you will have learned. In the paper, you should provide your impressions of the work itself but the key here is not a critique of the writing but the insights you have gotten about the work of the scientist. The paper (perhaps 2-3 pages) is before Week #12 (80pts). Here are *some* suggested books (please get permission before proceeding)

Einstein: His Life and Universe (Isaacson)

Charles Darwin: Voyaging and Power of Places (Vols. I and II) (Browne)

Darwin: Life of a Tormented Evolutionist (Desmond and Moore)

Galilleo: Watcher of the Skys (Wooton)

Rosalind Franklin: Dark Lady of DNA (Maddox)

Isaac Newton (Gleick)

Barbara McClintock: A Feeling for the Organism (Keller)

Map that Changed the World: William Smith and Birth of Geology (Winchester)

1. NOS Research Team (1-2 people max) Project; Design and conduct a study designed to access to public views with respect to the following three questions (although these issues do not have to be phrased exactly as stated below):

1) What is Science?

2) Can Science Answer all Questions? Why/why not?

3a) What is the Scientific Method?

3b) What Methods are commonly used in Science?

Your task (along with *one* partner, if you like) is to collect enough information targeting a specific group of persons (e.g. K-3, 4-6, 7-8, 9-12, adults) to propose conclusions. Where possible, provide verbatim quotes/comments made by respondents as your data along with any interview responses and/or impressions. This assignment is due before Week #13. Please write as a lab report.

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| --- | --- | --- |
| Overview of Graded Assignments |  | Due Date  Spring 2017 |
| A) Class participation (45 pts) |  | Always |
| B) Paper POMS (90 pts total) |  | Always |
| C) Theory/Law Paper (60 pts) See Appendix A |  | WK #7 |
| D) Global POMS (32 pts) |  | May 3 |
| E) Final Exam (65 pts) |  | May 10 |
| F1) Lesson Plans + Presentation (150pts)  See Appendix C |  | WKS#10 and #12 |
| TOTALS | 377 |  |

Note: For any assignments in a "lab report" format, these are the sections to include:

1. Introduction 5. Results/Discussion

2. Research Question(s) 6. Conclusions and Implications

3. Description of you Methodology/Procedure 7. Reference (if applicable)

4. Data Gathered / Observations Made

The Nature of Science for Science Educators / Class Schedule Spring 2017

Session Date Topic

1 JAN 18 Introduction to NOS Class + Science and its Methods (I)

2 JAN 25 An Introduction to Science and its Methods (II)

3 FEB 1 *Tools and Products of Science*: Social Studies of Science and its Logic

4 FEB 8 *Tools and Products of Science*: Science and Its Methods

5 FEB 15 *Tools and Products of Science*: Inductivism-empiricism and HD thinking

6 FEB 22 *Tools and Products of Science*: Images of Science & Methods, Revisited

7 MAR 1 *Tools and Products of Science*: Theories and Laws, the Products and Tools of Science

8 MAR 8 *Human Elements of Science*: Observation & Creativity in Science

9 MAR 15 *Human Elements of Science*: Conceptual Change in Science & Classroom

MAR 22 NO CLASS Spring Vacation

10 MAR 29 Class Planning Discussion Preservice Teachers (Burgin) No Class for Inservice

11 APR 5 *Human Elements of Science*: Society and Science & the Society of Science

12 APR 12 Science Knowledge and its Limitations: Realism, Tentativeness & Technology

13 APR 19 Science Knowledge Limitations: Religion vs. Science or Mixed Blessing?

14 APR 26 Teaching the Nature of Science (Presentations, Part I)

15 MAY 3 Presentations, Part II (Projects, Lesson/Lab Plans)

MAY 10th FINAL EXAMINATION (Will send electronically, details TBA)

Note: You will find that all of the readings relate to the nature of science and/or how to teach aspects of the nature of science, but the class has another very important element – the history of science (HOS). To avoid having you read twice as much (or more) the history of science component of this class is conveyed solely through lecture, making class attendance every more important. The basic content of the history of science is in the final exam but may be referred to in POMS where appropriate.

NATURE OF SCIENCE - READING LIST

*Please read the articles in the order in which they are listed and be sure to read all articles assigned for discussion during a given session.*

*Supporting Materials*

Study Guide Handout: Theory/Law Comparison

Study Guide Handout: Traditional vs. New Views of Science

Key Philosophers of Science

Glossary of the Philosophy of Science

Definitions of Science and Other Statements about its Nature

The Arch of Aristotelian Knowledge

Note 1; please do not be concerned about the age of any of these articles. They have been included, not because I am lazy did not want to update the course, but because they have something important to say. Many things actually get better with age like fine wine and your instructor!

Note 2; articles marked with this symbol “¥ “are optional for all students but may be included in POMS.

Session #1 and 2 Theme: *AN INTRODUCTION TO THE SOCIAL STUDIES OF SCIENCE*

2.1 Brush, S. (2000). Postmodernism vs. Science vs. Fundamentalism: An Essay Review. *Science Education, 84*(1), 114-117.

2.2 Wolpert, L. (1992). Chapter 1, “Unnatural Thoughts” from *The Unnatural Nature of Science*. Cambridge, MA: Harvard University Press.

2.3 Dear, P. (2007). Science as natural philosophy, Science as instrumentality. From *The Intelligibility of Nature.* Pp. 1-14. Chicago: The University of Chicago Press.

2.4 Lindberg, D. C. (1992). What is Science? From *The Beginnings of Western Science*. Chicago, IL: The University of Chicago Press. (Pp. 1-4)

2.5 Achenback, J. (2015, March). Why do reasonable people doubt science? *National Geographic*.

2.6 Schmaltz, R. and Lilienfeld, S.C. (2014, April 17). Hauntings, homeopathy and the Hopkinsville goblins: Using pseudoscience to teach scientific thinking. *Frontiers in psychology 5*(336), 1-5.

Session #3 Domain: THE TOOLS AND PRODUCTS OF SCIENCE

Theme: *THE SOCIAL STUDIES and LOGIC OF SCIENCE*

3.1 Gjertsen, D. (1989). *Science and Philosophy: Past and Present from Science and Philosophy: Past and Present*. London: Penguin Press. (Pp 1-7)

3.2 Klemke, E. D., Hollinger, R. and Kline, A. D. (1988). What is Philosophy of Science? From *Introductory Reading in the Philosophy of Science, Revised*. Buffalo: Prometheus. (Pp. 19-26)

3.3 Rhodes, R. (1986). Atoms and Void, from *Making of the Atomic Bomb.* New York: Simon and Schuster. (Pp. 29-39)

3.4 Casti, J. L. (1989). Faith, Hope and Asperity, from *Paradigms Lost*. New York: William Morrow and Company, Inc. (Pp. 1-15).

3.5 McComas, W. F., Clough, M, and Almazroa, H. (1998). The Role and Character of the Nature of Science (Part I), in W. F. McComas (ed). *The Nature of Science in Science Education*. Boston: Kluwer Academic Publishing Company (Pp. 3-20). Note, article continues in a later readings set.

3.6 Horgan, J. (1992). Intellectual warrior: Karl Popper. Sci. American (November) (Pp. 38-40).

3.7 Wallace, W. L. (1971). Edited selections from *The Logic of Science in Sociology*. New York: Aldine Publishing Company. (Pp. 11-24)

3.8 Richards, S. (1983). Scientific Argument: The Role of Logic from *Philosophy and Sociology of Science: An Introduction*. Oxford: Basic Blackwell (Pp. 14-27)

Session #4 Domain: THE TOOLS AND PRODUCTS OF SCIENCE *Theme: THE METHODS OF SCIENCE (A brief introduction to FORMAL LOGIC*)

4.1 Gjertsen, D. (1989). Is There A Scientific Method? From *Science and Philosophy: Past and Present.* New York: Penguin Books. (Pp. 87-113).

¥4.2 Richards, S. (1983). Philosophies of Scientific Method Theories of Science (Part of Chapter 4) from *Philosophy and Sociology of Science: An Introduction*. Oxford: Basic Blackwell. (Pp. 44-59)

¥4.3 Hempel, C. G. (1966). A Philosopher Gives His Account of the Scientific Method from *Philosophy of Natural Science*. Englewood Cliffs, NJ: Prentice-Hall, Inc. (Pp. 3-18) Note; edited version.

4.4 Mayr, E. (1991). Darwin's Scientific Method from *One Long Argument.* Cambridge, MA: Harvard University Press. (Originally on Pp. 9-11, here reduced to two pages).

4.5 Bauer, H. H. (1994). Chapter 2 from Science literacy and the myth of the scientific method. (p. 19-41). Urbana: University of Illinois Press.

¥4.6 Chamers, A. (1990). *Against Universal Method from Science and Its Fabrication*. Minneapolis: University of Minnesota Press. (Pp. 11-23)

4.7 Millar, R. (1988). What is the 'Scientific Method' and Can It be Taught? From *Skills and Processes in Science Education: A Critical Analysis*. Wellington, J. J. (Ed.) London: Routledge. (Pp. 47-62)

¥4.8 Horgan, J. (May, 1993). Paul K. Feyerabend: The Worst Enemy of Science. *Scientific American* (Pp. 36-37).

4.9 Feyerabend, P. K. (1993). Selection from *Against Method*. New York: Verso. This selection from S. Rosen (ed) (2003). The Philosopher’s Handbook. New York: Random House. p. 495-502.

4.10 Medawar, P. B. (1963). Is the Scientific Paper a Fraud? In P. B. Medawar (1963/1990). *The Threat and the Glory (pp. 228-233)*. New York: Harper Collins.

Session #5 Domain: THE TOOLS AND PRODUCTS OF SCIENCE

*Theme:*  *INDUCTIVIST-EMPIRICISM and HYPOTHETICO-DEDUCTIVISM*

¥5.1 Johsua, S. and Dupin, J. (1986). Is Systematization of Hypothetico-Deductive Reasoning Possible in a class situation? *European Journal of Science Education*. *8*(4), 381-388.

5.2 Holton, G. (1975). Selection from Mainsprings of Scientific Discovery. In *The Nature of Scientific Discovery*. Gigerich, O. (Ed.) Washington, DC: Smithsonian Institution Press. (Pp. 203-208)

5.3 Medawar, P. (1982). Two Conceptions of Science from *Pluto's Republic*. New York: Oxford University Press. (Pp. 28-34).

5.4 Pagels, H. R. (1982). Selection (Pp. 56-59) from *The Cosmic Code*. NY: Simon and Schuster.

5.5 Trefil, J. (1989). Science in Context in *Reading the Mind of God: In Search of the Principle of Universality*. New York: Anchor Books (Originally on pgs 31-44)

¥5.6 Rachelson, S. (1977). A Question of Balance: A Wholistic View of Scientific Inquiry. *Science Education, 61*(1), 109-117.

Session #6 Domain: THE TOOLS AND PRODUCTS OF SCIENCE

*Theme:*  *IMAGES OF SCIENCE: METHODS AND PROGRESS OF SCIENCE*

6.1 Richards, S. (1983). Philosophies of Scientific Method: Theories of Science from *Philosophy and Sociology of Science: An Introduction* (Concluding part of chapter 4). Oxford: Basil Blackwell.

6.2 Nadeau, R. and Desautel, J. (1984). The Khun Development in Epistemology and the Teaching of Science. Toronto, Canada: Guidance Center of the University of Toronto. (Pp. 11-21).

6.3 Anon. (n.d.) Summary of Kuhn's Model of Science.

¥6.4 Horgan, J. (1991). Reluctant revolutionary: Thomas Kuhn. *Scientific American* (May). (48-9).

6.5 Anon. (1964). Book Review: *The Structure of Scientific Revolutions* from *Scientific American*

6.6 Kuhn, T. (1993). Selection from *The Structure of Scientific Revolutions, 3rd edition*. Chicago: University of Chicago Press. This selection from S. Rosen (ed) (2003). The Philosopher’s Handbook. New York: Random House, Pp. 503-519.

6.7 Wallace, B. A. (1989). Views of Science and Reality through History. *Choosing Reality: A Contemplative View of Physics and the Mind*. Boston: New Science (Pp. 24-33).

6.8 Barrow, J. D. (1988). The Different Views of Science from *The World Within the World* Oxford: Clarendon Press. (Pp. 10-12)

6.9 Gould, S. J. (1993). Selection from The First Unmasking of Nature.  *Natural History, 102*(4), (Originally on pages 14-21).

Note; Those in STEM 4333 may read and potentially cite *either* 6.7 or 6.8

Session #7 Domain: THE TOOLS AND PRODUCTS OF SCIENCE

*Theme:*  *THEORIES AND LAWS and the PRODUCTS & TOOLS OF SCIENCE*

7.1 Dilworth, C. (1994). On the Nature of Scientific Laws and Theories, from *Scientific Progress, Third Edition*. Boston: Kluwer Academic Publishers. (Pp. 174-194)

7.2 Trusted, J. (1979). Theories and Laws in *The Logic of Scientific Inference*. New York: Macmillan. (Pp. 70-77).

7.3 Rhodes, G. and Schaible, R. (February, 1989). Fact, Law and Theory: Ways of Thinking in Science and Literature. *Journal of College Science Teaching*. (Pgs. 228-232, 288)

7.4 Sonleitner, F. J. (1989). Theories, Laws and All That. National Center for Science Education. *Newsletter, 9*(6).

7.5 Fleisher, P. (1987). What is a Natural Law (Pgs. 1-4) from *Secrets of the Universe: Discovering the Universal Laws of Science.* New York: Athenaeum.

7.6 Strahler, A. (1992). Selection from *Understanding Science*. Buffalo: Prometheus (Pp. 40-41).

7.7 Crick, F. (1988). Selection from *What Mad Pursuit*. New York: Basic Books, Inc. (Pp. 137-142).

7.8 McComas, W. F. (2003). A Textbook Case of the Nature of Science: Laws and Theories in the Science of Biology. *International Journal of Science and Mathematics Education 1*(2), 141-155.

Session #8 Domain: THE HUMAN ELEMENTS OF SCIENCE

Theme: *OBSERVATION & CREATIVITY IN SCIENCE*

¥8.1 Munby, A. H. (1976). Some Implications of Language in Science Education. *Science Education, 60*(1), 115-124.

8.2 Casti, J. L. (1989). Faith, Hope and Asperity from *Paradigms Lost.*  New York: William Morrow and Company, Inc. (Pp. 16-55).

8.3 Hodson, D (1986). The nature of scientific observation. *School Science Review 68,* (1), 17-29.

8.4 Hainsworth, M. D. (1956). The effect of previous knowledge on observation. *School Science Review, 37*(132), 234-242.

8.5 Holton, G. (1995). Chapter 4 Imagination in Science from *Einstein, history and other passions.*  New York: Addison-Wesley.

8.6 McComas, W. F. and Moore, L. S. (1997). The expectancy effect in the secondary school laboratory: Issues and opportunities. *American Biology Teacher*, 63(4), 246-252.

Session #9 Domain: THE HUMAN ELEMENTS OF SCIENCE

Theme: *CONCEPTUAL CHANGE IN SCIENCE AND IN THE CLASSROOM*

9.1 Barber, B. (1961). Resistance by scientists to scientific discovery. *Science, 134*, 596-602.

9.2 Gould, S. J. (1990). Selections from *Wonderful Life*. New York: W. Norton and Company. Originally on pgs 277-79 and 282-291 in the original.

9.3 Lessem, D. (1993). Weird Wonders Fuel the Battle over Evolution's Path. *Smithsonian, 23*(10), 107-115.

9.4 Lewin, R. (1992). Whose View of Life? *Discover, 15*(5) 18-19.

9.5 Morris, S. C. and Gould, S. J. (1998, December). Showdown on the Burgess Shale. *Natural History*, 48-55.

9.6 Strike, K. A. and Posner, G. J. (1982). Conceptual Change and Science Teaching. *European Journal of Science Education, 4*(3), 231-240.

¥9.7 Gauld (1989). A Study of Pupil's Responses to Empirical Evidence. In *Doing Science*. R. Millar (Ed.) Philadelphia: The Falmer Press/Taylor and Francis. (Pp. 62-82).

9.8 Millar, R. (1989). Bending the Evidence: The Relationship between Theory and Experiment in Science Education. Philadelphia: The Falmer Press/Taylor and Francis. (Pp. 38-61)

¥9.9 Driver, R. (1983). From Theory to Practice from *The Pupil as Scientist?* Philadelphia: Open University Press (Pp. 73-84).

9.10 Driver, R. (1983). Invention and Imagination from *The Pupil as Scientist?* Philadelphia: Open University Press. (Pp. 41-49)

Session #10 Domain: THE HUMAN ELEMENTS OF SCIENCE

Theme: SOCIETY and SCIENCE and the SOCIETY of SCIENCE

10.1 Kiefer, G. F. (1979). Science and Society from *Bioethics: A Textbook of Ideas* (Pp. 413-442).Reading, MA: Addison-Wesley, Inc.

10.2 Thompson, D. (November 23, 1992). Science's Big Shift. *Time*. (Pp. 34-35)

¥10.3 Collins, H. M. (1983). The Sociology of Scientific Knowledge: Studies of Contemporary Science. *Annual Review of Sociology. 9*(1), 265-285.

10.4 Mendelsohn, E. (1977). The Social Construction of Scientific Knowledge. E. Mendelsohn, P. Weingart and R. Whitley (Eds.) The *Social Production of Scientific Knowledge. Sociology of the Sciences*, Vol. I, 3-26. Boston: D. Reidel Publishing Co.

10.5 Lemonick, M. D. (2006). *The Rise and Fall of the Cloning King*. Time, *167*(2).

10.6 Monney, C. (2005). Science Wars II: Science and the Bush Administration. *The Skeptical Inquirer, 29*(6), 30-31. 13.11a

Session #11 Domain: SCIENCE KNOWLEDGE and it LIMITATIONS

Theme: *REALISM, TENTATIVESS and TECHNOLOGY*

11.1 Chalmers, A. F. (1999). Realism and anti-realism (Pp. 226-246) from *What is This Thing Called Science*? Third edition. Indianapolis, IN: Hackett Publishing Company.

11.2 Hodson, D. (1982). Selection from Science -- The Pursuit of Truth? Part I. *School Science Review, 63 (*225) (in the original on pages 643-652).

11.3 Timmer, J. (2006). Scientists on science: Tentativeness. http://arstechnica.com/science/news/2006/10/5609.ars

11.4 Johnson, A.T. and Southerland, S. (2001). The Multiple Meanings of Tentative Science. Paper presented at the 6th meeting of the International History, Philosophy, and Science Teaching Organization. Denver, CO.

11.5 Wolpert, L. (1992). Technology is not Science. In L. Wolpert (Ed). *The Unnatural Nature of Science.* Cambridge: Harvard University Press (Pp. 25-34)

Session #12 Domain: SCIENCE KNOWLEDGE and it LIMITATIONS

Theme: *RELIGION vs. SCIENCE: REAL or IMAGINED BATTLE*

12.1 Gould, S. J. (1997). Non-overlapping magisteria. *Natural History, 106*(2), 16-18, 22, 60-62.

12.2 Woodward, K. L. (1998, July 20). How the heavens go. *Newsweek*, 52.

12.3 Larson, E. J. and Witham, L. (1999, September). Scientists and Religion in America. *Scientific American*, 88-91.

12.4 Tyson, N. deG. (1999, October). Holy wars. *Natural History, 108*(8), 80-82.

12.5 Shermer, M. (2000). Selection from *How We Believe: The Search for God in the Age of Science.* New York: W. H. Freeman and Company.

12.6 Will, G. F. (1998, November 9). The Gospel from Science. *Newsweek.*

12.7 Ruse, M. (2003). The Mismeasure of Science. *Natural History, 112*(6), 52-55 & 58.

¥12.8 Matthews, M. (1989). A Role for History and Philosophy in Science Teaching. *Interchange 20*(2), 3-15.

12.9 Morrison, J. A., Raab, F. and Ingram, D. (2009). Factors Influencing Elementary and Secondary Teachers' Views on the Nature of Science. *Journal of Research in Science Teaching 46*(4), 384-403.

Session #13 Theme: TEACHING THE NATURE OF SCIENCE

13.1 McComas, W. F., Clough, M, and Almazroa, H. (1998). The Role and Character of the Nature of Science (Part II), in W. F. McComas (ed). *The Nature of Science in Science Education*. Boston: Kluwer (Springer) Academic Publishing Company (Pp. 21-39).

13.2 National Research Council (2013). The Next Generation Science Standards (Please see Appendix H and review the NGSS for how NOS fits in the delivery plan). Please note that this document is NOT included in the readings because it is on the web and for those of you who will be science teachers, you should have a personal copy.

13.3 McComas, W.F. and Nouri, N. (2016). The Nature of Science and the Next Generation Science Standards: Analysis and Critique. *Journal of Science Teacher Education*.

13.4 Kampourakis, K. (2016). The “general aspects” conceptualization as a pragmatic and effective means of introducing students to the nature of science. To be published in the *Journal of Research in Science Teaching* (JRST).

13.5 McComas, W.F. (2010). A Typology of Approaches for the Use of the History of Science in Science Instruction. Paper delivered at the 8th International Conference for the History of Science in Science Education. August 16-19th, 2010. Maresias, Brazil.

13.6 McComas, W. F. (1997). The Discovery and Nature of Evolution by Natural Selection. *American Biology Teacher, 59*(8), 492-500.

13.7 Morrison, J. A., Raab, F. and Ingram, D. (2009). Factors Influencing Elementary and Secondary Teachers' Views on the Nature of Science. *Journal of Research in Science Teaching 46*(4), 384-403.

Note: I have reserved time in Session #13 for delivering the NOS lessons created by the preservice teachers. Inservice teachers will have a significant role too!

Session #14 Theme: TEACHING THE NATURE OF SCIENCE

Lessons delivered by the preservice teachers with a significant role for preservice teachers.

FINAL EXAMINATION Time TBA

Note: In previous versions of this class, we have focused a little on the history and nature of mathematics. Although this is *not* included in class this semester, these readings might be of some interest and so I have left them in the course reader.

Theme: Brief Introduction to the History and Philosophy of Mathematics

14.1 Overview of the Video Presentation you have watched

14.2 Rooney, A. (2008). The Story of Mathematics: Starting with Numbers. London: Arcturus Pub Co.

14.3 Rooney, A. (2008). The Story of Mathematics: Early Geometry. London: Arcturus Pub Co.

14.4 Rooney, A. (2008). The Story of Mathematics: Beginning of Algebra. London: Arcturus Pub Co.

14.5 Rooney, A. (2008). The Story of Mathematics: Calculus and Beyond. London: Arcturus Pub Co.

14.6 Crilly, T. (2011). Big Questions in Mathematics: Purpose of Math. London: Quercus Pub Co.

14.7 Crilly, T. (2011). Big Questions in Mathematics: Where do Numbers Come from? Quercus Pub.

14.8 Crilly, T. (2011). Big Questions in Mathematics: Is Math Beautiful? London: Quercus Pub Co.

14.9 Crilly, T. (2011). Big Questions in Mathematics: Is Math True? London: Quercus Pub Co.

14.10 Crilly, T. (2011). Big Questions in Mathematics: Is there Anything Left? London: Quercus Publishing Company.

APPENDIX A

CRITERIA FOR EVALUATING THE THEORY / LAW PAPER (60 pts)

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How well is the paper presented in "lab report format" with all of the

requisite parts such as introduction, research questions, etc.?

\_\_\_\_\_\_\_ / 5pts

Is there a section in which the official/sophisticated definitions of the

terms “law” and “theory” are provided with appropriate references?

\_\_\_\_\_\_\_ / 5pts

Did the paper provide the required number of references (5 references

+ 5 textbooks) defining or illustrating the terms “law” and “theory”?

\_\_\_\_\_\_\_ / 10pts

Quality of the Introduction / Research Questions / Methods Sections?

\_\_\_\_\_\_\_ / 10pts

E) Quality of the Data Section and Discussion of Results?

\_\_\_\_\_\_\_ / 15pts

F) Quality of the Conclusions (and Implications) section?

\_\_\_\_\_\_\_ / 10pts

G) Overall Impression. Neatness, organization and some comparison

to other papers from class members.

\_\_\_\_\_\_\_ / 5pts

OVERALL SCORE \_\_\_\_\_\_\_ / 60pts

APPENDIX B

CRITERIA FOR EVALUATING THE “What is Science?” Research Project

Name(s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Points Earned

Introduction and/or Purpose – an overall description of the \_\_\_\_\_\_\_ / 15 pts

project, its purpose and the focus group (subjects)

experiential goals held for the lesson, etc.

Description of the Data Collection Method - is there enough \_\_\_\_\_\_\_ / 20 pts

information provided so that others can evaluate and/or

repeat the study?

Data – an organized display of information you collected \_\_\_\_\_\_\_ / 25 pts

Discussion/Conclusions – an organized discussion of \_\_\_\_\_\_\_ / 20 pts

what the data mean perhaps including implications

Relative Score - A subjective view of how your \_\_\_\_\_\_\_ / 5 pts

presentation compares with those provided by

other class members (including timeliness and neatness)

OVERALL SCORE \_\_\_\_\_\_\_ / 85 pts

APPENDIX C

NOS Lesson Plans Assignment (150pts)

Note: All portions of the assignment are turned in via email to [**srburgin@uark.edu**](mailto:srburgin@uark.edu)

APPENDIX C-1

NOS Lesson Mini-Proposal 1 (20pts of 150pts). Note: This same format will be used for your second lesson plan as well. 10pts each for a total of 20pts.

A) Brief description of the activity:

B) What important NOS element (s) are you targeting?

C) Brief description of the science content targeted:

D) Where do the science content and NOS aspect(s) fit in the Standards?

APPENDIX C-2

NOS Lesson Plan Evaluation Checklist (100pts of 150pts). Note: This same checklist will be used for each of the

lesson plans. 50pts each for a total of 100pts.

|  |  |  |
| --- | --- | --- |
| Description of Evaluated Element | Points  Possible | Points Awarded |
| 1) Is the lesson written in some organized fashion based on some reasonable plan (Learning Cycle, 5E, etc.)? Is the flow of the lesson clear and sensible? Note: there is no single style of lesson plan required but your lesson plan should include a response (include the subheadings) for each of the starred items below. | 10 |  |
| 2) Is the lesson written in such a way that others could easily follow it? Does it contain all necessary materials and methods? | 5 |  |
| 3\*) STANDARDS LINK (Content): Does the lesson plan contain a clear link to either the Next Generation Science Standards (for science content) or the Common Core (for math content)? | 5 |  |
| 4\*) STANDARDS LINK (NOS): Does the lesson plan contain a clear link to the Next Generation Science Standards for the NOS Content? Note: Some important NOS elements are missing from the NGSS so you will have to link to some other document (like perhaps a McComas article). | 5 |  |
| 5\*) CONTEX: Does the lesson plan discuss who the learners are and where the lesson would fit in the curriculum? | 5 |  |
| 6\*) ASSESSMENT: Is there a section in the lesson plan discussing how you will assess content/NOS? (Note, the actual lesson you present may or may not include an assessment aspect, but the lesson plan itself must have a discussion and/sample of such assessment). | 10 |  |
| 7\*) PRE-FLECTION: Is there a section discussing how the lesson was developed and how the lesson might be expanded/extended in the future? | 5 |  |
| 8) How effective is the use of grammar, spelling, syntax, neatness, citations (if necessary), of the lesson plan? | 5 |  |
| *Total* | 50 |  |

APPENDIX C-3

NOS Lesson Presentation Peer Evaluation Checklist (30pts of 150pts)

Note: Each class member will complete this form to evaluate the lesson presentation. The score awarded will be the average of the points awarded by classmates.

Team Member #1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Team Member #2 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| Description of Evaluated Element | Points  Possible | Points Awarded |
| 1) CONTEXT: Did the presentation provide some explanation/ introduction about who the students are for whom the lesson is designed? Grade level, discipline, etc? | 2.5 |  |
| 2) CONTEXT (Link to NGSS): Did the presentation feature enough description about where this lesson would fit within the NGSS for science and NOS? | 2.5 |  |
| 3) IMPACT (Affective): Was the lesson engaging, fun, interactive, interesting, and/or effective? | 5 |  |
| 4) IMPACT (Organization): Was the lesson well organized, timely, have a strong beginning, middle and ending? | 5 |  |
| 5) IMPACT (Content Cognition): If you were a student in the class where this lesson occurred how much science/math content would have learned? | 5 |  |
| 6) IMPACT (NOS Cognition): If you were a student in the class where this lesson occurred would you have learned some NOS content? | 5 |  |
| 7) IMPACT (Performance): Did the presenters seem well prepared, practiced, and enthusiastic? | 2.5 |  |
| 8) SUBJECTIVE EVALUATON: In the space below and/or on the back of this sheet, please write a few comments/ reactions/ suggestions and award up to 2.5pts if you think that the lesson was “perfect.” | 2.5 |  |
| *Total* | 30 |  |

Please total the points and feel free to make any additional comments and/or ask any questions on the reverse of this sheet. Thanks.

Appendix D

Policies Governing this Class

I) Instructor’s Policies

A) Grading Scale: Presently, we are not permitted to award "+" and "-" grades. This is unfortunate because there is certainly a difference between the achievement of those earning 80% and those earning 89% but in the current system both would be a "B." So, in order to award a meaningful grade with some precision, we will use a 9 point scale in this class whereby 91% will be the lowest A, 82% the lowest 8, 73% the lowest C and 64% the lowest D.

B) Syllabus Disclaimer: This syllabus is a starting guide to planned class activities. Changes may occur to meet class needs as determined by the professor but every attempt will be made to abide by the current syllabus.

C) Lateness: To encourage everyone to hand in all assignments, I will accept late work. However, in fairness to those who turn assignments in on time there will be a price to pay. All assignments will be reduced by at least one letter grade for each week (or part of a week) of lateness.

D) Digital and Electronic Device Policy: You may use devices such as laptop computers, tablets and other such tools in class. They are useful for note taking (of course) and for immediate fact-checking (yes, professors do make mistakes). However, you will lose this privilege if you engage in non-educative functions such as roaming the internet, checking and receiving emails and engaging in other social media excursions. Please realize that your colleagues in class often see what others are doing and have regularly reported being distracted by these sorts of off-task digital behaviors.

II) University Policies and Procedures

A) The Grade of Incomplete (IN) can be assigned only when work is not completed because of a documented illness or some other emergency occurring after the 12th week of the semester. Students must not assume that the instructor will agree to the grade of IN. Removal of the "IN" must be instituted by the student, agreed to by the instructor, and reported on the official "Incomplete Completion Form."

B) Students with Disabilities: University of Arkansas Academic Policy 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately within two weeks of the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access Room 104 in the Arkansas Union (Contact 479–575–3104 or visit http://cea.uark.edu for more information on registration procedures).

C) Academic Honesty and Integrity Policy: As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy’ which may be found at http://provost.uark.edu/.

Academic dishonesty is defined by the University of Arkansas Honesty Policy as “Acts which may subvert or compromise the integrity of the educational process at the University of Arkansas. Included is an act by which a student gains or attempts to gain an academic advantage for himself or herself or another by misrepresenting his or her or another’s work or by interfering with the completion, submission, or evaluation of work.” If I suspect academic dishonesty has occurred, I will act in accordance with the guidelines contained in the Academic Honesty Policy as set in the *2013-2014 University of Arkansas Graduate School Catalog.* Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

D) Emergency Preparedness: Many types of emergencies can occur on campus; instructions for specific emergencies such as severe weather, active shooter, or fire can be found at emergency.uark.edu.

Severe Weather (Tornado Warning):

Follow the directions of the instructor or emergency personnel

Seek shelter in the basement or interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside

If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building

Stay in the center of the room, away from exterior walls, windows, and doors

Violence / Active Shooter (Think “CADD”):

CALL: 9-1-1

AVOID: If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.

DENY: Barricade the door with desk, chairs, bookcases or any items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.

DEFEND: Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

E) Inclement Weather Policy: When the University has officially canceled classes because of inclement weather this class will not meet. At other times if you feel the weather is so bad that you would risk an accident to get to class, you are responsible for making your own best decisions in these instances.

For information regarding whether the university is closed for any reason use the following sources:

See the inclement weather web site at <http://emergency.uark.edu/11272.php>

Call 479-575-7000 or university switchboard at 575-2000 for recorded announcements about closings

Check voice mail for announcements

Listen to KUAF Radio, 91.3 FM, or other local radio and television stations for announcements.

F) Tape-recording and/or any Other Form of Electronic Capturing: Tape-recording and/or any other form of electronic capturing of lectures is expressly forbidden.  *State common law and federal copyright law protect my syllabus and lectures. They are my own original expression and I record my lectures at the same time that I deliver them in order to secure protection. Whereas you are authorized to take notes in class thereby creating a derivative work from my lecture, the authorization extends only to making one set of notes for your own personal use and no other use. You are not authorized to record my lectures, to provide your notes to anyone else or to make any commercial use of them without express prior permission from me.*

*Persons authorized to take notes for the Center for Educational Access, for the benefit of students registered with the Center, will be permitted to do so, but such use still is limited to personal, non-commercial use.  Similarly, you are permitted to reproduce notes for a student in this class who has missed class due to authorized travel, absence due to illness, etc.  However, to be clear, any class notes must not be sold or made available for any commercial use.*

G) Academic appeals: Students are first encouraged to resolve academic conflicts and complaints informally with the instructor involved, through their department, or through the assistance of the University Ombuds Office, which can provide objective and confidential mediation. To assist students in identifying the appropriate contact person, please view this [List of Program, Department, and College Contacts](http://uark.us4.list-manage1.com/track/click?u=dac1ff80baf86bae679a958d7&id=4e9f1468d4&e=96b74097eb). A [flow chart](http://uark.us4.list-manage2.com/track/click?u=dac1ff80baf86bae679a958d7&id=6dc31e4178&e=96b74097eb) is also available for viewing. If an informal resolution cannot be reached, there are procedures for students to pursue with complaints of an academic nature. Refer to either the Undergraduate Catalog of Studies ([http://catalogofstudies.uark.edu/2882.php](http://uark.us4.list-manage1.com/track/click?u=dac1ff80baf86bae679a958d7&id=7a86de01e8&e=96b74097eb)) or the Graduate Catalog of Studies ([http://catalogofstudies.uark.edu/3909.php](http://uark.us4.list-manage.com/track/click?u=dac1ff80baf86bae679a958d7&id=73f4365caa&e=96b74097eb)) for appeals structures and procedures for academic grievances.

**SEED 5313 – Theories of Learning Mathematics**

University of Arkansas

College of Education and Health Professions

Curriculum and Instruction

Fall 2016

* Descriptive Information
  1. Program Affiliation: Secondary Education
     1. Course Number and Title: SEED 5313 Theories of Learning Mathematics
  2. Description: Study of the theories that have influenced teaching and learning of mathematics. Specific frameworks of secondary students’ mathematical thinking and learning trajectories will be examined. Implications for instruction will be explored.
  3. Prerequisites: Entrance in MAT program.
  4. Intended Audience: Preservice math teachers
  5. Instructor: Laura B. Kent, Associate Professor

Office: 303 Peabody, 575-8762

Cell number: (479) 305-0330

email: lkent@uark.edu

Office Hours: Tuesdays and Thursdays,

11-1:30 and by appointment

* 1. Class Meeting Dates/Times/locations: Tuesdays & Thursdays 9:30- 10:45 a.m., Peabody 308
* Course Goals and Objectives

Relationship to the knowledge base: Initial teacher preparation. This is a pedagogical studies course, which provides the Scholar Practitioner with the knowledge and ability to incorporate the latest theory and research in secondary mathematics education philosophy.

* 1. Goals: This course is designed to provide an expanded view about and experience with methods, materials, technology, and procedures for teaching mathematics.
  2. Competencies - Students will be able to:
     1. relate current research on middle and high school students' Standard #9: Professional Learning and Ethical Practice and #5 Application of Content)
     2. know and use knowledge of students' mathematical thinking as the basis for assessment and instructional decision-making in one or more topics, ie., ratio and proportions, functions, three-dimensional geometry; (Arkansas Teaching Standards #4 Content Knowledge &#6: Assessment) examine their beliefs about the goals, methods, and content of secondary school mathematics; (Arkansas Teaching Standard #9: Professional Learning and Ethical Practice)
     3. design and implement mathematics lessons that address issues of diversity of learners in middle and high schools. (Arkansas Teaching Standard #2: Learning Differences and #7: Planning for Instruction)

Arkansas Teaching Standards: <http://www.arkansased.gov/public/userfiles/HR_and_Educator_Effectiveness/Educator_Prep/Arkansas_Teaching_Standards_2012.pdf>

TESS focus areas:

Domain 1: Planning and Preparation

Domain 3: Instruction

<http://www.arkansased.gov/divisions/human-resources-educator-effectiveness-and-licensure/office-of-educator-effectiveness/teacher-evaluation-system>

* Required Texts and Materials

Selected articles

Optional text:

Principles to Actions: Ensuring Mathematical Success for All. NCTM (2014)

* Academic Requirements (see pages 3-4)
* Administrative Requirements

Class attendance and participation.

* Evaluation
* Participation/Response to Readings - 10 points
* Lesson Plan – Technology or Manipulatives-Based - 10 points
* Lesson Plan comparison activity – 10 points
* Clinical Interview – Rational Numbers 10 points
* Ratio Proportion Interview/Assessment Paper Part 1 - 30 points
* Ratio Proportion Interview/Assessment Paper Part 2 – 10 points
* Interview Assessment Paper, topic of your choice – 20 points
* Grading

Grades will be based on the following 100 point scale:

90-100 A

80-89 B

70-79 C

60-69 D

<60 F

* Major Topics

1. Standards for Mathematical Practice

2. Students' Mathematical Thinking

3. Instructional Decision-making

4. Research in Mathematics Education

5. Mathematics Curricula: Past and Present

6. Assessment

**Description of Academic Requirements:**

1. Participation is mandatory. Whenever possible, please let me know in advance of days missed. Participation is also critical. Each student is responsible for reading the material in advance of class and verbally participating in the discussions related to the readings and other assignments.
2. Lesson Plan – For this assignment you will write, implement, and reflect on a lesson of your choice and/or related to your internship. A handout for the requirements will be given in class.
3. Lesson Plan Comparison Activity. – For this assignment, you will compare/contrast two lessons (these will be given in class). A write-up including strengths and weaknesses of each will be required.
4. Rational Number Interview/Assessment Write-up – For this assignment you will interview a student and observe his/her responses to the tasks. (Tasks will be provided) . The write-up will be in narrative form and include the student work and verbal comments and descriptions from the student.

5. Ratio & Proportion Interview/Assessment Write-up – Part One

- Everyone will develop a set of tasks that can be used to assess a particular students' thinking about ratios and proportions. Readings will be provided in class that will help you design your tasks.

-Interview one student; ie., present your tasks to him/her and observe how he/she solves them.

-Write a 5-6 page paper utilizing the following format:

1. Introduction that provides background academic information and interests.
2. Analysis of his/her performance on the tasks using the following sequence **for each task**:
   * The task used
   * Description of strategy and/or picture of the students’ work
   * Your analysis of the strategy based on Lamon’s Framework
3. Summary of the interview results that includes an overall description of the student’s knowledge of ratio/proportion.
4. Conclusion that includes implications of your results for your future whole class instruction.

3. Ratio & Proportion Interview/Assessment Write-up – Part TWO

Based on the results of the first interview, develop a new set of tasks to use to interview the same student to further explore the learning trajectory for students related to proportional reasoning.

4. Assessment Interview – Topic of your choice – For this assignment you will follow a similar protocol to the one used for ratio and proportion.

.

**Updated Course Outline – Fall 2016**

9/6

Assessing Student’s understanding of complex fraction concepts

**Read** Stephan & A article for 9/8

9/8

Students’ understanding of integers

**Read** Knuth article for 9/13

9/13

Equality/Equations

**Read** Lamon article for 9/13 & 9/15

9/15

Ratios/Proportions

9/20

Proportional Reasoning cont.

**Read** Rauff article for 9/22

9/22

Polynomial Expressions

**Read** Even article for 9/27

9/27

Functions

**Read**  TBA for 9/29 & 10/4

9/29

Geometry

10/4

Geometry cont.

**Read TBA** for 10/6

10/6 Statistics topics

**Read**

10/11

Advanced math topics

10/13–

Advanced Math topics

**Read** for 10/20

10/18– Fall Break (no classes)

10/20

10/25

10/27 –

11/11

11/3 – ACC conference (no class)

Week of November 9th – Field Experience Immersion

Week of November 16th - Field Experience Immersion

Week of November 30th - Field Experience Immersion

12/8 –

12/10 – Summary/Synthesis

**Selected** **Readings**

Common Core Standards for Mathematics (2011). Common Core Standards Initiative. National Governors Association.

Even, R. (1993). Subject-matter knowledge and pedagogical content knowledge: Prospective secondary teachers and the function concept. *Journal for research in mathematics education*, 24 (2), 94 - 116.

Lamon, S. J. (1993). Ratio and proportion: Connecting content and children's thinking. *Journal for research in mathematics education* 24 (1), 41-61.

National Council of Teachers of Mathematics (2000). *Principles & standards for school mathematics.* Reston, VA: NCTM.

National council of teachers of mathematics (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: NCTM.

Patsiomitou, S. & Emvalotis, A. (2010). Students movement through van Hiele levels in a dynamic geometry guided reinvention process. *Journal of mathematics and technology*, vol 1, 18-48.

Rauff, J. V. (1994). Constructivism, factoring, and beliefs. *School science and mathematics*. 94, (8), 421-426.

Stephan, M. & Akyuz, D. (2012). A proposed instructional theory for integer addition and subtraction. *Journal for research in mathematics education* 43 (4), 428-464..

Staples, M. (2007). Supporting whole-class collaborative inquiry in a secondary mathematicsclassroom. *Cognition and Instruction,* 25(2-3), 161-217.

MATH 2903 - Functions, Foundations and Models Course Syllabus - Fall 2014

|  |  |
| --- | --- |
| Professor: | Dr. Shannon Dingman |
| Office: | Science – Engineering (SCEN) 321a |
| Email: | [sdingman@uark.edu](mailto:sdingman@uark.edu) |
| Phone (Office): | (479) 575-3493 |
| Office Hours: | 1:00 – 1:50 W/F or by appointment (drop-ins are welcome; calling, emailing, or setting up appointment is appreciated |
| Course Numver: | MATH 2903 |
| Course Name: | Functions, Foundations, and Models |
| Semester Credit Hours: | 3 |
| Meeting Time: |  |
| Meeting Location: |  |

Course Description: An in depth study of topics from secondary school mathematics, emphasizing the development of the concept function , function patterns in data sets, connections among the main topics associated with a secondary school curriculum, and the appropriate use of technology. Pre- or Co-requisite: MATH 2564 . Required

Textbook: There is no required text in this course. We will work materials provided by the UTeach Institute or problems distributed in class. Given that there may be a number of handouts throughout the semester, it is highly recommended you keep a notebook of these activities and worked problems in order to study for exams.

Calculators: A Tl-calculator is required in this course. You should bring it to each class meeting and each test.

Other Technology: During classroom investigations, laptop computers or tablets may be used to enhance investigations. These may not be required each class period, and I will try to alert you to when these might be necessary.

GRADING:

Your grade in the course will be determined usi ng the following percentage allocations:

|  |  |
| --- | --- |
| 50-minute Exams (2) | 25% |
| TI-Nspire Lesson Plan | I 0% |
| Homework/Written Assignments/Labs | 20% |
| Attendance/Engagement and Contributions | 10% |
| Mid-Term Exam | 15% |
| Final (comprehensive) | 20% |

Letter grades will typically follow a 90-80-70-60 scale, although the instructor reserves the right to revise dov.nward if necessary.

Late Work:

You should anticipate turning in all assignments by their due date. Grades will be reduced one letter grade (I0%) for work submitted after the due date.

Attendance Policy:

Since a majority of this work hinges on group work done during class time, AND this is a relatively small class, attendance is of UTMOST importance. Therefore you should make every effort to be in class each and every day. Attendance is one component of your grade, and you may suffer a grade reduction for excessive, non-university related absences. If you do need to miss class for any reason, please email me (preferably in advance).

Tests/Labs/ Written Assignments/Homework:

There will be frequent HW assignments, labs, and written work to build and test your knowledge of the concepts we are currently discussing in class. You are expected to enhance classroom discussion with extended research of topics outside of the classroom. Test and labs will be in class, while HW will be finished outside of class time. There will be 2 hourly exams (Dates TBD; approximately in weeks 4 and 12 of the semester), 1 midterm exam (Friday, October 17), and the final exam (Wednesday , December 17, from I :00 -3:00). The in-class activities and lab will allow you to investigate concepts under study. You will be responsible for knowing all technology techniques presented in class.

Tl-Nspire Lesson Plan:

Using graphing calculators effectively is a key skill for secondary mathematics teachers. You will partner with a classmate and create a lesson plan based on uti lizing the Tl-Nspire calculator. On Friday, August 29, the focus of the class will be devoted to an overview and investigation the calculator led by UAteach. You then will work with a partner to create a lesson plan and will implement this lesson plan for a full class period this semester (dates for lesson plan demonstrations will be Sept 12, Sept 29, Oct 1, Nov 7, and Nov 12).

Major Topics:

* Functions and Relations Qualitative Graphing
* Sequences/Patterns-Function Patterns
* Mathematical Modeling-Data, Regression & Matrices
* Polar & Parametric Relations
* Complex Numbers and Properties
* Exponential Growth and Decay Models
* Problem Solving Techniques

Course Objectives:

In revisiting secondary mathematics, prospective mathematics teachers are expected to:

* Deepen and broaden function-related mathematical content knowledge from Algebra through Calculus by exploring relevant topics in an inquiry-based learning situation;
* Make connections between college mathematics and secondary school mathematics;
* Build preliminary knowledge of professional and state mathematics curriculum standards;
* Use reflective and collaborative learning, and develop a stronger sense of professionalism and leadership;
* Create efficient seekers of content knowledge;
* Explore and learn appropriate use of technology in the mathematics classroom.

Statement for Academic Integrity:

As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry) and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail." Each University of Arkansas student is required to be familiar with and abide by the University's Academic Integrity Policy that may be found at [http://pro,](http://pro/)·ost.uark.edu. Students with questions about ho\\ these policies apply to a pat1icular course or assignment should immediately contact their instructor.

Inclement Weather Policy:

Class will meet unless the University is closed. On-campus students are expected to be present. Off­ campus students should make their own decisions i n the best interest of personal safety. Off-campus students will not be penalized for being absent on those days the Fayetteville Public Schools are closed due to weather. If attendance is severely affected by weather. Deadlines and exam dates may be adjusted. Please do not call the Department of Mathematical Sciences with weather-related inquiries . You may email me for information.

EMERGENCY PROCEDURES

Many types of emergencies can occur on campus: instructions for specific emergencies such as severe weather, active shooter, or fire can be found at emergcncy.ua rk.edu.

Severe Weather (Tornado Warning):

* Follow the directions of the instructor or emergency personnel
* Seek shelter in the basement or interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside
* If you are in a multi-story building and you cannot get to the lowest floor, pick a hallway in the center of the building
* Stay in the center of the room, away from exterior walls, windows, and doors

Violence *I* Active Shooter (CADD):

* CALL- 9-1-1
* AVOID- If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
* DENY- Barricade the door with desk, chairs, bookcases or any items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police its safe.
* DEFEND- Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

*THIS SYLLABUS IS SUBJECT TO CHANGE .*You will be notified in email, on MLP, and/or in class of changes. Failure to check your email and/or failure to attend class will not constitute a reason to be allowed to make up any assignments, tests, or changes to the course.

### 2Ei.i.i. Syllabi for Courses supporting the Computer Science Competencies

|  |  |
| --- | --- |
|  | **REQUIRED Content COURSES**  These 6 courses meet 97% of the  Computer Science competencies |
| CSCE 2004 | Programming Foundations I |
| CSCE 2014 | Programming Foundations II |
| CSCE 2114 | Digital Design |
| CSCE 3193 | Programming Paradigms |
| BIOL/CHEM/PHYS  3273 | Research Methods (UAteach) |
| STEM 4409 | Supervised Clinical Teaching |

**CSCE 2004 - Programming Foundations I, (4 credits) Required CE & CS**

**Catalog Description:** Introductory programming course for students majoring in computer science or computer engineering. Software development process: problem specification, program design, implementation, testing and documentation. Programming topics: data representation, conditional and iterative statements, functions, arrays, strings, file I/O, and classes. Using C++ in a UNIX environment. Co-requisite: Lab component.

**Prerequisites:** MATH 2554 or CSCE 1953

**Textbook / Required material:** *Starting out with C++, From Control Structures through Objects*, 7th Edition, by T. Gaddis, Pearson/Addison-Wesley, 2012

**Goals:** The goal of this class is to develop fundamental computer-based problem solving skills in the following areas:

* Software Development - The specification, design, implementation, testing, and documentation of software to solve specific problems.
* Structured Programming - The syntax, semantics, and use of the basic features of a typical structured programming language (e.g., conditionals, loops, functions).
* Algorithms and Data Structures - Basic methods for storing and manipulating data to effectively solve specific problems (e.g., arrays, binary search).
* Object Oriented Programming - The syntax, semantics, and use of the basic features of a typical object-oriented programming language (e.g., C++).

The pedagogical approach will be focused on solving problems using existing software modules (e.g., class libraries) and new modules when necessary. The syntax and semantics of programming language constructs will be introduced as needed in this context. Biweekly programming assignments and their associated reports will be added to each student's programming portfolio. Labs will reinforce concepts taught in the lecture and also introduce students to the Linux operating system.

**Topics covered**:

Introduction Computing

Introduction to C++

Conditional Statements

Iterative Statements

Functions and Recursion

Arrays and Strings

Searching and Sorting

File Input/Output

Classes and OOP

Pointers

**Class/laboratory schedule:** Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.

**Relationship of course to Computer Engineering Program Student Outcomes:**

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(e) An ability to identify, formulate, and solve engineering problems.

(f) An understanding of professional and ethical responsibility.

(j) A knowledge of contemporary issues.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Relationship of course to Computer Science Program Student Outcomes**:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(e) An understanding of professional, ethical, legal, security and social issues and responsibilities.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

**Prepared by:** Gordon Beavers **Date:** January 29, 2013

**CSCE 2014, Programming Foundations II, (4 credits), Required CE & CS**

**Catalog Description:** This course continues developing problem solving techniques by focusing on fundamental data structures and associated algorithms. Topics include: abstract data types, object-oriented programming, linked lists, stacks, queues, hash tables, binary trees, recursion, and searching and sorting algorithms. Using C++ in a UNIX environment. Co-requisite: Lab component.

**Prerequisites:** CSCE 2004 with a C or better

**Textbook/required material (either book below**):

Data Abstraction and Problem Solving with C++ (6th Edition), Carrano, 2013, Addison Wesley.

Data Structures and Problem Solving Using C++ (2nd Edition), Weiss, 2000, Addison Wesley.

**Goals**: Ability to apply basic software principles to design, implement, test, and document moderately-sized programs using the data structures and algorithms listed above.

**Topics covered:**

* *Software design*
* Object-oriented analysis and design
* Component-level design
* *Object-oriented programming*
* Encapsulation and information hiding
* Implementation of classes in C++
* *Fundamental data structures*
* Data representation in memory
* Static, stack and heap allocation
* Pointers and references
* Linked list data structures
* Stacks, queues, trees, heaps and hash tables
* *Recursion*
* Simple recursive procedures
* Divide and conquer strategies
* Implementation of recursion
* *Basic algorithmic analysis*
* Big O notation
* Empirical measurements of performance
* *Fundamental computing algorithms*
* Sequential and binary search algorithms
* O(N2) sorting algorithms (selection, insertion, bubble)
* O(NlogN) sorting algorithms (quick, merge, heap)
* Binary search trees
* *Social and professional issues*
* Professional and ethical responsibilities
* Intellectual property

Class / laboratory schedule: Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.

Relationship of course to Computer Engineering Program Student Outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(e) An ability to identify, formulate, and solve engineering problems.

(f) An understanding of professional and ethical responsibility.

(j) A knowledge of contemporary issues.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Relationship of course to Computer Science Program Student Outcomes:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(e) An understanding of professional, ethical, legal, security and social issues and responsibilities.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Prepared by: John Gauch Date: February 6, 2013

**CSCE 2114, Digital Design (4 credit hours), Required**

**Catalog Description:** Introduction to the hardware aspects of digital computers, logic gates, flip-flops, reduction, finite state machines, combinational and sequential logic design, digital systems, software design tools, hardware description language (VHDL), and implementation technologies. Co-requisite: Lab component.

Prerequisites: MATH 2554

**Textbook/required material:** “Fundamentals of Digital Logic with VHDL Design,” by Stephen Brown and Zvonko Vranesic, Third Edition, McGraw Hill

**Goals:** The goal of the class is to develop the ability to apply knowledge of digital logic to the design of a microprocessor and operate an advanced CAD software application.

**Topics covered:**

* Design Concepts
* Intro. to Logic Circuits
* Implementation Technology
* Optimized Implementation of Logic Functions
* Number Representation
* Arithmetic Circuits
* Combinational Circuits
* Flip-Flops, Registers, and Counters
* Synchronous Sequential Circuits
* Asynchronous Sequential Circuits
* Digital Systems
* Computer Aided Design Tools
* Breadboard Techniques
* Basic Logic Circuits
* Combinational Logic
* Sequential Circuits
* CAD Tools
* FPGA Implementations

Class/laboratory schedule: Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks. Lab meets once a week for 2 class periods. Laboratories meet 8 times for 2 hours per lab.

Relationship of course to Computer Engineering Program Student Outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(e) An ability to identify, formulate, and solve engineering problems.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Relationship of course to Computer Science Program Student Outcomes

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

Prepared by: Pat Parkerson Date: February 12, 2013

**CSCE 3193, Programming Paradigms (3 credits), Required**

**Catalog Description:** Programming in different paradigms with emphasis on object oriented programming and network programming. Survey of programming languages, event driven programming, and concurrency.

Prerequisites: CSCE 2014.

**Textbook/required material:**  
Java: Paul Deitel and Harvey Deitel, Java: How to Program, 9e, Prentice Hall, 2012.  
PHP: <http://www.w3schools.com/php/>  
Javascript: <http://www.w3schools.com/js/>  
Scheme: <http://racket-lang.org/>  
Python: <http://docs.python.org/2/tutorial/>

**Course learning outcomes:** The students should be able to program in a variety of languages representative of different paradigms, e.g., object-oriented, functional, client-server, etc. The students should have a better understanding of how programming languages differ and how they are similar.

**Topics covered:**

* Event Driven Programming – Event Handling Methods, Exception Handling
* The web as an example of client-server computing – Web technologies (scripts, applets, client-side and server-side programming), Client-Server relationship, Web Protocols.
* Overview of Programming Languages – Survey of programming languages
* Object-Oriented Programming – OO design, Encapsulation and information-hiding, Classes and subclasses, Inheritance, Polymorphism, Class hierarchies, Collection classes and iteration protocols, Generic Programming
* Functional Programming – Overview and motivation, Recursion over lists, natural numbers, trees, and other recursively-defined data. (optional)
* Concurrency – Overview and motivation, threads, synchronization. (optional)
* Using APIs – API Programming
* Software Tools and Environments – Programming Environments

Class/laboratory schedule: Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.

Relationship of course to Computer Engineering Program Student Outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(e) An ability to identify, formulate, and solve engineering problems.

(i) A recognition of the need for, and an ability to engage in life-long learning.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Relationship of course to Computer Science Program Student Outcomes:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(h) Recognition of the need for and an ability to engage in continuing professional development.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

(k) An ability to apply design and development principles in the construction of software systems of varying complexity.

Prepared by: Michael Gashler Date: February 05, 2012

**Research Methods Course Syllabus—Spring 2017\***

|  |  |  |
| --- | --- | --- |
| BIOL 3273/3273L | or | BIOL 3273H/3273M |
| CHEM 3273/3273L | or | CHEM 3273H/3273M |
| PHYS 3273/3273L | or | PHYS 3273H/3273M |

|  |  |
| --- | --- |
| Instructor(s) |  |
| Instructor: Dr. William (Lin) Oliver Location: PHYS 216  Office Phone: 479‐575‐6571 Mobile Phone:  Office Hours: TBD  E‐mail: [woli](mailto:woliver@uark.edu)[ver@uark.edu](mailto:ver@uark.edu) | Instructor: Dr. Peggy Ward Location: UTCH 112  Office Phone: 479‐575‐3280 Mobile Phone:  Office Hours: TBD  E‐mail: [pdward@uark.edu](mailto:pdward@uark.edu) |

Pre‐Requisite: ARSC 1221 – Inquiry Based Lesson Design and Junior Standing

Course Web Site: We will use Blackboard Learn

Building: UTCH Room Number: 117

Location: 946 Clinton Ave, Fayetteville, AR 72701

There is a trail for your convenience going up the hill from the UAteach house to the main campus. Student parking is not available at the UAteach house.

**Text and Readings**

The main textbook for this course is:

Marder, Michael. *Research Methods for Science*. Austin, Texas: Cambridge UP, 2011. ISBN # 978‐0‐521‐14584‐8. This book is available from the bookstore. It is the primary text and you will be using it all semester.

Selected readings will also be assigned in:

Feynman, R., & Leighton, R. (1985). *"Surely you're joking, Mr. Feynman!": Adventures of a curious character*. New York: W.W. Norton. ISBN#: 978‐0393316049. This book is available to be ordered on‐line or you may check out a copy from the UAteach Library.

**Course Description**

Research Methods is a one‐semester, three‐hour course in the required UAteach sequence. It is one of several content courses specially designed to meet the needs of future teachers (others include “Perspectives on Science and Mathematics” and “Functions and Modeling”).

The course is cross‐listed in Physics, Chemistry, and Biology.

The goals of the course are to:

* Provide UAteach students with tools that scientists use to solve scientific problems.
* Give students the opportunity to use these tools in a laboratory setting.
* Make students aware of how scientists communicate with each other through peer‐ reviewed scientific literature.
* Enable students to understand how scientists develop new knowledge and insights, the most important of which are eventually presented in textbooks and taught in conventional science classes.
* Develop skills required to integrate experimentation into science and math classrooms in the spirit of Common Core.
* Advance students in their journey toward becoming licensed STEM teachers.

Students design and carry out four independent scientific inquiries, which they write up and present in a manner consistent with common practice in the scientific community. These inquiries incorporate mathematics and the various scientific disciplines, and thus the instructor teaching this course along with support faculty and advisors have expertise in different disciplines and are available to supervise students as they work on their inquiries.

The combination of *Research Methods* and *Perspectives on Mathematics and Science* provides prospective science and mathematics teachers with an in‐depth understanding of how the scientific enterprise works.

Course Objectives and Expectations

|  |  |
| --- | --- |
| **Course Objectives and Evidence of Student Learning and Engagement** | |
| ***Students will:*** | ***Evidence:*** |
| Create their own experiments to answer scientific questions. | * Reports and/or papers on four separate independent inquiries, designed and carried out by the student: (1) brief home inquiry, (2) laboratory inquiry using high school equipment, (3) survey involving human subjects, and (4) extended laboratory inquiry |
| Design experiments to reduce systematic and random errors and use statistics to interpret the results. | * Papers on inquiries 2, 3, and 4 * Proposals for inquiries 2 and 4 |
| Use probes and computers to gather and analyze data. | * Instructor observations during inquiry 2 or 4 or both |
| Use statistics to interpret experimental results and deal with sampling errors. | * Two homework assignments * Two brief in‐class papers * Class performance * Write‐ups for inquiries 2, 3, and 4 |
| Treat human subjects in an ethical fashion. | * Certificate demonstrating completion of human subjects training * Satisfactory completion of inquiry 3, which involves human subjects |
| Apply safe laboratory procedures. | * Instructor observations during inquiries 2 and 4 |
| Find and read articles in the scientific literature. | * Two homework assignments * Performance assessment during debate |
| Create mathematical models of scientific phenomena. | * Two homework assignments * Personalized modeling assignments as part of inquiries 2 and 4 |
| Apply scientific arguments in matters of social importance. | * Student presentations of open questions |
| Write scientific papers. | * Four written inquiries, with inquiries 2 and 4 involving at least two drafts |
| Give oral presentation of scientific work. | * In‐class oral reports on inquiries 2 and 4 |

**Course Requirements and Expectations**

* The Inquiry categories may contain multiple assignments such as proposals, rough drafts, presentation, and final drafts.
* You will be expected to keep copies of all assignments and drafts in electronic format.
* Assignments and drafts will be uploaded to Blackboard Learn for grading and comments. Due dates for assignments will be posted to Blackboard Learn.
* 10% of your grade will be based upon attendance and in‐class activities. These activities may **not** be completed at a later date for credit.
* Please note that the final inquiry must be related to the discipline under which you have registered for this class. For example, if you are registered in biology, your final inquiry must be a biology inquiry.
* Write‐ups of your final inquiries will be graded according to rubrics and checklists that will be posted on the course Web site.
* Your inquiries will be evaluated both **on content** and the quality of the written expression. There will be no formal examinations.

Assignments and Grading Policy

|  |  |
| --- | --- |
| **Category** | **Percentage of Grade** |
| Homework and Reading Reflections | 25 % |
| In‐class Activities | 10 % |
| Inquiry 1 | 10 % |
| Inquiry 2 | 15 % |
| Inquiry 3 (May be integrated into Inquiry 4) | 10 % |
| Inquiry 4 | 30 % |
|  |  |
| **Total** | 100 % |

**Categories:** Each category will contain multiple assignments and submissions.

Grading Scale

A: Total Score ≥ 90

B: 80 ≤ Total Score < 90 C: 70 ≤ Total Score < 80 D: 60 ≤ Total Score < 70 F: Total Score < 60

Other Course Policies

**Late Work Policy:** If you turn assignments late without prior approval, you will lose 10% of the value of the assignment for each day that it is late. Most assignments are submitted electronically; therefore, they are due on the due date (and time) regardless of illness, snow, car trouble or other reasons. **The submissions are due even if class is cancelled by the University due to inclement weather.**

If you have a significant illness or circumstance that prevents you from completing work on time, please contact us in advance or as soon as possible to make alternative arrangements. Under these circumstances, it is recommended that you send an email to both instructors.

**Inclement Weather Policy:** Classes will be held each week unless the university officially closes due to inclement weather. If the university remains officially open and you do not feel that you can safely travel to class, then you must communicate this to the instructors for the course prior to the class meeting, if at all possible.

\* **Syllabus Revision Policy:** Should any changes to this syllabus be necessary or desirable, an updated version will be announced in class and posted on the website for the course.

### 2E.i.i.i.i Elective Content Courses

|  |  |
| --- | --- |
|  | **Elective Content Courses:**  **Computer Science and Math**  Students must choose 2 electives from this list to deepen their knowledge in additional areas of study. These Computer Science courses were chosen to provide further support of the CS competencies. Math courses were chosen to encourage students to seek both Computer Science and Math teacher licensure. |
| CSCE 2214 | Computer Organization |
| CSCE 3513 | Software Engineering |
| CSCE 3613 | Operating Systems |
| CSCE 4133 | Algorithms |
| CSCE 4523 | Database Management |
| MATH 2564 | Calculus II |
| MATH 2903\* | Functions, Foundations & Models |
| MATH 3773 | Foundations of Geometry |

\**MATH 2903 appears in both electives lists, but will not count twice.*

*NOTE: The courses listed above comply with ADHE criteria for contact hours, lab hours, practicum hours and clinical experience hours required for academic credit.*

**CSCE 2214 Computer Organization, (4 credits), Required**

**Catalog Description:** Presents the relationship between computing hardware and software with a focus on the concepts for current computers. CPU design topics are covered including various techniques for microprocessor design and performance evaluation. Co-requisite: Lab component.

**Prerequisite:** CSCE 2114 with a grade of C or better.

**Textbook/required material:** David Patterson and John Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, Revised Fourth Edition, Morgan Kaufmann Publishers, 2011

**Goals:** A basic understanding of computer organization. The ability to analyze and design an ISA and pipelined microprocessor. The ability to analyze a memory hierarchy.

**Topics Covered:**

• Computer Abstractions and Technology

• Arithmetic and ALU Design

• ISA Design and Encodings

• Logical/Control Flow Ops, Addr Modes

• Stacks, Calling Conventions, Arrays & Pointers

• Data Path Design

• Pipelining and Hazards

• Introduction to Memory Hierarchies and Caches

• Virtual Memory

**Class/Laboratory Schedule:**

• Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for

15 weeks

• Homework assignments are due approximately every 2 weeks

• Laboratory design of microprocessor due approximately every 3 weeks

Relationship of course to Computer Engineering Program Student Outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(e) An ability to identify, formulate, and solve engineering problems.

(i) A recognition of the need for, and an ability to engage in life-long learning.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Relationship of course to Computer Science Program Student Outcomes:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(h) Recognition of the need for and an ability to engage in continuing professional development.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Prepared by: Miaoqing Huang Date: January 28, 2013

**CSCE 3513, Software Engineering (3 credits), Required**

**Catalog Description**: A modern approach to the current techniques used in software design and development. This course emphasizes the use of modern software development tools, multi-module programming, and team design and engineering.

**Prerequisite:** CSCE 3193

**Textbook / Required material:** Software Engineering (9th edition), by Ian Sommerville, Addison-Wesley,

**Goals:** Students learn and practice the basic software engineering concepts and improve programming skills through programming assignments and team project. In particular, fundamental principles of software engineering and Unified Modeling Language are covered in this course. Students are expected to use UML to create visual models of software-intensive system, form a team to finish a complex project, rely on Subversion (SVN) during code development, and improve document and presentation skills.

**Topics covered:**

* Software Life Cycle
* Software Process and Other Models
* Software Project Management
* Software Project Planning
* Software Requirements
* Software Design
* Software Metrics
* Risk Analysis and Management
* Software Quality Assurance
* Unified Modeling Language
* Version Control with Subversion

**Class / laboratory schedule:**  Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.

Relationship of course to Computer Engineering Program Student Outcomes:

An ability to function on multidisciplinary teams.

An understanding of professional and ethical responsibility.

An ability to communicate effectively.

The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

A recognition of the need for, and an ability to engage in life-long learning.

A knowledge of contemporary issues.

**Relationship of course to Computer Science Program Student Outcomes**:

* An ability to function effectively on teams to accomplish a common goal.
* An understanding of professional, ethical, legal, security and social issues and responsibilities.
* An ability to communicate effectively with a range of audiences.
* An ability to analyze the local and global impact of computing on individuals, organizations and society.
* Recognition of the need for and an ability to engage in continuing professional development.
* An ability to apply design and development principles in the construction of software systems of varying complexity.

Prepared by: **Brajendra Panda** Date**: March 12, 2013**

**CSCE 3613, Operating Systems (3 credits), Required**

**Catalog Description:** An introduction to operating systems including topics in system structures, process management, storage management, files, distributed systems, and case studies.

**Prerequisites:** CSCE 2014 and CSCE 2214

**Textbook / required material:** Silberschatz, Galvin, and Gagne, *Operating System Concepts*, Wiley, 9th edition.

**Goals:** Upon the successful completion of this course a student should understand:

* Operating systems structure and operations.
* Concepts of process management, memory management, direct access storage management, resource allocation, and time management.
* Process synchronization, mutual exclusion, and deadlocks.
* Virtual memory structure and implementation.
* File access methods and allocation.
* Operating system and application protection and security.
* Real-time systems.

**Topics Covered:**

* Major operating system components (Ch. 1)
* Structure of an OS (Ch. 2)
* Processes states (Ch. 3)
* Interprocess communication (Ch. 3)
* Communication in client-server systems (Ch. 3)
* Threads (Ch. 4)
* CPU scheduling (Ch. 5)
* Process synchronization (Ch. 6)
* Deadlocks (Ch. 7)
* Main memory (Ch. 8)
* Virtual memory (Ch. 9)
* File-system interface (Ch. 10)
* File-system implementation (Ch. 11)
* Mass-storage structure (Ch. 12)
* I/O Systems (Ch. 13)

**Class / laboratory schedule:**

Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks

**Relationship of course to Computer Engineering Program Student Outcomes:**

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(e) An ability to identify, formulate, and solve engineering problems.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Relationship of course to Computer Science Program Student Outcomes**:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Prepared by: **Dale R. Thompson** Date: **May 31, 2013**

**CSCE 4133 - Algorithms**

Syllabus for CSCE 4133

Algorithms

**The University of Arkansas Fall 2016**

**Instructor**: Gordon Beavers

**email**: [gordon](mailto:gordonb@uark.edu)[b@uark.edu](mailto:b@uark.edu)

**Office Hours**: MTWR 3:30 - 4:30

**Office** : JBHT 504

**Grader**: Yirong Chen

**email**: [yc007@email.uark.edu](mailto:yc007@email.uark.edu)

**Office Hours**: TR 8:00 - 10:00

**Office** : JBHT 434

**Class Time**: MWF 7:30 - 8:20

**Class Room**: JBHT 144

**Textbook**: **Introduction to Algorithms**, Third Edition

**Authors**: Cormen, Leiserson, Rivest, and Stein

**Publishers**: MIT Press 2009

Catalog Course Description:

**CSCE 4133** Provides an introduction to formal techniques for analyzing the complexity of algorithms. The course surveys important classes of algorithms used in computer science and engineering. Prerequisite: CSCE 3193 and MATH 2603.

Evaluation:

Graduate students will have additional assignments and a longer final examination.

Quizes 20% weekly

Assignments 50%

Final Exam 30% Friday 16 December 8:00

Course Content:

We shall attempt to cover the following material during this semester.

Getting Started (Chapter 2)

Growth of Functions (Chapter 3)

Recurrences (Chapter 4)

Heapsort (Chapter 6)

Quicksort (Chapter 7)

Sorting in Linear Time (Chapter 8) Hash Tables (Chapter 11)

Binary Search Trees (Chapter 12) review Red-Black Trees (Chapter 13)

Augmenting Data Structures (Chapter 14)

Dynamic Programming (Chapter 15)

Greedy Algorithms (Chapter 16)

Elementary Graph Algorithms (Chapter 22)

Minimum Spanning Trees (Chapter 23)

Single-Source Shortest Paths (Chapter 24)

All-Pairs Shortest Paths (Chapter 25)

Maximum Flow (Chapter 26)

Computational Geometry (Chapter 33)

**Suggestions**: Since we have an ambitious schedule, you will have to assume considerable responsibility for the mastery of this material. Complete understanding will normally come only with considerable study. Students should expect to spend three hours of individual study for each hour of lecture. Please look over the material before class so that you may ask relevant questions in class. Should you find that you still have questions after class, or you find that there is a problem you cannot solve on your own, please submit the question via email or submit it during a following class. Class participation will be taken into account in determining grades for borderline cases. The final will be open book, but not open notes.

**Class Attendance**: You are responsible for all material covered in class. If you must miss a class, it is your responsibility to get the notes, assignments, etc. from someone in class.

**Academic Honesty**: The policy specified in the *University of Arkansas Undergraduate Studies Catalog, Academic Regulations, Academic Dishonesty* will be followed. The goal of homework is to give you practice in mastering the course material. Consequently, you are encouraged to collaborate on problem sets. In fact, students who form study groups generally do better on exams than do students who work alone. If you do work in a study group, however, you owe it to yourself and your group to be prepared for your study group meeting. You should try to solve each problem beforehand. If your group is unable to solve a problem, talk to other groups or ask your recitation instructor.

You must write up each problem solution by yourself without assistance even if you collaborate with others to solve the problem. Identify your collaborators on your submitted assignments. If you did not work with anyone, you should write ”Collaborators: none.” If you obtain a solution through research (e.g., on the Web), acknowledge your source, but write up the solution in your own words. It is a violation of this policy to submit a problem solution that you cannot explain.

Plagiarism will not be tolerated.

**ADA Statement**: If any member of the class has a documented disability and needs special accommodations, the instructor will work with the student to provide reasonable accommodation to ensure the student a fair opportunity to perform in this class. Please advise the instructor of the disability and the desired accommodations within the fi week of the semester.

**Inclement Weather**: If the university is officially closed, class will not be held. You will be expected to make every effort to attend class, but not if you don’t feel that you can get to campus safely. Assignment due dates will be postponed in case of inclement weather.

**CSCE 4523, Database Management Systems**

(3 credits), Required CS

Catalog Description: **Introduction to database management systems, architecture, storage structures, indexing, relational data model, E-R diagrams, query languages, SQL, ODBC, transaction management, integrity, and security.** Prerequisite: **CSCE 3193**

Suggested Textbook: **T. Connolly and C. Begg, *Database Systems: A Practical Approach to Design, Implementation, and Management*, 5th Edition, Addison Wesley**

Goal: **This course is designed to teach the basic principles of data management in a database environment**

Topics Covered:

* DBMS Overview and Architectures
* Relational Data Model
* Relational Algebra
* Entity Relationship Model
* Database Language: SQL
* Physical Data Organization and Indexing
* Normalization
* Query Processing
* Transaction Management, Concurrency Control, and Recovery
* Security

Class / laboratory schedule: **Meets either 3 times a week for 50 minutes or 2 times a week for 1 hour 15 minutes for 15 weeks.**

**Relationship of course to Computer Engineering Program Student Outcomes:**

(a) An ability to apply knowledge of mathematics, science, and engineering.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(e) An ability to identify, formulate, and solve engineering problems.

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Relationship of course to Computer Science Program Student Outcomes**:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline.

(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

(c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

(i) An ability to use current techniques, skills, and tools necessary for computing practices.

(j) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Prepared by: **Brajendra Panda** Date: **August 26, 2013**

**MATH 2564 – Calculus II**

Course Syllabus

**Professor:** Dr. Shannon Dingman

**Office:** Science-Engineering (SCEN) 321a

**E‑mail:** [sdingman@uark.edu](mailto:sdingman@uark.edu)

**Phone (Office):** (479) 575-3494

**Office Hrs:** 12:45-1:45 MWF, or by appointment (drop-ins are welcome if I’m in my office; however, calling, emailing, or setting up a time will increase your chances of meeting)

**Course Number:** MATH 2564

**Course Name:** Calculus II

**Semester Credit Hours:** 4

**Meeting Time:** 2:00 p.m. – 2:50 p.m. Monday, Wednesday, Friday

**Meeting Location:** JB Hunt 144

**Required Materials:** There are two aspects of the required materials: the MYLABSPLUS Student Access Kit and the Turning Technologies response card (e.g., clicker).

**SOFTWARE:** MYLABSPLUS (MLP) Student Access Kit – This kit is ***REQUIRED*** for this class. The textbook is recommended, but not required since an electronic version of the textbook is included in the kit. If this is your first math course that requires the MyLabsPlus software, you will receive an email with your login/password information and how to enroll in this course. Please follow those instructions. If you have previously taken a course that requires the My LabsPlus software, then go to uark.bb.mylabsplus.com and log in using your current login (which is your University of Arkansas email address including the @uark.edu part) and password. This course will now appear in the course listing. Click on this course and follow the instructions.

**PROBLEMS WITH THE SOFTWARE:** If your login fails, please check that you typed in the correct web address for MLP: uark.bb.mylabsplus.com. If you are able to open your course but you are not able to access your assignments, please try again. If you have tried a few times and still receive some type of an error message, then you need to contact the MLP Technical Support line at 888-883-1299 (available 24/7) or click on the Support Tab and then click on the email address. If you contact the company please make sure that they give you a case number and keep that number in case it is needed for verification.

**AUDIENCE RESPONSE:** The Turning Technologies audience response system will be used in all lectures. The student is required to purchase a Turning Technologies response card (clicker) unless one has previously been purchased for another class. The student is required to bring the clicker to every lecture. The channel setting for this class will be **channel 37**. Each student must register his/her clicker online as follows:

1. Go to the website ***webreg.turningtechnologies.com***
2. Enter your First Name, Last Name, User ID, Email address, and Device ID in the correct spots
3. Enter the Captcha image and click Register Device.
4. Verify the information is correct and click Final Submission to complete your registration, or Cancel to start over

**Textbook:** *Calculus, Early Transcendentals,* William Briggs, Lyle Cochran, 2011, Pearson. As stated earlier, this is not required, as there is an electronic version of the textbook included in the MYLABSPLUS kit. However, if you work better from a print version, I suggest you obtain a copy, as it will be used in future calculus courses as well.

**Calculators:**

Calculators are not necessary for the course. No calculators or computers will be allowed during exams or quizzes. Calculators and computers may be used for homework or for in-class investigations but are not necessary.

**OTHER TECHNOLOGY**

Please do not have your cell phone on during class. Cell phones, palm pilots, Blackberries, IPods, etc. will not be allowed to be visible or used in any way during class. Do not plan to use these devices for a clock on the exam. Any device using earplugs/headsets is not allowed in class. If you have any of these devices in your back-pack or pocket during class, be sure that they are turned off and left in your back-pack or pocket.

**GRADING:**

Grades for this course will be determined as follows:

Homework (Mylabsplus + Attendance) 10%

Quizzes 15% Exam 1 (tentatively Sept 20) 15%

Mid-Term (departmental) 20%

Exam 3 (tentatively Nov 18) 15%

Final (departmental & comprehensive) 25%

Letter grades will typically follow a 90-80-70-60 scale, although the instructor reserves the right to revise downward if necessary.

There are two COMPREHENSIVE, COURSE-WIDE exams. These exams are written by the course coordinator, and graded by all course instructors.

**THURSDAY, OCT 17 MIDTERM EXAMINATION 6:00-7:30 pm**

**MONDAY, DEC 16 FINAL EXAMINATION 6:00-8:00 pm**

These exams are scheduled before the semester begins. **Students should ELIMINATE ANY CONFLICTS NOW.** Students who are entitled for accommodation by ADA must notify their instructor, and their instructor must notify the coordinator, at least one full week before the common examinations. Students who have a legitimate University-related conflict with the midterm or final exam must also identify themselves at least a week in advance. Last minute requests for make-up exams may not be granted.

The single best indicator of success in any calculus course is **DOING THE HOMEWORK!** There is simply no better tool for mastering the material. The course moves very quickly, so don’t get behind!

The homework will have a written component (e.g., paper HW from the textbook) and an online component (e.g., computer HW from mylabsplus). Generally, there will be a paper homework assignment for each class meeting. Not all homework assignments will be collected for grading. However, it is extremely important that you keep up with homework, as this is the practice and important learning experiences you need in order to be successful on quizzes, investigations, and exams. (A minimum of two hours per night is to be expected.) Computer homework will be posted on MLP and will contain two types of assignments—required ones and suggested ones. You are strongly encouraged to complete all of the online HW, as well as the assigned book problems. Note that computer homework comes with deadlines. After the deadline deductions will be given for late HW. Computer homework applies to your course grade.

You will have a chance to ask questions on homework problems in the drill sections, and will be able to attempt the online questions as many times as you like, before each assignment’s due date. If you are keeping up with the material you should do well on the HW. The HW will count for 10% of your final grade.

Additionally, there will be weekly quizzes in your drill section. The problems will usually be from the book HW. The quizzes will count for 15% of your final grade.

**Attendance & Class Participation:**

Class attendance is required and extremely important. Attendance is part of your grade—therefore, absences from class will influence your grade in more ways than just your overall performance. The Turning Technologies audience response system will be used in the lecture class. You are required to purchase a Turning Technologies remote clicker unless you have previously purchased one for another class. Attendance will be taken in lecture class using the clicker. Participation in class activities and discussion is encouraged and also contributes to your overall grade. Attendance will be worth two HW grades in your final grade, while your clicker responses will account for an additional HW grade.

**Statement for Academic Integrity:**

As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail." Each University of Arkansas student is required to be familiar with and abide by the University's Academic Integrity Policy which may be found at http://provost.uark.edu/. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor. In addition, given the common coordination across Calculus 2 courses, it is considered academic dishonesty to discuss the contents of exams or quizzes with other students prior to their completing these assignments. Failure to abide by this rule is grounds for academic dishonesty charges being brought against all students involved.

**TUTORING**

There are free student tutors in the Enhanced Learning Center (Gregson Hall), Mullins Library, ENGR, Reid, Futrall, Maple Hill, and MRTC – SCEN 209. Visit their websites for the latest hours. In addition, private tutoring is also available.

**Inclement Weather Policy:**

Class will meet unless the University is closed. On-campus students are expected to be present. Off-campus students should make their own decisions in the best interest of personal safety. Off-campus students will not be penalized for being absent on those days the Fayetteville Public Schools are closed due to weather. If attendance is severely affected by weather, deadlines and exam dates may be adjusted. Please do not call the Department of Mathematical Sciences with weather-related inquiries. You may email me for information.

**EMERGENCY PROCEDURES**

Many types of emergencies can occur on campus; instructions for specific emergencies such as severe weather, active shooter, or fire can be found at **emergency.uark.edu**.

**Severe Weather (Tornado Warning):**

* Follow the directions of the instructor or emergency personnel
* Seek shelter in the basement or interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside
* If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building
* Stay in the center of the room, away from exterior walls, windows, and doors

**Violence / Active Shooter (CADD):**

* **CALL-**  9-1-1
* **AVOID-** If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
* **DENY-** Barricade the door with desk, chairs, bookcases or any items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it’s safe.
* **DEFEND-** Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

***THIS SYLLABUS IS SUBJECT TO CHANGE.* You will be notified in email, on MLP, and/or in class of changes. Failure to check your email and/or failure to read the announcements in MLP and/or failure to attend class will not constitute a reason to be allowed to make up any assignments, tests, or changes to the course.**

**MATH 2564 COURSE OUTLINE AND SUGGESTED SCHEDULE:**

This schedule is an approximation and subject to change.

Week of

26 August Cal I Review

7.1 Integration by Parts

2 September Labor Day Holiday

7.2 Trigonometric Integrals

7.3 Trigonometric Substitutions

9 September 7.3 Trigonometric Substitutions

7.4 Partial Fractions

7.7 Improper Integrals

16 September 7.7 Improper Integrals

Exam 1 (Covering Sections 7.1-7.4, 7.7)

23 September 6.1 Velocity and Net Change

6.2 Regions Between Curves

6.3 Volume by Slicing

6.4 Volume by Shells

30 September 6.5 Length of Curves

6.6 Physical Applications

7 October 6.6 Physical Applications

6.8 Exponential Models

8.1 An Overview (of sequences and series)

14 October 8.2 Sequences

Review

MIDTERM EXAM – THURSDAY, 6:00 – 7:30 PM

8.3 Infinite Series

21 October Fall Break

8.4 Divergence and Integral Tests

8.4/8.5 Integral Test/Comparison Tests

28 October 8.5 Ratio and Root Tests

8.6 Alternating Series

4 November 9.1 Approximating Functions with Polynomials

9.2 Properties of Power Series

9.3 Taylor Series

11 November 9.3 Taylor Series

9.4 Working with Taylor Series

18 November Exam 2 (Covering Chapters 8 and 9)

L1 An Introduction to Matrices

L2 Determinants of 2x2 and 3x3 Matrices

25 November L3 Matrix Multiplication

Thanksgiving Break

2 December L4 Linear Independence

L5 Linear Transformations

9 December L6 Eigenvalues and Eigenvectors

Review

16 December FINAL EXAM – MONDAY, 6:00 – 8:00 PM

Foundations of Geometry I

Math 3773 Fall 2016 Prof. C. Goodman-Strauss

SCEN 303 (enter through 301)

[*strauss@uark.edu*](mailto:strauss@uark.edu)

Geometry is a huge and vital subject, developed over thousands of years, all over the world, for all kinds of purposes: architectural, ornamental, religious, philosophical, administrative, artistic and, yes, even mathematical. This course will survey several broad aspects of geometry:

Roughly the course can be divided into four sections: classical Euclidean geometry in the plane, with many applications; solid geometry; other geometries, particularly projective geometry; and symmetry.

Your assessment will be 30% a portfolio of class work, three mini-projects worth 10% each, and two major projects, due 20% each. There will be substantial overlap across these assignments. Group work is permitted so long as each member’s role is represented to me in detail. A calendar of deadlines is on the following page.

*Portfolio* As you will have noticed, there is no text-book for the class; materials will take a variety of forms: lectures, activities, model-making, etc. Your portfolio is meant to be permanent documentation of this course, in a form that will be useful to the professional geometry teacher. (Homework assignments will be built into the portfolio assessment.) Lectures should be recopied into this portfolio; homework questions should be posed, and then answers given and annotated; handouts and additional materials should be preserved for future use. A 3-ring binder and hole-punch, with additional pockets might be useful for this.

Every second Wednesday, the Portfolio will be turned in and then returned.

*Projects* Like all work in this class, the emphasis is on producing materials that are of practical use in the classroom. These projects can take a variety of forms, the work should be professional, mathematically complete, engaging, and reproducible. Apart from that though, really, the only limitation is your imagination!

There are two kinds:

*Mini projects* Roughly equivalent to a 5-10 page paper in effort, these are more detailed write- ups or extensions of materials covered in class. A very good example would be to take a particular lecture and create well-put together documentation, complete with supplementary material, illustrations, etc. –in short, a section of the textbook for this class. Video, model making, large scale constructions, pedagogical exercises, or serious mathematical investigations are all appropriate formats.

*Major projects* Roughly equivalent to two mini projects, these are more open ended, independent study type projects; again the work should be professional, mathematically complete, engaging, and reproducible. We will discuss ideas throughout the semester.

Aug 22 24 26 29

31 Portfolio check

Sept 2 5 Labor day 7 Mini I due - 10% 9

12 14 Portfolio check

Major I idea due

16 19 21 Major I draft 23

26 28 Portfolio check 30

Oct 3 5 Major I due - 20% 7 10

12 Portfolio check 14 17 (Fall Break) 19 Mini II - 10%

21 24 26 Portfolio check 28

31

Nov 2 Mini III - 10%

Major II idea due

4 7 9 Portfolio check 11

14 16 Major II draft 18 21 Portfolio check

23 (Thanksgiving) 25 (Thanksgiving) 28 30 Major II - 20%

Dec 2 5 Portfolio due - 30% 7 12 1-3 Final (exhibit)

## 2F. Teacher Candidate Competencies for Knowledge and Use of Educational Technology

As a teacher preparation program of math, science, engineering, and computer science majors as pre-service teachers, it is easy to embrace the use of technology in our classes, to see the rationale for using technology, and experience the increased interest and understanding that can occur when technology facilitates the exploration of a concept. The use of technology is specified in our syllabi of the 6 core education courses. Instructors engage the students with model lessons that demonstrate the use of technology for instructional purposes and we support students in developing lessons in which student understanding and interest are enhanced by the use of technology. The required Research Methods course provides students opportunities to further make use of technology while they engage in their own scientific investigations. We look forward to having more computer science students in our courses and seeing how their knowledge base influences what we are already doing.

Connecting to the National Educational Technology Standards for Teachers (ISTE), we have provided the primary expectations for our math/science/computer science pre-service teachers:

Effective teachers…

*Facilitate and inspire student learning and creativity*

* Students will learn to use LabQuest data collection devices with a variety of probes to collect and analyze real-world data.
* Students will reflect upon the value of these tools, among others, to the inquiry-based instructional approach to teaching, as this technology allows students to make conjectures, test them, derive conclusions, and raise more questions of what to investigate next.

*Design and develop digital age learning experiences and assessments*

* Students are expected to plan and teach at least one inquiry-based lesson per practicum, including assessment, that utilizes technology (ranging from use of document camera and smartboards in the first course, to Vernier probes, TI-Nspires, I-Pad apps, programs such as PhET simulations & Geometer’s Sketchpad, etc. in subsequent courses)

*Model digital age work and learning*

* Students will make use of electronic tools such as google docs, dropbox, Edmodo, websites, etc. for planning lessons, finding and organizing resources, collaborating with teaching partners, communicating professionally with peers, mentor teachers, and students.

*Promote and model digital citizenship and responsibility*

* As a component of classroom organization and management, students are expected to develop a plan to efficiently distribute and collect technology devices used in the classroom, and be able to clearly explain the importance of handling the equipment responsibly.

*Engage in professional growth and leadership*

* Students are encouraged to present their inquiry-based lessons that utilize technology at mentor teacher workshops, university pre-service teacher events, and local/state teacher conferences. We would like to instill an attitude of ‘giving back to the profession’ among our students. Staying up-to-date on the latest technology is a challenge for many teachers, and we hope that our students will share their knowledge of technology with those who need to learn, both informally and by taking on leadership roles.

## 2G. Common Assessments Required in the Program

### 2Gi. Samples of Assessments and Rubrics

#### 2G.i.aPraxis Exams

Students will be required to take and pass the following Praxis exams:

|  |  |
| --- | --- |
| PRAXIS EXAM | Qualifying Score |
| Praxis Core Reading\*  5624 | 156 |
| Praxis Core Writing\*  5722 | 162 |
| Praxis Core Math\*  5732 | 150 |
| Praxis Principles of Learning and Teaching (grades 7-12)  5624 | 157 |
| Praxis Content: Computer Science  5712 | 159 |

\**In lieu of taking Praxis Core exams, a student may present a qualifying ACT composite score of 24, with minimum 22 on each section, or an SAT composite score of 1090, with minimum 510 on each section.*

#### 2Gi.b TESS Teacher Summative Evaluations and Rubric

During the one semester internship in the final semester of a student’s program, the student’s mentor teacher and intern supervisor each fill out the summative evaluation based on their observations of the student (intern teacher.) The evaluation follows the 4 domains of the Danielson framework.

Teacher Education Summative Evaluation Form

|  |  |  |
| --- | --- | --- |
| **Intern/Student Teacher:** | **Date:** | **School:** |
| **Observer:** | **Grade:** | **Rotation / Observation #:** |
| **Mentor:** | **Subject:** | **Program:** |

|  |  |  |
| --- | --- | --- |
| **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** |  |  |
|  | **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 explanation of content * Accurate response to student questions * Questions build on prior k/s   ***Teacher Lesson Plans/Interview***   * Explains how discipline is organized and has evolved * Identifies concepts to be taught * Shares relationship to other disciplines * Selects appropriate teaching strategies | **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** |
| **Comments:** |
| ***Teacher Lesson Plans/Interview***   * Age appropriate * References current research * Activities engage inquiry and reciprocal learning process * Activities/strategies based in formal / informal and ongoing assessment * Seeks input from parents * Interest surveys and interviews * Cultural sensitivity * Meets with key school personnel * Accommodations | **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** |
| **Comments:** |
| **Teacher Plans/Interviews**   * Connects to national, state, and local standards * Represents big ideas * Scaffolded on prior and establishes foundation for future learning that represent the discipline * Written in terms of LEARN **not** DO * Are specific, doable, observable * Reflect different types of learning * Provide opportunities for coordination * Reflect actual and higher-order thinking * Reflect procedural knowledge * Reflect conceptual understanding * Reflect communication skills * Reflecting reasoning skills * Reflecting collaboration skills * Are suitable for all students | **c. Teacher selects instructional outcomes.**  **- Value, sequence, and alignment**  **- Clarity**  **- Balance**  **- Suitability for diverse learners** |
| **Comments:** |
| **Teacher Plans/Interviews**   * Utilizes several and differentiated resources * Stays abreast of subject(s) teaches * Aware of and familiar with resources in and out of school/district * Guest speakers * Field trips * Internet * Professional organizations * Media center, computer lab * Multidisciplinary resources * Artifacts | **d. Teacher demonstrates knowledge of resources.**  **- Resources for classroom use**  **- Resources to extend content knowledge and pedagogy**  **- Resources for students** |
| **Comments:** |
| **Teacher Plans/Interviews**   * Suitable to students and learning outcomes * Represent significant cognitive challenge * Differentiated * Engaging * Varied grouping * Clearly defined structure * Reasonably timed | **e. Teacher designs coherent instruction.**  **- Learning activities**  **- Instructional materials and resources**  **- Instructional groups**  **- Lesson and unit structure** |
| **Comments:** |
| **Teacher Plans/Interviews**   * Assesses all outcomes * Adapts for groups/students * Identifies clear criteria/standards * Develops appropriate strategies * Uses to plan for future instruction | **f. Teacher assesses student learning.**  **- Congruent with instructional outcomes**  **- Criteria and standards**  **- Design of formative assessments**  **- Used for Planning** |
| **Comments:** |

Summary:

Suggestions:

|  |  |  |
| --- | --- | --- |
| **Domain 2: The Classroom Environment**  *To be completed during observation of a lesson* | | |
| **Score** |  |  |
|  | **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.** | * Teacher calls students by name * Teachers uses “we” statements to make students feel part of the group * Listens to students with care * Polite language is used in interaction between the students and the teacher * Teacher checks with students to find out how they feel about the class/lesson |
| **Comments:** |
| *Classroom Observation* **b: The importance of the content. Expectations of learning and achievement. Student pride in work.** | * Voice and body language convey enthusiasm * Student have a choice about how they show what they have learned * Teacher shares the learning goal for the lesson and explains the lesson’s importance and purpose * Teacher reinforces students’ development of conceptual understanding in order for students to demonstrate proficiency of content |
| **Comments:** |
| *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.** | * Guidelines for group work are specified * Routines are established * Roles are used when appropriate * Group members listen respectfully * Group works to meet learning goal * Worked productively * Used time well * Voice level appropriate * Materials and supplies are handled smoothly and efficiently |
| **Comments:** |
| *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.** | * Appropriate and clear standards of behavior * Alert to student behavior at all times * Consistency * Clear consequences * Demonstrate positive behavior * Sense of respect * Responds to serious behavior problems * Rationale for standards |
| **Comments:** |
| *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.** | * Class arrangement * Use of space appropriate for learning * Safety * Access to instruction * Facilitates learning * Lesson adjustments * Traffic pattern |
| **Comments:** |
|  |  |

Summary:

Suggestions:

|  |  |  |
| --- | --- | --- |
| **Domain 3: Instruction**  *To be completed during observation of a lesson* | | |
| **Score** |  |  |
|  | **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** |
| * Written and verbal explanation of lesson purpose * Directions and procedures are clear to students * Explanation of content is appropriate and connects to student knowledge and experience * Clear and correct spoken and written language | *Classroom Observation* **a: Expectations for learning. Directions and procedures. Explanations of content.** |
| **Comments:** |
| * Teacher’s questions are of high quality * Adequate time provided for response * Genuine discussion among students * Teacher successfully engages all students in discussion | *Classroom Observation* **b: Quality of questions. Discussion techniques. Student participation.** |
| **Comments:** |
| * Assignments are appropriate and students are cognitively engaged * Instructional groups are productive and appropriate for the lesson * Materials and resources are appropriate and engage students mentally * Lesson has a clearly defined structure * Pacing is appropriate | *Classroom Observation* **c: Activities and assignments. Grouping of students. Instructional materials and resources. Structure and pacing.** |
| **Comments:** |
| * Students are fully aware of criteria and performance standards by which work will be evaluated * Monitors the progress of groups making use of diagnostic prompts * Feedback to students is timely and high quality * Students frequently assesses and monitors quality of their own work against criteria | *Classroom Observation*  **d: Assessment criteria. Monitoring of student learning. Feedback to students. Student self-assessment and monitoring of progress.** |
| **Comments:** |
| * Makes minor adjustments to lesson in a smooth manner * Successfully accommodates for students’ questions and interests * Anticipates and responds to student differences * Persists in seeking approaches for students who are struggling | *Classroom Observation* **e: Lesson adjustment. Response to students. Persistence.** |
| **Comments:** |

Summary:

Suggestions:

|  |  |  |
| --- | --- | --- |
| **Domain 4: Professional Responsibilities** | | |
| **Score** |  |  |
|  | **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 |

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| --- |
| **Domain D: Teacher Professionalism** |

|  |  |
| --- | --- |
| **Key Proficient “Look Fors”** | **Criteria** |
| * Accurately assess lesson's effectiveness in meeting outcomes * Generally supports judgments * Suggests future adjustments | **a. Reflecting on teaching.**  **- Accuracy**  **- Use in future teaching** |
| **Comments:** |
| * Fully effective system for maintaining information on student completion of assignments. | **b. Maintaining accurate records**  **- Student completion of assignments**  **- Student progress in learning**  **- Non-instructional records** |
| **Comments:** |
| * Provides frequent information to families * Communicates regularly about students' progress * Engages families frequently and successfully * Volunteers in school events making substantial contribution * Coordinates with specialists | **c. Communicating with families**  **- Information about the instructional program**  **- Information about individual students**  **- Engagement of families in the instructional program** |
|  | **Comments:** |
| * Mutual support and cooperation * Grade-level/departmental meetings * Engages in analysis, reflection, discussion and debate with intent to improve * Actively participates in a culture of professional inquiry * Professional development * Action research * Collaboration | **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** |
| **Comments:** |
| * Seeks out opportunities for professional development to enhance content knowledge and pedagogical skill * Welcomes feedback and responds/asks for further feedback | **e. Growing and developing professionally**  **- Enhancement of content knowledge and pedagogical skill  - Receptivity to feedback from colleagues**  **- Service to the profession** |
| **Comments:** |
| * Displays high standards of honesty, integrity, and confidentiality in interactions with colleague, students, and the public. * Volunteers to participate in before/after school programs * Ensures all students have fair opportunity to succeed. * Open minded and participates in team/departmental decision-making. * Consistent and on time in attendance * Consistent and on time in attendance at team and faculty meetings * Dresses appropriately | **f. Showing professionalism**  **- Integrity and ethical conduct**  **- Service to students**  **- Advocacy**  **- Decision making**  **- Compliance with school and district regulations** |
| **Comments:** |
|  |  |

Summary:

Suggestions:

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| --- | --- | --- | --- | --- | --- |
|  | **TESS Summative Rubric** | | | | |
| **Domain 1: Planning & Instruction** | **Component** | **Unsatisfactory** | **Basic** | **Proficient** | **Distinguished** |
| *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 are suitable for only some students. | 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 has a recognizable structure and reflects partial knowledge of students and resources. | 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 students. The lesson or unit has a clear structure and is likely to engage students in significant learning. | 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 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. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Domain 2: The Classroom Environment** | | **Component** | | **Unsatisfactory** | | **Basic** | | **Proficient** | | **Distinguished** |
| *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. |
| **Domain 3: Instruction** | **Component** | | **Unsatisfactory** | | **Basic** | | **Proficient** | | **Distinguished** | |
| *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 intellectual engagement. The lesson has no structure or is poorly paced. | | 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 lesson has a recognizable structure but is not fully maintained. | | 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 level of rigor. The lesson’s structure is coherent, with appropriate pace. | | 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 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. | |

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| --- | --- | --- | --- | --- | --- |
| **Domain 4: Professional Responsibilities** | **Component** | **Unsatisfactory** | **Basic** | **Proficient** | **Distinguished** |
| *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. |

#### 2Gi.3 University of Arkansas EPP Teacher Candidate Dispositions Inventory and Rubric

**University of Arkansas**

**Teacher Education Candidate Disposition Inventory**

Candidate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Program: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_ Course: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  #Absences: \_\_\_\_\_\_ # Tardies: \_\_\_\_\_\_

Is a conference needed? \_\_\_ Yes \_\_\_No    If yes, who should be involved: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Purpose**: The Candidate Disposition Inventory is an assessment tool designed to provide feedback to teacher candidates regarding demonstration of dispositions considered essential to effective teaching. The Inventory is completed by University Faculty working directly with teacher candidates as they proceed through the teacher preparation program. Once faculty have completed the Inventory, individual conferences are scheduled with teacher candidates to discuss personal growth plans and any areas of concern and/or needing improvement. Teacher candidates exhibiting considerable concerns will work closely with faculty and program leadership to address these concerns so that they can complete the program successfully. They will be monitored closely to assess their progress in noted areas. Other uses of the inventory may include teacher candidate self-assessment or as a discussion tool about professional practice with University faculty as they proceed through the program.

***Instructions:*** For each dispositional statement, indicate if the disposition was appropriately displayed, inappropriately displayed, or not seen. Please refer to the Rubric for Candidate Disposition Inventoryfor specific elements related to each statement. The following descriptors apply:

* **YES – All dispositions in the statement are appropriately displayed**
* **NO – One or more of the dispositions in the statement are inappropriately displayed**
* **NS – Not Shown**

|  |  |
| --- | --- |
| **DISPOSITIONAL STATEMENT** | **RATING** |
| 1. Communicates effectively and/or appropriately. | Yes No NS |
| 1. Demonstrates a positive attitude through engagement. | Yes No NS |
| 1. Uses courtesy, respect, and civility when interacting with others. | Yes No NS |
| 1. Displays the ability to work with diverse individuals. | Yes No NS |
| 1. Displays a passion for continuous learning. | Yes No NS |
| 1. Stays focused on a task and handles the task professionally and maturely. | Yes No NS |
| 1. Demonstrates confidence and commitment when taking on assigned and/or unassigned tasks. | Yes No NS |
| 1. Demonstrates flexibility and is able to make adjustments in light of changing circumstances. | Yes No NS |
| 1. Shows ethical thinking and sound judgment. | Yes No NS |
| 1. Exhibits a belief that ALL students can learn. | Yes No NS |
| 1. Is self-reflective and accepts and uses constructive feedback. | Yes No NS |

Comments (Required for disposition statement(s) marked “No”)

This form completed by (circle one): Instructor Supervisor Mentor Teacher

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_

Instructor Signature Date \*Candidate Signature Date

(\*Candidate signature acknowledges review of form, not necessarily concurrence)

**Rubric for Candidate Disposition Inventory**

**University of Arkansas Teacher Education Program**

|  |  |  |  |
| --- | --- | --- | --- |
| **Disposition**  **And Related Standards** | **Disposition Definition** | **YES** | **NO** |
| (1) Effective and appropriate communication  CAEP 1.1  InTASC 6.8 | Communicates effectively and appropriately both orally and in written work | Uses no objectionable language; Grammar use is mostly accurate; Honesty and integrity are generally apparent. Words and actions are polite and professional. | Uses objectionable language; Incorrect grammar employed; Honesty and integrity are sometimes not evident in actions or words. Words or actions are insulting or show contempt for others or other cultures or genders. |
| (2) Appropriate engagement  CAEP 1.1  InTASC 9, 10 | Demonstrates appropriate engagement such as appropriate facial expressions, eye contact, and body language | Pays attention in class and school settings; displays appropriate levels of participation; displays a positive attitude toward involvement; body language indicates engagement (appropriate eye contact, positive posture, appropriate facial expressions) | Appears disengaged in class and/or school settings; rarely participates; makes little or no effort to be involved in course activities; body language is routinely negative (little eye contact, slouched posture, inappropriate facial expressions) |
| (3) Interactions with and treatment of others  CAEP 1.1  InTASC 1, 2, 3 | Interacts appropriately and positively with others. Treats others with courtesy, respect and civility. | Interactions with peers, colleagues, or authority figures are appropriate and positive. Treats others with courtesy and respect. Words and actions are polite and professional. Treats others with sensitivity to cultural and gender differences. | Interactions with peers, colleagues, or authority figures are at times negative, demeaning, sarcastic, combative, or inappropriate. At times treats others rudely and with disrespect. Words or actions are insulting or show contempt for others or other cultures or genders. |
| (4) Willingness and ability to work with others  CAEP 1.1  InTASC 3, 10 | Displays the ability to work with diverse individuals. | Works harmoniously and effectively with diverse individuals. May seek opportunities to include or show appreciation for under-represented individuals. | Communicates an inability or unwillingness to work with some students, other teacher candidates, or teachers. |
| (5) Passion for learning  CAEP 1.1  InTASC 4, 7, 9 | Passionate about learning. | Shows some curiosity for learning. Shows interest in learning from others and from experiences. Attempts to learn new concepts eagerly. Shows awareness of ideas. Questions assumptions. | Exhibits boredom with learning; shows little, if any curiosity, zest and energy for learning. Fails to seek understanding and appears to lack personal commitment to learning from others and from experiences. Exhibits little interest in trying different ways to learn something. Lacks engagement with ideas. Does not ask questions or question assumptions. |
| (6) Problem solving abilities and self-control  CAEP 1.1  InTASC 9, 10 | Displays maturity and independence by following appropriate protocol when seeking solutions to problems. Demonstrates appropriate self-monitoring and control of emotions and behavior. | If unable to resolve problems independently, enlists the help of faculty or staff in identifying the appropriate person to assist; follows through with that person to seek a resolution; uses discretion in discussing the problem. Focuses on seeking solutions rather than assigning blame. Models appropriate emotional and behavioral responses. | Fails to identify the appropriate personnel with whom to address problems; focuses on blaming others rather than seeking solutions. Enlists participation of family members or other individuals to seek solutions on his/her behalf. At times visibly demonstrates lack of emotional control; may become upset, use put-downs or display anger. |
| (7) Confidence and commitment  CAEP 1.1  InTASC 9, 10 | Demonstrates enthusiasm, confidence, initiative, and commitment. Prepares thoroughly and consistently. Meets deadlines. Is reliable and dependable. | Exhibits enthusiasm and confidence in teaching and takes initiative. Assigned and unassigned responsibilities are completed with minimal direct supervision. Consistently displays a thorough preparation of materials. Abides by deadlines for assignments, including projects and presentations. Usually completes assignments, duties or tasks on time. Attendance and punctuality are usually appropriate. | Lacks enthusiasm and confidence in teaching and does not take initiative. Does little without supervision and/or does not follow through on responsibilities. Some assigned and unassigned responsibilities are completed but with direct supervision. Seldom displays a thorough preparation of materials. Does not consistently abide by deadlines for assignments, including projects and presentations. Sometimes completes assignments, duties, or tasks on time. Attendance and punctuality are inappropriate. |
| (8) Flexibility  CAEP 1.1  InTASC 9, 10 | Demonstrates flexibility and is able to make adjustments in light of changing circumstances. | Displays a willingness and ability to adapt to changes in events, conditions, activities, and tasks. Responds positively to last minute changes in the daily schedule based on the requests of instructors or school personnel. | Is unwilling or unable to adapt or change when necessary or is confrontational when faced with an unexpected situation. Responds in a negative manner to changes in the daily or course schedule. |
| (9) Ethical thinking and sound judgment  CAEP 1.1  InTASC 9 | Exhibits sound judgment in personal and professional situations. Exhibits a strict code of honesty related to tests, assignments, and teaching responsibilities. Maintains confidentiality of records, correspondence and conversations.  Behaves in a legal and ethical manner. | Makes acceptable decisions; relates to P-12 students in an adult and professional manner; never leaves the classroom without a qualified adult in charge. Documents thoroughly.  Maintains confidentiality of P-12 student records and of professional correspondence and conversations; refrains from gossiping. Conduct is legal and ethical. | Sometimes makes questionable decisions; relates to P-12 students as peers; leaves the classroom without a qualified person in charge. Has knowingly plagiarized, cheated on a test, copied another’s work or allowed someone to copy. Documentation is sometimes incomplete. Does not maintain confidentiality of records; participates in gossip about P-12 students, faculty, or school personnel; does not respect confidentiality of professional correspondence or conversations. Engages in illegal or unethical conduct or in behavior, which would be grounds for dismissal from a teaching position. |
| (10) Belief that ALL students can learn  CAEP 1.1  InTASC 1,2,3 | Exhibits belief that all students can learn. | Shows through words and actions a belief in the ability of all students to learn. Encourages all students to be successful. | Does not appear to have confidence in all students’ ability to learn. Little evidence of commitment to encouraging students who have difficulty learning. |
| (11) Self-reflection and response to feedback  CAEP 1.1  InTASC 9 | Reflects on own behavior; accepts and uses constructive feedback. | Accurately demonstrates reflection through conferencing and written responses. Reflects on teaching and includes specific examples of successes and area needing improvement; can provide several suggestions for improvement. Is receptive to constructive comments and implements changes. | Does not accurately reflect on teaching through conferencing or written responses or propose ideas as to how it might be changed. Reflects when prompted and is generally accurate at a superficial level; able to make global suggestions as to how instruction might be improved; can occasionally make specific suggestions for self-improvement. Is not receptive to constructive comments and shows no sign of implementing change. |

**University of Arkansas Teacher Education Program**

**Candidate Disposition Inventory**

Candidate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Program: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Course: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Instructor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This form is to be used by faculty members to report significant concerns about a candidate’s dispositions. The completed copy is to be submitted to the program coordinator in which the candidate is enrolled. A completed Candidate Disposition Inventory should be attached. The candidate should be given a completed copy of both forms.

I have the following concerns about this teacher education candidate:

I am recommending the following course of action (include a timeline for addressing the concern):

Faculty Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Candidate Comments:

\*Candidate Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

(\*Signature indicates that candidate has read the referral. It does not indicate agreement.)

#### 2Gi.4 Sample Assessments from Education Courses

**STEM 2103: Knowing & Learning, The Clinical Interview Assignment & Rubric**

**STEM 2103 Knowing and Learning in Mathematics and Science**

**‘Clinical/Flexible’ Interview Assignment**

*Choose one type of interview described below. Write a set of 3 interview questions (in your discipline) that slightly increase in complexity (questions should be somewhat related). Email me your questions in advance for approval to ensure that they are of reasonable complexity. The questions should be such that they elicit the interviewee’s conceptual thinking that could lead to further questioning, not just recall of facts – or else your interview would be over in 30 seconds! The main goal of these interviews is for you to experience ‘listening’ to a person’s thinking, and learn to ask questions that further bring out what knowledge and understanding your interviewee has. You will interview 2 people with different levels of knowledge. A secondary goal of this assignment is for you to notice and describe the differences in thinking between a novice and an expert. In your interview write-up, you will connect what you’ve learned about educational theory to what you observed in the interviews.*

**Interview Set #1 (75 points, due October 8):** Interview both a low-achieving student (the novice) and a high-achieving student (the expert) at either the elementary or middle school level where you are doing your practicum or where you have done a previous practicum. Both students must be from the same grade level. Your mentor teacher can suggest which students to interview, and your mentor will send those students home with parent permission forms. *This interview is NOT recorded.*

**What to hand in for Interview #1 (hard copy, email, or submit to Blackboard):**

**1) \*\*\*\* *Before the interview:***

*email me your questions so that I can approve them*

2) **During the interview:**

* Have paper and pencil for the student to work on as well as any models or manipulatives that may be helpful. It’s best not to tell the student to use a certain math manipulative, for example, because you want to find out which strategy comes first to their minds, or how they would represent the problem by drawing a picture, rather than going straight to a pre-made representation. But if the student is struggling, you can offer it.
* If the student does not know where to begin, or gives an incorrect answer, you are expected to scaffold their thinking to help them figure out the process, rather than go on to the next problem. You might ask them a few questions to determine what they know, or break apart the problem for them, or simplify the problem. If the student begins to get upset, drop back to simpler problems, or move on.

3) **After the interview:** Your write up of the interview, one student at a time, in a detailed, per question/response format, that includes each question that you asked and a description of the student’s response along with your own commentary.

Although some of your commentary will naturally include some of the points below, at the end of both write-ups, write a summary analysis of…

* *a) how the knowledge and thinking process of the high-achiever compares with the low-achiever,*
* *b) Describe how the ideas of personal constructivism and social constructivism were present in the interviews:*

*A. “Personal” construction: Consider carefully what the student’s first response was to each question, perhaps the most revealing time of their prior knowledge, misconceptions and inclination toward certain strategies; What prior knowledge was evident? What do you think their choices of problem-solving strategies tell you about their personal way of constructing knowledge?*

*B. Social construction: Also consider how you were uncovering students’ ideas and prompting them to think in a new direction. Give at least one example from your interview of how you gave the student an opportunity to construct knowledge by your involvement in the conversation (did you prompt them by asking them to compare, give them a hint, or ask them to explain their thinking on an incorrect answer? Etc.)*

* *c) generally, what you learned from and felt about this interview experience*

4) Include any student work.

5) Signed parent permission slips.

**Interview Set #2 (125 points, due by December 12):** This interview will be done with students/professionals 18 or over, so no parent permission forms will be needed! (There will be a form that they sign, however, that will include the permission to digitally record the interview and transcribe it for this assignment.) For this interview, you will interview a person who truly is an expert in their discipline (such as a professor) or someone who is very advanced in and passionate about that area of study (a graduate student, or possibly an upperclassman.) You will also interview a novice in the discipline (i.e. a freshman in Physics 1, or a non-major.) Try to keep the interview to less than 20 minutes, so that you don’t have as much transcribing to do, but if your conversation is going too well to stop, go for it!

**\*\*\*\* *Before the interview:***

*email me your questions so that I can approve them*

Transcribe the interview as soon as you can after the interview. Then go back into your word document and add your commentary and analysis wherever appropriate to further explain what happened during the interview. Your transcription should be labeled so that it is very clear who said each statement, and which statements are added commentary. You could use the following system, specifying your initials, your interviewee’s initials, and the commentary. Here’s a hypothetical novice interview, with commentary:

**KM:** Is evolution considered a theory, a law, or a hypothesis?

**CB:** It’s the theory of evolution.

**KM:** Can you explain why is it considered a theory?

**CB:** Well, that’s what I hear people call it.

***Commentary:*** *Although CB went on to correctly tell me what evolution is, he could not explain why he thinks people call evolution a theory. When I interviewed the expert, the expert gave rationale for why evolution is a law, not a theory, and proceeded to explain that a theory is an explanation, so the theory aspect of the topic is the theory of natural selection, which explains the mechanism by which evolution occurs. His explanation revealed the deep content knowledge that is typical of experts. He went on to give examples of other laws to help generalize what a law is. In doing this, he exemplified the first characteristics of experts, that they notice meaningful patterns that are not noticed by novices.*

Because this is an expert/novice interview, you should discuss to what degree you saw characteristics of the expert and novice learners as described in Reading #6 from the *How People Learn* book, “How Experts Differ from Novices”, in Week 3 folder on Blackboard. You may discuss this either with embedded commentary within the transcript, or in a summary analysis at the end, or both.

**You will also analyze these interviews in terms of topics that we have discussed this semester.** One way to approach this is after you have typed the transcription and added your commentary that describes the interview, go through your list of vocabulary and theorists. Look for opportunities to use the vocabulary and relate the theories and ideas to what happened in the interview. For instance, expanding on the previous example:

***Commentary:*** *CB had recalled a discussion in class on why ‘law of gravity’ is considered a law – a generalization or principle – but no ‘transfer of learning’ on the difference between law and theory had occurred to cause him to question the mis-use of the term ‘theory’ for evolution. His ‘prior knowledge’ was such that he had only heard people refer to evolution as a ‘theory’ and he had received no new experience that caused him to ‘re-conceptualize this misconception’.*

**What to hand in for Interview #2 (hard copy of email or submit to Blackboard):**

1. The transcription of each interview (novice and expert) with added commentary appropriately embedded within.
2. An analysis of the interview, focusing on the differences between expert and novice. The length of this may depend on how much analytical commentary you embedded within the transcription. If you did most of your discussion within appropriate lines of the transcript, your final analysis may be brief.
3. Any written work done by the interviewees.
4. The signed permission slips

**\*\*\*\*This assignment will be posted to your Chalk & Wire Portfolio, for those of you who are continuing in the UAteach program heading for teacher licensure. Rubric follows.**

**STEM 2103 Knowing and Learning**

***The Clinical Interview Assignment Rubric***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **High Mastery 4** | **Average Mastery 3** | **Low Mastery 2** | **Not Attempted 1** |
| **Introduction** | \_\_\_ Provides thorough description of student’s gender, grade level, abilities  \_\_\_ Uses a pseudonym for student  \_\_\_ Interview questions were pre-approved by instructor to insure that topic is grade level/age appropriate, and questions have potential to elicit deeper student thinking  \_\_\_Interview questions were exceptionally-designed to elicit student thinking and multiple solutions/explanations  \_\_\_ Students selected were of varying abilities or levels of expertise  \_\_\_ Includes a clear, thorough, and  accurate explanation of the concepts covered in the interview, including common misconceptions and/or error patterns | \_\_\_Provides description of student’s gender, grade level, abilities  \_\_\_ Uses a pseudonym for student  \_\_\_ Interview questions were pre-approved by instructor to insure that topic is grade level/age appropriate, and questions have potential to elicit deeper student thinking  \_\_\_ Interview questions were well-designed to elicit student thinking  \_\_\_ Students selected were of varying abilities or levels of expertise  \_\_\_ Includes an accurate explanation of the concepts covered in the interview, including common misconceptions and/or error patterns | \_\_\_Provides minimal description  \_\_\_ Does not use a pseudonym for student  \_\_\_ Interview questions were not pre-approved by instructor or not pre-approved in time to improve the questions  \_\_\_ Interview questions only elicit yes/no or short response answers  \_\_\_ Students were not of varying abilities or levels of expertise  \_\_\_ Includes an inaccurate explanation of the concepts covered in the interview, and does not include common misconceptions nor error patterns | Not attempted |
| **Interview Responses and**  **Analysis of Student Thinking** | \_\_\_ Includes a thorough description of student’s responses, question by question  \_\_\_ Includes thorough description of how the interviewer responded to the student’s responses, including ample evidence that follow-up questions were asked and students who answered incorrectly, were prompted to help elicit student thinking  \_\_\_Detailed discussion of student's thinking is incorporated into the description of the interview responses  \_\_\_ Discusses misconceptions and/or error patterns identified and speculates on the source of each  \_\_\_Insightfully compares the responses of the ‘high and low ability’ or the ‘expert and novice’ interviewees | \_\_\_ Includes a description of student’s responses question by question  \_\_\_ Includes description of how the interviewer responded to the student’s responses, with some evidence that follow-up questions were asked and students who did not know answers, or answered incorrectly, were prompted to help elicit student thinking  \_\_\_Discussion of student's thinking is incorporated into the description of the interview responses  \_\_\_ Discusses misconceptions and/or error patterns identified  \_\_\_Compares the responses of the ‘high and low ability’ or the ‘expert and novice’ interviewees | \_\_\_ Description of responses is in general rather than by specific questions  \_\_\_ Little indication that the interviewer responded to the student’s responses, with little evidence that follow-up questions were asked and nor prompts offered to students who did not know answers, or answered incorrectly  \_\_\_Discussion of student's thinking was rarely incorporated into the description of the interview responses  \_\_\_Misconceptions and/or error patterns were rarely identified  \_\_\_Compares the responses of the ‘high and low ability’ or the ‘expert and novice’ interviewees only briefly | Not attempted |
| **Analysis of Interviewing skills** | \_\_\_ Cites many items from the checklist in *Ginsburg’s Guidelines to Clinical Interview* and describes their use in making this a successful interview  \_\_\_Thoughtful and objective reflection of interviewer’s own interviewing skills, noting strengths as well as areas needing improvement | \_\_\_ Cites items from the checklist in *Ginsburg’s Guidelines to Clinical Interview* and describes their use in making this a successful interview  \_\_\_ Sufficient reflection of interviewer’s own interviewing skills, noting strengths as well as areas needing improvement | \_\_\_ Cites only 1 or 2 items from *Ginsburg’s Guidelines*  \_\_\_ Minimal reflection of interviewer’s own interviewing skills | Not attempted |
| **Reflection on the Value of the Interview** | \_\_\_ Thorough reflection about what this interview experience has personally meant to the interviewer  \_\_\_Reflects upon the value of making students’ thinking ‘visible’, citing examples from the interview  \_\_\_ Thoroughly addresses how this experience will influence interviewer’s own teaching, describing potential practices | \_\_\_Sufficient reflection about what this interview experience has personally meant to the interviewer  \_\_\_Reflects upon the value of making students’ thinking ‘visible’  \_\_\_ Addresses how this experience will influence interviewer’s own teaching | \_\_\_ Limited reflection, and little interest shown in the experience  \_\_\_ Not a clear indication that interviewer understands what it means to make students thinking ‘visible’  \_\_\_ Slightly mentions the influence on future teaching | Not attempted |
| **Connecting to Learning Theory** | \_\_\_ Thoroughly discusses the clinical interview in terms of learning theory, naming specific theories, and giving examples in terms of this interview | \_\_\_Discusses the clinical interview in terms of learning theory, naming specific theories | \_\_\_Mentions learning theory but only superficially | Not attempted |
| **Consent Forms** | \_\_\_ Parental or individual consent forms present | \_\_\_ Parental or individual consent forms present | \_\_\_ Only one consent form | \_\_\_ Lacks parental consent forms |
| **Grammar, Mechanics, and Spelling** | \_\_\_ Three or fewer errors in grammar, mechanics, and/or spelling | \_\_\_ Four - nine errors in grammar, mechanics, and/or spelling | \_\_\_ Ten - fifteen errors in grammar, mechanics, and/or spelling | \_\_\_ More than fifteen errors in grammar, mechanics, and/or  spelling |

##### **STEM 2203: Classroom Interactions, Lesson Analysis Assignment & Rubric**

**Lesson 1AB Analysis (100 points, 10% of semester grade)**

**Tentative Due date: Thursday, March 5th, posted to Blackboard by 11:59 pm**

*Work with your partner to critically examine your teaching of Lesson 1. Make sure that each of you has a copy of the videos on your own laptop as you will frequently refer back to them. If one of you writes a section of the analysis, the other should carefully read and edit the writing so that both partners’ experiences are reflected. Responses should be thorough.*

*If snow days set back your teaching schedule, we will stay flexible with the due date of this analysis.*

***Looking ahead to a future assignment:*** *As you watch the video of these 2 lessons, make note of video clips that would be good for your Lesson Analysis Presentation which you will work on after spring break. You’ll be asked to clip 3-4 video snippets from any of your 3 lesson videos that show good group interaction, questioning techniques and dialogue generated from questioning, examples of using formative assessment, and clever instructional strategies. In other words, show us your best stuff! You will embed the video clips in a 10-12 minute PowerPoint/Prezi presentation that you will present to class during the last week of the semester.*

*This is one of the assignments that you will post to Chalk and Wire later this semester.*

*If there is a section below that asks for an analysis of something that you did not capture adequately on video, do your best to describe what happened! If that’s difficult to do, or if the section does not apply to your lesson, provide an explanation as to why not, then create an alternative section to discuss some other unique element of your lesson. Do not leave any section blank as you will not earn points for that section.*

*Please email Dr. McComas if you are unsure about anything in this assignment!*

**Materials to gather to work on this analysis:**

* The videos of Lesson 1A and Lesson 1B
* All student artifacts that you collected
* Mentor/instructor feedback forms
* Popcorn, chocolate, patience, enthusiasm, etc.

**Lesson 1 Analysis**

|  |  |
| --- | --- |
| **Teaching Team:** | **Mentor Teacher Name/School/Subject:** |
| **Title of Lesson:** | **Dates:** |

|  |
| --- |
| **Brief Description of lesson 1A and Lesson 1B:** |

**Part 1: Did Students meet the Objectives?**

**Choose one main objective that was prominent throughout both lessons.**

**Provide 3 types of Evidence to describe how well your students achieved this objective.**

**If you include evidence that only indicates the achievement of a single student, please broaden your explanation to indicate how you are confident that this result was typical of the class. Consider the following as possible sources:**

* Student work -Summary: *A summary of the results of a written assessment, written on a blank copy of the student handout*
* Student work-individual copies: *3-5 student copies of a handout that show a variety of responses that indicate mastery of the objective. (this counts as one piece of evidence, however, not multiple. A different type of student work could count as a separate piece of evidence.)*
* A transcript of conversation or questioning interaction (student-student, or teacher-student) that exhibits understanding of the objective
* Photos or description of group presentations/posters/boardwork (you can clip a frame of your video to embed)

|  |
| --- |
| **Objective:** |
| Brief description of Evidence #1:  Explanation of how Evidence #1 demonstrates that the objective was achieved: |
| Embed Evidence #1 here. (or type transcript of conversation) |
| Brief description of Evidence #2:  Explanation of how Evidence #2 demonstrates that the objective was achieved: |
| Embed Evidence #2 here. (or type transcript of conversation) |
| Brief description of Evidence #3:  Explanation of how Evidence #3 demonstrates that the objective was achieved: |
| Embed Evidence #3 here. (or type transcript of conversation) |

**Part 2:**

**Strengths and Weaknesses of the Lesson**

**‘Monitoring and Adjusting’ from Lesson 1A to Lesson 1B**

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| --- |
| Scan and embed mentor/instructor feedback forms for Lesson 1A here (both sides.) |
| In addition to the comments on the feedback forms, write any verbal comments from students, mentor, or instructor after the first lesson that prompted you to make changes for the second lesson. |
| What were the strengths of Lesson 1A?  What were the weaknesses of Lesson 1A? |
| Describe any adjustments you made to Lesson 1B in response to the feedback as well as your own experiences from teaching Lesson 1A. |
| Scan and embed mentor/instructor feedback forms for Lesson 1B here (both sides.) |
| What were the strengths of Lesson 1B?  What were the weaknesses of Lesson 1B? |
| Reflect upon how you feel the adjustments that you made from Lesson 1A to Lesson 1B might have made a difference? |

**Part 3: Interactions**

**Teacher-Class Interaction:**

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| --- |
| **In your videos, identify a question that you asked to the whole class, then called on one student to answer, that could have been turned into a more extended partner discussion using a “think, pair, share” strategy instead.** |
| Type transcript of the question/response here: |
| What is the advantage to using a ‘think, pair, share’ strategy? What kind of responses might you have gotten if you had broadened the discussion by giving every student a chance to discuss before asking for a response from the class? |

**Teacher-Group Interaction: *(‘group’ includes ‘partners’)***

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| --- |
| **Choose your most successful interaction with a group (in which you feel that your questioning helped extend their thinking and understanding.)** |
| Briefly describe the group activity and the purpose of the activity. |
| Type a transcript of the conversation. |
| Characterize your interaction with the group by considering:  Did you approach the group without their calling you over? If so, what was the first thing you said to the group:  Did you tend to answer their questions with answers or with more questions?  What do you think is an advantage to answering their questions with more questions? |
| Review what ‘open’ and ‘closed’ questions are. *(Week 1 reading assignment on questioning, Lapp & Manouchehri article on Blackboard).*    In the transcript above, highlight the open questions in yellow.  Highlight the closed questions in light blue. |
| Did you ask more open or more closed questions during this interaction? |
| Describe the elements of this interaction that made it a ‘successful’ interaction. |

Student – Student Interaction:

|  |
| --- |
| **Choose the most successful interaction between students.** |
| Briefly describe the group activity and the purpose of the activity. |
| Type a transcript of the conversation. |
| Describe the elements of this interaction that make it a ‘successful’ interaction. |

**Ideas for Improving Group/Partner Interaction**

|  |  |
| --- | --- |
| After viewing the videos of group interactions again, analyze two group activities looking for ways to improve them considering ideas suggested by the literature you have read on cooperative learning (posted on Blackboard) or in your text.  Which cooperative learning strategies could you have employed to improve the efficiency of the group effort, keep students more on task, or increase learning outcomes?  At least one of your entries in the right hand must come from the Felder & Brent article (on Blackboard, assigned Week 2. Specify a page number from that article.) | |
| **Brief Description of Group Activity in Lesson 1A and/or 1B** | **Cooperative Learning Strategies that you could have implemented to improve group learning and engagement:** |
| Group Activity #1: | One idea for improvement: |
| Another idea for Improvement: |
| Group Activity #2: | One idea for improvement: |
| Another idea for Improvement: |
| Describe a time in your lesson when you could have had students work in pairs or groups but didn’t, and describe what the group/partner activity could have been: | |
| Describe how groups got to see the ideas/results of other groups? If this did not occur, explain why such an opportunity may or may not have been useful for learning. | |

**Part 4: Board Organization with emphasis on Vocabulary for English Language Learners and students with auditory processing difficulties**

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| --- |
| **For either Lesson 1A or 1B, view your video to recall what information you wrote on the board, or had written on poster paper that was on display throughout the classtime. Briefly respond to the following questions:** |
| Was the lesson objective or ‘driving question’ on the board? |
| Key vocabulary, phrases, definitions, illustrations? *(Even if you included these items in a powerpoint, consider the importance of having them available for students to see throughout the lesson rather than only appearing in a slide.)* |
| Was the information on the board in an organized manner so that students can easily interpret it? |
| Give rationale for why this is important. |

**Part 5: What else can you notice in the video?**

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| --- |
| Describe student participation In whole class discussions: when you asked questions, did the same students tend to raise their hands? Did you tend to call on the same students? Did a lot of students raise their hands to answer? |
| Generally, do you think that there was more ‘teacher talk’ in your lessons, or more ‘student talk’? |
| Recalling from Knowing and Learning, that specific feedback is more useful and motivational to students than a vague ‘good job’ comment or praising a student for their ‘smarts’, how would you characterize the feedback/praise/encouragement that you gave to students? Provide specific examples. |
| When you’re concentrating on your teaching, it can be difficult to notice what else students are doing at their seats other than the assigned task. Watch the video for off-task behaviors and describe them here: |
| Describe a classroom management strategy that you could use to minimize off-task behaviors. |

**Part 6: Connecting to Learning Theory**

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| --- |
| Consider one element of your lesson that contributed to student engagement and relate it to either a theory of learning or other idea that you studied in Knowing and Learning, that may justify its use. Specify which theory/idea you have chosen and write a paragraph to discuss.  *A reading/vocabulary list from Knowing and Learning are posted on Blackboard (under Lesson 1 Analysis) as reminders.* |

**Part 7: Changes you would make if you were to teach this lesson again**

|  |
| --- |
| *Look over your original lesson plan.*  List anything you forgot to implement:  List anything you ran out of time to implement:  List significant questions that you forgot to ask:  Write your ideas of how to avoid these omissions next time: |
| *Having become more aware of the effectiveness of your lesson, how could you make this lesson better? Write your responses in the 5 sections below, for each “E” of the 5E lesson plan.*  *Note: for each “E” below, you may consider either day’s lesson.* |
| If you were to teach this lesson again, what changes would you make to the ENGAGE? |
| If you were to teach this lesson again, what changes would you make to the EXPLORE? |
| If you were to teach this lesson again, what changes would you make to the EXPLAIN? |
| If you were to teach this lesson again, what changes would you make to the ELABORATE? |
| If you were to teach this lesson again, what changes would you make to the EVALUATE? |

Part 8: Individual Reflection and Goals

Partner 1 and Partner 2, this is where each of you gets to say what you *individually* got out of watching yourself interact with students on the video. Any prominent ‘ah-ha’s!’ , things you didn’t realize about your teaching such as annoying phrases or behaviors you overused, proud moments you’d like to share, etc.? Write at least one solid paragraph! Conclude by stating at least three goals as to what you would like to become more aware of or how you would like to improve as a teacher. There is a response box for each of you below.

|  |
| --- |
| Partner 1 Name: |
| My Reflection: |
| My 3 Goals: |

|  |
| --- |
| Partner 2 Name: |
| My Reflection: |
| My 3 Goals: |

100 point grading rubric for the course. The Chalk and Wire rubric follows.

**Lesson 1 Analysis (100 Points ) *Rubric for grading***

**Classroom Interactions STEM 2203**

Student Names:

Course Taught/Lesson Topic:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Comments | Points  (10 points each) | |
| **Part 1**:  Evidence that students met objectives |  |  | |
| **Part 2**:  Strengths & Weaknesses, Modifying lesson |  |  | |
| **Part 3:**  Teacher-Class Interaction |  |  | |
| **Part 3:**  Teacher-Student *or*  Student-Student Interaction |  |  | |
| **Part 3:**  Improving Group  Interaction |  |  | |
| **Part 4:**  Board Organization |  |  | |
| **Part 5:**  Other Observations |  |  | |
| **Part 6:**  Learning Theory |  |  | |
| **Part 7:**  Proposed Changes |  |  | |
| **Part 8:**  Individual Reflection |  |  |  |
|  |
| **TOTAL out of 100 points** |  |  |  |

Rubric for Chalk & Wire Evaluation

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Evidence that students met objectives |  | No Evidence or inconsequential |  | Not all objectives are supported by evidence. |  | Evidence is provided, either embedded or described, that shows how well students met each objective. |  | For each objective, evidence is provided, either embedded or described, to show the learning objective was achieved. Includes a detailed explanation of how each piece of evidence supports. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Description of Strengths and Weaknesses |  | No Evidence or inconsequential |  | Strengths and weaknesses are listed without a comprehensive reflection on the significance of the teaching experience. Video of lesson is not referenced. |  | Reflection on the strengths and weaknesses of the lesson, including examples from reviewing video of lesson. |  | Insightful reflection on the strengths and weaknesses of the lesson, with keen attention given to what was learned from the teaching experience. Video of lesson was carefully analyzed resulting in well-described examples. |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Formative Assessment and Resulting Modifications from Lesson 1A to Lesson 1B |  | No Evidence or inconsequential |  | Describes assessment but does not make the connection between assessing student learning and modifying instruction accordingly. No reference to what was learned from the lesson video. |  | Discussion of what was learned from formative assessment throughout the first lesson that shaped the flow of Lesson 1A as well as prompted modifications for Lesson 1B. References of what was noticed in the lesson video are made. |  | Extensive discussion of what was learned from formative assessment throughout the first lesson that shaped the flow of Lesson 1A as well as prompted modifications for Lesson 1B. References of what was noticed in the lesson video are discussed. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Teacher-Student Interactions: Questioning Techniques |  | No Evidence or inconsequential |  | Lesson video is analyzed, but no transcript given, and analysis is shallow. Only a few questions are analyzed for Bloom's level and wait time, or they are analyzed incorrectly with inadequate discussion. |  | Lesson video is analyzed and transcript provided of best teacher-student interaction. Questions are correctly analyzed for Bloom's level and wait time. |  | Lesson video is analyzed and transcript provided of best teacher-student interaction. Questions are correctly analyzed for Bloom's level and wait time, and insightful ideas for improvements are discussed. |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Teacher-Student Interactions: Equity |  | No Evidence or inconsequential |  | Some discussion of equitable attention to students but no evidence that video of the teacher interaction with students was used as a source of this discussion. |  | Lesson video is analyzed for equitable attention to students, with description of the opportunities for each student to share his/her thinking. |  | Lesson video is carefully analyzed for equitable attention to students, with thorough description of the opportunities for each student to share his/her thinking. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Teacher-Student Interactions: Differentiating for Special Needs |  | No Evidence or inconsequential |  | Limited discussion comparing what was written in lesson plan and what actually occurred during the lesson. |  | Discussion comparing what was written in lesson plan and what actually occurred during the lesson, confirmed by video analysis. |  | Thorough discussion comparing what was written in lesson plan and what actually occurred during the lesson, confirmed by video analysis. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Improving Group Interaction |  | No Evidence or inconsequential |  | Description of a successful group interaction is given. Limited discussion and no ideas for improving group interaction. |  | Lesson video is analyzed for successful interaction within groups. Description of a successful group conversation is provided. An idea for improving group interaction is given. |  | Lesson video is analyzed for successful interaction within groups. Transcript of a successful group conversation is provided. Ideas for improving group interaction are described and cited from readings. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Connections made to Learning Theory |  | No Evidence or inconsequential |  | Discusses a connection made between learning theory and what was observed and experienced in this lesson. No reference is cited. |  | Discusses connections made between learning theory and what was observed and experienced in this lesson. One reference is cited. |  | Thoroughly discusses connections made between learning theory and what was observed and experienced in this lesson. At least 2 references are cited. |
|  |  |  |  |  |  |  |  |  |
| Criteria | **1** | No Evidence | **2** | Basic | **3** | Proficient | **4** | Distinguished |
| Individual Reflection and Proposed Changes |  | No Evidence or inconsequential |  | Reflection is brief. Proposed changes are of the obvious, not showing much insight or initiative to improve. |  | The value of reviewing the lesson video is discussed. Reflection is insightful, with thoughtful suggestions on how the lesson and teaching of the lesson could be improved. |  | The value of reviewing the lesson video is thoroughly discussed. Reflection is insightful, clearly written from the perspective of one who is on the way to being a professional educator, with thoughtful suggestions on how the lesson and teaching of the lesson could be improved. |

**STEM 3303: Project-based Instruction, Planning a Project, Reflection, & Rubric**

**Project-Based Instruction**

**Multi Day Planner**

**Overall Summary of High School A Project**

Download this form and save it as a google doc. Share it with me and your partner, but give us all editable privileges. Remove this statement before you upload it to your Google doc.

**Instructions:** Please use this document to begin planning your field teaching experience. Make certain that Day 1 has a launch/engagement/introduction component. Make sure and save time during Day 1 or 2 to organize students into cooperative learning groups with specific roles assigned. Incorporate checkpoints and assessments to determine progress. Day 4 needs to include some sort of presentation so students can present their product.

**Write your information below each heading as appropriate.**

**Your Name(s):**

**Teaching Dates:**

**Classroom Context and Student Characteristics** (Write your response to this section in NARRATIVE form. Be sure and remove this statement from your document before you submit it for final approval.) You should have this information after you complete at least two observations and submit your observation reflections.

1. Describe the context of your class. Include pertinent demographics (subject, grade,school etc.)
2. Demographic Information: What are some descriptive characteristics of the students (gender ratio, learning differences, special learning circumstances etc.)
3. Knowledge of Students: What specific information do you know about your students (individually or whole class) that will help you engage them as learners? (Think personalities, interests, cultures, their skills etc.) How did you learn this about your students?
4. Unit Topic & Background:
   1. Describe your unit overview, and explain why it is important for students to know about.
   2. What preconceptions might they have already about this topic? How do you know?
   3. What prior knowledge do your students need to successfully complete this unit?
5. How do you plan to foster a sense of community among your students? What cooperative learning strategies do you intend to engage your students in?

|  |
| --- |
| **Unit Overview: “Write your unit topic here.”** |
| **Day 1 (Launch Day)**  **Driving question/problem:**  **Standards (incl. content & practices): (full text not just numbers and letters)**  **Student Learning Objectives: (SWBAT)**  **Student Assessments & Evidence:**  **What will you do with these?**  **Lesson/inquiry/investigation ideas:**  **Classroom Management Strategies:**  **Resources:** |
| **Detailed Lesson Plan-1:**  **Describe and explain in detail each step of your instruction for the day. I might suggest you use appropriate portions of the 5Es to structure your daily lesson details.** |
| **Engage:**  **Explore:**  **Explain:**  **Evaluate:** |
| **Teacher Reflection (after lesson):** |
| **Day 2**  **Driving question/problem:**  **Standards (incl. content & practices): (full text not just numbers and letters)**  **Student Learning Objectives for this lesson: (SWBAT)**  **Student Assessments:**  **What will you do with these?**  **Lesson/inquiry/investigation ideas:**  **Classroom Management Strategies:**  **Resources:** |
| **Detailed Lesson Plan-2:**  **Describe and explain in detail each step of your instruction for the day. I might suggest you use appropriate portions of the 5Es to structure your daily lesson details.** |
| **Engage:**  **Explore:**  **Explain:**  **Evaluate:** |
| **Teacher Reflection (after lesson):** |
| **Day 3**  **Driving question/problem**  **Standards (incl. content & practices): (full text not just numbers and letters):**  **Student Learning Objectives: (SWBAT)**  **Student Assessments & Evidence:**  **What will you do with these?**  **Lesson/inquiry/investigation ideas:**  **Classroom Management: (What classroom management strategies will you incorporate?)**  **Resources:** |
| **Detailed Lesson Plan-3:**  **Describe and explain in detail each step of your instruction for the day. I might suggest you use appropriate portions of the 5Es to structure your daily lesson details.** |
| **Engage:**  **Explore:**  **Explain:**  **Evaluate:** |
| **Teacher Reflection (after lesson):** |
| **Day 4**  **Driving question/problem:**  **Standards (incl. content & practices): (full text not just numbers and letters):**  **Student Learning Objectives: (SWBAT)**  **Student Assessments & Evidence: (Attach your rubric or grading criteria here)**  **What will you do with these?**  **Classroom Management: (What classroom management strategies will you incorporate?)**  **Resources:** |
| **Detailed Lesson Plan-4:**  **Describe and explain in detail each step of your instruction for the day. I might suggest you use appropriate portions of the 5Es to structure your daily lesson details.** |
| **Engage:**  **Explore:**  **Explain:**  **Evaluate:** |
| **Teacher Reflection (after lesson):** |

**PBI Field Experience Reflective Analysis Assignment and Rubric**

**Requirements’ Overview**

* Individual Assignment
* Final Document Due **December 8th** (via email or google doc)

1. Written Reflection Narrative ( 12-point font, 5-7 pages double spaced)
2. References (as appropriate)
3. Appendices:
   1. Scanned copies of any and all observer notes (5 )
   2. Scanned copies of any student artifacts you used in your narrative.
   3. The final rubric with your self-evaluation scores listed

\*\*\*\*\*\*\*\*

**Purpose:** The main objective of this assignment is to get you to think about how to improve your teaching and curriculum design abilities, using the theoretical constructs we have read about and discussed in class- particularly as it pertains to project-based instruction.

**Instructions and Guidelines**: Use the BIE [PBL Essential Design Elements](https://docs.google.com/document/d/1ly67ubnDzH9sEwCnuj30XwTeWGvSDIEORlUbDG8Ba8E/edit?usp=sharing) and *reflective analysis rubric* at the bottom of this page to help you analyze and improve your PBI Unit to demonstrate your knowledge of project-based teaching and learning. Reflect on what went well and what didn’t go as well. Describe how you would modify the curriculum materials, instructional practices, and assessments you used in your field experience so that they would be more effective the next time you implement them. (As a general rule, this reflection assignment is more about improving your unit to make it more effective than it is about making it perfect.) Your interpretations and proposed revisions should be guided by the literature whenever possible.

Be thoughtful; write in narrative form; defend your rationales. Use the headings and subheading described below (Introduction, analysis, key knowledge…. etc.) to organize your narrative and to help guide your analysis.When responding to the PBI components below, use **evidence** from any observer notes and comments as well as the student artifacts (pre- and/or post-tests, worksheets, final projects) that you collected during your lessons.

1. **Introduction.** Introduce your project using contextual information from your unit multiplanner. Then segue into the reflection analysis narrative appropriately.
2. **Reflection Analysis.** For reflection analysis category, consider the following two questions to help you get started:

* ***What went well****. Provide evidence to demonstrate success.* ***Why did it go well?*** *Make use of the theoretical constructs we’ve read about and discussed in class in your explanations.*
* ***What did not go well?*** *Provide evidence to demonstrate lack of success.* ***Why did it not go well, and how you would change to improve it?*** *Make use of the theoretical constructs we’ve read about and discussed in class in your explanations.*
  1. **Key Knowledge/ Understanding & Success Skills:** The project focused on teaching students key knowledge and understanding derived from standards, and success skills including critical thinking/problem solving, collaboration, and self-management.
     1. What were you key learning goals, and how did you decide upon these specifically? (See [Krajcik et al., 2008, Learning Goals](https://drive.google.com/file/d/0BzWrKkVFCLjEMEIwak50WXVMUVE/view?usp=sharing)…)
     2. How did the math/science standards impact your decisions? See [PBL and the Common Core- and NGSS](https://drive.google.com/file/d/0BzWrKkVFCLjEdkYzZVZhN24yTHc/view?usp=sharing).
     3. What math/science practices and or specific success skills did your lessons capitalize on the most? (Pick one or two practices that was -or could have been- well represented during instruction.)
  2. **Challenging Problem/Driving Question:** The project was based on a meaningful problem to solve or a question to answer, at the appropriate level of challenge for students, which is operationalized by an open-ended, engaging driving question.
     1. Review the [Crafting Questions that Drive Projects](http://learninginhand.com/blog/drivingquestions) blog post to reflect on the effectiveness of your driving question. Does your driving question meet the majority of the items on the driving questions checklist located a bit more than halfway down the page?
     2. Did you use the driving question effectively during your instruction? Why or why not?
  3. **Coherent Instruction/Inquiry Heavy:** The unit clearly coordinated the teachers knowledge of content, students, and resources in a series of learning experiences targeting specific learning outcomes suitable to diverse levels of learners/The project involves an active, in-depth process over time, in which students generate questions, find and use resources, ask further questions, and develop their own answers (see [Inquiry Continuum Matrix](https://docs.google.com/document/d/1hLBvYVD5Zi5zfBYz9AKkS6tZDWw9yJm_HIAe0bMWhkk/edit?usp=sharing)).
     1. Did your sequence of learning activities flow logically and effectively; did they target your stated learning objectives; were there there opportunities for students with different abilities to be successful? Do you feel significant learning took place?
     2. Did you include opportunities for students to engage in inquiry learning? Use the [Inquiry Continuum Matrix](https://docs.google.com/document/d/1hLBvYVD5Zi5zfBYz9AKkS6tZDWw9yJm_HIAe0bMWhkk/edit?usp=sharing) to describe the levels of inquiry you included in your instruction.
  4. **Authenticity / Demonstrating Knowledge of Students.** The project has a real-world context, used real-world processes, tools, and quality standards, makes a real impact, and/or is connected to students’ own concerns, interests, and identities.
     1. Below are a couple of Blog posts to give you background and reflective ideas about how to improve authenticity.
        1. [What does it take for a project to be authentic?](https://www.edutopia.org/blog/authentic-project-based-learning-john-larmer)
        2. [Tips for Planning Authentic PBL](http://www.bie.org/blog/3_tips_for_planning_authentic_pbl_projects)
  5. **Student Voice & Choice.** The project allowed students to make some choices about the products they create, how they work, and how they use their time, guided by the teacher and depending on their age and PBL experience.
     1. Did you find yourselves using any interactive and dialogic discussion strategies, or did you tend to fall into more familiar patterns that you experienced as a student (authoritarian, telling, short Q& A etc.)? How about your wait time? Provide some brief descriptions (transcribing segments is optional). Suggest ways you can improve this with time. Browse appropriate links below for ways to improve this component in future lessons.
        1. Math & Science: ([Five ways to give your students more voice and choice](https://www.edutopia.org/blog/five-strategies-more-voice-choice-students-rebecca-alber).)
        2. Math: [Keys to Productive Discussions in the Math Classroom](http://www.justaskpublications.com/just-ask-resource-center/e-newsletters/mccca/keys-to-productive-discussions-in-the-math-classroom/) OR
        3. Science: [Talk Science Primer](https://drive.google.com/file/d/0BzWrKkVFCLjEU0NRcHF5cnVxVm8/view?usp=sharing) (or see single page 11: [Goals for Productive Science Talk](https://drive.google.com/file/d/0BzWrKkVFCLjEa0YyZXkzVXJUMW8/view?usp=sharing))
        4. Science: [PBL Science Empowered by Discussion Forums](https://www.edutopia.org/blog/learning-science-pbl-discussion-forums-fatima-terrazas-arellanes)
  6. **Reflection, Critique, & Revision (Assessments)**
     1. **Formative Assessments (for student purposes):** The project provided opportunities for students to reflect on what and how they are learning, and on the project’s design and implementation.
     2. **Formative Assessments (for teacher purposes):** The project provided opportunities for the teacher to reflect on what and how the the students were doing in class in order to modify instruction during the instructional period or during subsequent lessons.
     3. **Critique and Revision:** The project included processes for students to *share and compare ideas during the lesson so* they can revise their ideas and/or product and produce more questions. (This also attends to the Inquiry Component)
     4. **Equity and access:** Do you think all of your students learned? Discuss how your modifications and strategies for ELLs, LD students, and weak readers affected those groups, and also how they affected the rest of the students. If you did not plan for these groups of students, is okay, but you must describe what you would do differently if you were to teach this unit again in order to more effectively address these equity issues.
  7. **Public Product and Knowledge of Resources:** The project required that *teachers attempt to plan for a project that* requires students to demonstrate what they learn by creating a product that is presented or offered to people beyond the classroom. See [Creating Products to Show and Share Learning](http://learninginhand.com/blog/products) to help you reflect on how to improve this component of PBL. By identifying ways students can share their knowledge outside the classroom, you are also demonstrating your own knowledge of resources outside the classroom

1. **Conclusion/Self-evaluation**.
   1. Please elaborate upon your personal experience planning, developing, and implementing, and evaluating a unit in terms of its “PBIness.” Include your perceptions, big learning moments, future use of PBL in your own classrooms.
   2. Conclude your PBI Reflection Analysis by self-evaluating your your PBI unit ***after reflecting on it and identifying areas of strengths and weakness***. Please include a final score and rationale behind it.
2. **References** (if appropriate)
3. **Appendices (**observer notes, students artifacts -if used, rubric)

Reflective Analysis Rubric. Analyze your unit project after revision (as described in the narrative above). Remember the idea is not to get a perfect score but rather to accurately evaluate your own unit plan.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Essential Project Design Element** | **Lacks Features of Effective PBL**  *The project has one or more of the following problems in each area:*  *(1 pt)* | **Needs Further Development**  *The project includes some features of effective PBL but has some weaknesses:*  *(2 pts)* | **Includes Features of Effective PBL**  *The project has the following strengths:*  *(3 pts.)* | **MY SCORE** |
| **Knowledge of Content & 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. |  |
| **Key Knowledge, Understanding** **& Success** | * Student learning goals are not clear and specific; the project is not focused on standards. * The project does not explicitly target, assess, or scaffold the development of success skills. * The project does not explicitly incorporate any of the math or science practices | * The project is focused on standards- derived knowledge and understanding, but it may target too few, too many, or less important goals. * Success skills are targeted, but there may be too many to be adequately taught and assessed. * The project explicitly includes some of the math or science practices but with an inadequate emphasis. | * The project is focused on teaching students specific and important knowledge, understanding, and skills derived from standards and central to academic subject areas. * Important success skills are explicitly targeted to be taught and assessed, including critical thinking/problem solving, collaboration, and self- management. * The project includes an explicit emphasis on the appropriate math or science standards |  |
| **&**  **Setting Instructional Outcomes** |
| **Challenging Problem**  **/Driving Question**  **&** | * The project is not focused on a central problem or question (it may be more like a unit with several tasks); or the problem or question is too easily solved or answered to justify a project. * The central problem or question is not framed by a driving question for the project, or it is seriously flawed, for example:   + it has a single or simple answer.   + it is not engaging to students (it sounds too complex or “academic” like it came from a textbook or appeals only to a teacher). | * The project is focused on a central problem or question, but the level of challenge might be inappropriate for the intended students. * The driving question relates to the project but does not capture its central problem or question (it may be more like a theme). * The driving question meets some of the criteria but not the majority | * The project is focused on a central problem or question, at the appropriate level of challenge. * The central problem or question is framed by a driving question for the project, which is: * Open-ended; it will allow students to develop more than one reasonable answer. * Is understandable and inspiring to students. * Aligned with learning goals; to answer it, students will need to gain the intended knowledge, understanding, and skills. |  |
| **Demonstrates Knowledge of Students** |
| **Inquiry Heavy**  **& Designing Coherent**  **Instruction** | * The “project” is more like an activity or “hands-on”task, rather than a process of inquiry. * The sequence of learning activities are poorly aligned with the instructional outcomes and do not represent a coherent structure. | * Inquiry may be brief and occurs once or twice in the project; information-gathering is the main task; deeper questions are not asked. * The sequence of learning activities demonstrate partial alignment with the instructional outcomes; some of which engage students in significant learning | * Inquiry is academically rigorous (students pose questions, gather & interpret data, develop and evaluate solutions or build evidence for answers, and ask further questions). * Teacher coordinates knowledge of content, of students, and resources to design a series of learning activities aligned to instructional outcomes that are likely to engage students in significant learning. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Authenticity**  **& Demonstrating Knowledge of Students** | * The project resembles traditional “schoolwork;” it lacks a real-world context, tasks and tools, does not make a real impact on the world or speak to students’ personal interests. | * The project has some authentic features, but they may be limited or feel contrived. | * The project has an authentic context, involves real-world tasks, tools, and quality standards, makes a real impact on the world, and/or speaks to students’ personal concerns, interests, or identities. |  |
| **Student Voice**  **& Choice**  **&** | * Students are not given opportunities to express voice and choice affecting the content or process of the project. * Students are expected to work too much on their own, without adequate guidance from the teacher and/or before they are capable. * Teacher demonstrates little or no knowledge of students’ backgrounds, cultures, skills, language proficiency, interests, and special needs, and does not see understanding. | * Students are given limited opportunities to express voice and choice, generally in less important matters (deciding how * to divide tasks within a team or which website to use for research). * Students work independently from the teacher to some extent, but they could do more on their own. * Teacher actively seeks knowledge of students’ backgrounds, interests, skills, language proficiency, and special needs. | * Students have opportunities to express voice and choice on important matters (questions asked, texts and resources used, people to work with, products to be created, use of time, organization of tasks). * Students have opportunities to take significant responsibility and work as independently from the teacher as is appropriate, with guidance. * Teacher uses knowledge of students’ backgrounds, interests, skills, language proficiency or special needs during lesson design |  |
| **Knowledge of Students** |
| **Reflection, Critique, Revision**  **&**  **Designing Student Assessments** | * Students and the teacher do not engage in reflection about what and how students learn * Teacher’s plan for assessing student learning contains no clear criteria or standards, is poorly aligned with the instructional outcomes * Students are not required to share their understanding with peers during the learning experiences. | * Students have opportunity to engage in some reflection during the project, but there is no opportunity to revise their thinking. * The teacher’s plan for assessment is partially aligned with the instructional outcomes but lacks some clear criteria. * The teacher makes not plans to use formative assessment to modify instruction. * Students are provided opportunity to share and compare information with their peers during the learning experiences. | * Students and teachers engage in thoughtful, comprehensive reflection both during the project and after its culmination, about what and how students learn and the project’s design and management.opportunities. * Teacher’s plan for student assessment is aligned with the instructional outcomes using clear criteria. * The teacher plans to use formative assessment to modify instruction. * Students are provided opportunity to revise their work based on peer review during the learning experiences. |  |
| **Public Product**  **&**  **Knowledge of Resources** | * There is no attempt to make the project product useful beyond the classroom. * Teacher demonstrates little or no familiarity with resources to enhance own knowledge, to use in teaching, or for students to use during instruction. | * Students present products to their classmates and the teacher, but are not asked to explain how they worked and what they learned. * Teacher demonstrates some familiarity with resources available through UAteach and other sources to enhance own knowledge, or to use in teaching. | * Students present products to their classmates and the teacher, and they are asked to explain the reasoning behind choices they made, their inquiry process, how they worked, what they learned, etc. * Teacher is fully aware of the resources available to enhance own knowledge or and to use in teaching. |  |  |

**STEM 4409: Teaching Internship, Unit Plan & Assessment Plan, with Rubrics**

**Unit Plan & Assessment Analysis Guidelines**

**Instructions**: Teacher candidates in UAteach are required to submit a Unit Plan and Assessment Analysis. This assignment should include the following information written mostly in narrative form. (Hint: Use the same headings in the guidelines on your paper.)

**Demographic Information**: Provide the unit title, your name, mentor and school name, the course/grade level you are teaching and the date/time for each lesson.

**Context:** Provide some narrative background to your unit and class characteristics. (NOTE: you only have to submit a unit for one class- even though you may use it for multiple classes.)

Who are your students? What are they like? What sort of diversity is in your classroom (e.g. boys/girls, ability levels, personality, hobbies, interests etc.)

**Unit Topic and Concept Statement:** In narrative form, introduce you unit topic and overarching goals for the students.

Describe what the students have been studying and how it relates to this unit as well as their future learning.

Describe the main concepts and big ideas of the unit topic. Also explain why this is important for students to know using reasons that are important to the students.

Describe any any common misconceptions students may have about this topic, and how you targeted these.

**Assessment Plan**- Describe your assessment plans. How will you assess if your students accomplish the intended learning outcomes?

**Formative**-What formative actions will you use to assess students’ understanding. Describe your formative assessments. Provide some details and specific examples.

**Summative-** You need to construct a diagnostic test to administer to students to assess their understanding of the intended learning targets. (Focus on a few major ideas rather than on the entire unit.) Describe these assessment documents, but put the actual assessment documents in the appendix.

Below are some possible options for you assessment framework:

* Pre-post assessment
* Post assessment
* Student presentation with rubric
* Student involvement in assessing their own learning
* Other alternative assessments

**Differentiation:** Explain how you will differentiate your lessons based on your knowledge of your students.

**Timeline & Overview:** Include a unit overview of the timeline briefly describing lesson topics, performance expectations, and lesson activities (See [example of Unit Plan Overview & Template](https://docs.google.com/document/d/1njCuXqHpzCkULKgky8A1gW1hzt4dNkgCJafGB05B9rs/edit?usp=sharing))

**Resources & Instructional Materials:** Use this section to think ahead. What instructional materials do you anticipate needed during the unit? List specific materials, resources including technology you might possibly need here.

**Individual Lesson Plans**: Although the unit may have multiple lesson plan, this Unit Assignment should have a minimum of **3 detailed lesson plans**. Each lesson may extend for more than one class period. Describe your lesson using an appropriate format (e.g. 5E-Lesson plan) that includes pertinent information. (See [5E Lesson Plan Template](https://docs.google.com/document/d/179KsxPlSiyeRrUifM52Er-v8NlJXTEGlCfzKGz79urU/edit?usp=sharing)). (Note: Although you are not required to use the 5E format, I encourage you to include the 5Es in some format so you will strategically focus on student-centered teaching and learning and conceptual understanding.)

**Unit Analysis (after the fact):** Write a narrative describing the strengths and weaknesses of the unit using specific data from quizzes, tests, and other performance results. Be clear and explicit about how you know if students learned the desired information. Remember, EVIDENCE is paramount! Consider including the following section in your Unit Analysis

**Assessment Results**- Organize your results into data tables, graphs, narrative themes etc. as appropriate. Every table or chart should be able to stand alone. (Note: put raw data in appendix.)

**Analysis**- Make sense of the results in such a way that it is clear the students got it or didn’t get it. Explain your analysis. Make sure you reference specific targeted learning outcomes.)

**Recommendations** for future modifications (instructional & assessment) and corresponding rationale. Make sure you refer back to your specified targeted learning outcomes.

**Appendix**-Include the following documents as appropriate:

Any assessment documents administered during the unit (tests, quizzes, formative questions, presentation rubrics etc.)

Include answer sheets (as appropriate)

Actual evidence of students’ work: exemplary, average, and below average (include narrative with every artifact.)

Raw data (spreadsheets, charts, data analysis etc.)

NOTE: Please submit assignment electronically. Include your unit narrative, your individual lesson plans and supporting documents (handouts, PowerPoint materials etc.) unit analysis. I prefer you scan all your documents into one pdf. And label the file according to the following format: PWard\_UP\_AA. If you submit your documents in separate files, make your organizational framework explicit and easy for me to follow. I will *NOT* spend time trying to decipher your documents.

How to label individual files:

1PWard\_UPAA Narrative

2PWard\_UPAA\_LP-1

3PWard\_ UPAA\_LP-2

4Pward\_UPAA\_LP-3

5PWard\_UPAA\_Analysis

6PWard\_UPAA\_Appendices1\_ “describe it”

Revised 9/12/16-pdw

**UNIT PLAN Checklist - Rubric**

**Instructions**: Teacher candidates are required to submit a total of one unit plan. Each UP should have the following components.

|  |  |
| --- | --- |
|  | **Demographic Information (0)**: Provide the unit title, your name, mentor and school name, the course/grade level you are teaching and the date/time for each lesson. |
|  | **Context (10):** Provide some narrative background to your unit and class characteristics. (Who are your students? What are they like? What sort of diversity is in your classroom (e.g. boys/girls, ability levels, personality, hobbies, interests etc.) |
|  | **Unit Topic and Concept Statement (10):** In narrative form, introduce you unit topic and overarching goals for the students.  Describe what the students have been studying and how it relates to this unit as well as their future learning.  Describe the main concepts and big ideas of the unit topic. Also explain why this is important for students to know using reasons that are important to the students.  Describe any common misconceptions students may have about this topic, and how you intend to target these. |
|  |
|  | **Evaluate/Assessments (10):** Describe in narrative formhow will you know (& be able to demonstrate) if students learned what you wanted them to learn? (Note: There should be references to multiple and diverse forms of assessments.) |
|  | Describe the assessments you plan to use (**formative and summative**) and how students will demonstrate their proficiency. Be specific and use some examples. (You can modify these in your actual lesson plans if you decided to do something differently.) |
|  | Explain how you will differentiate your lessons based on your knowledge of your students. |
|  | **Timeline & Overview (10):** Include a unit overview of the timeline briefly describing lesson topics, performance expectations, and lesson activities (See [example of Unit Plan Overview & Template](https://docs.google.com/document/d/1njCuXqHpzCkULKgky8A1gW1hzt4dNkgCJafGB05B9rs/edit?usp=sharing)) |
|  | **Resources & Instructional Materials (5) :** Use this section to think ahead. What instructional materials do you anticipate needing during the unit? List specific materials, resources including technology you might possibly need here. |
|  | **Individual Lesson Plans (30)**: Although the unit may have multiple lesson plan, this Unit Assignment should have a minimum of **3 detailed lesson plans**. Each lesson may extend for more than one class period. Describe your lesson using an appropriate format (e.g. 5E-Lesson plan) that includes pertinent information. (See [5E Lesson Plan Template](https://docs.google.com/document/d/179KsxPlSiyeRrUifM52Er-v8NlJXTEGlCfzKGz79urU/edit?usp=sharing)). (Note: Although you are not required to use the 5E format, I encourage you to include the 5Es in some format so you will strategically focus on student-centered teaching and learning and conceptual understanding.) |
|  | **Unit Analysis (20)** (in addition to your lesson analyses**)-** How did it go; what was good, and not so good? How do you know? Diagnose the assessments and provide some form of analysis on how to improve instruction and student learning.Be clear and explicit about how you know if students learned the desired information. |
|  | **Overall Organization (5):** |
|  | **TOTAL (100)** |

(Note: To combine your unit plan and your assessment assignment, see [Assessment Assignment](https://docs.google.com/document/d/1b1sV7TLG7jTsHrVdq2-WLkIkJn_iU5XKuqYbTP--wkQ/edit?usp=sharing) criteria.)

NOTE: Please submit this Unit Plan electronically. Include your unit narrative, your individual lesson plans and supporting documents (handouts, PowerPoint materials etc.) and your Unit Analysis. I prefer you scan all your documents into one pdf. And label the file according to the following format: PWard\_Unit Plan. If you submit your documents in separate files, make your organizational framework explicit and easy for me to follow. I will *NOT* spend time trying to decipher your documents.

How to label individual files

1PWard Unit Plan Narrative

2PWard\_UP\_LP-1

3PWard\_ UP\_LP-2

4Pward\_UP\_LP-3

5PWard\_UP\_Analysis

6PWard\_UP\_Appendices1\_ “describe it”

**Assessment Assignment: Instructional Effects on Student Learning**

**Instructions:** Choose a unit that you will teach from beginning to end (as much as possible) in your internship. Construct a diagnostic test to administer to students to assess their understanding. **Write a 2-3 page paper that analyzes the results of your students’ performance, including areas they did and did not do well.** Include the following information:

|  |  |
| --- | --- |
|  | **Introduction & Background Information (10)**- Explain the context of the class/unit topic and goals of the lesson. Include information specific to your students and you classroom environment. |
|  | **Assessment Plan (10)**- Consider all formative and summative actions you plan to implement to assess students’ understanding. You choose the framework for Assessment Plan. Below are some possible options:  Pre-post assessment  Student presentation with rubric  Student involvement in assessing their own learning  Other alternative assessments |
|  | **Results (15)**- Organize your results into data tables, graphs, narrative themes etc. as appropriate. (Put raw data in the Appendix.) |
|  | **Analysis (25)**- Make sense of the results in such a way that it is clear the students got it or didn’t get it. Explain your analysis. |
|  | **Recommendations (25)** for future modifications (instructional & assessment) and corresponding rationale. |
|  | **Appendix (10)**-Include the following documents:  Any assessment documents administered during the unit (tests, quizzes, formative questions and examples of student responses, presentation rubrics etc.  Include answer sheets (as appropriate)  Actual evidence of students’ work: exemplary, average, and below average  Extraneous materials (spreadsheets, data analyses etc.) |
|  | **Organization (5)** and navigation overall |
|  | **TOTAL (100)** |

Notes:

Please modify your Assessment Assignment to meet your individual needs. Just make sure you provide a defensible assessment of students’ performance and your instruction.

Please submit Assessment Assignment electronically. Include your assessment narrative, analysis, and appendices. Please name the file appropriately (e.g. PWard\_AA). If you submit your documents in separate files, make your organizational framework explicit and easy for me to follow. I will *NOT* spend time trying to decipher your documents.

1PWard\_AA\_ Narrative

2PWard\_AA \_Appendix-1\_ “Test”

3Pward\_AA\_Appendix-2?”describe it”

## 2Gi.5 Sample Assessments from Computer Science Courses and UAteach Research Methods

### 2Gi.5a CSCE 2004: Programming Foundations I, Programming Assignment & Rubric

CSCE 2004 - Homework 7   
Due Date - Dec 11, 2014 at 11:59 PM   
  
10% off if handed in by Dec 12, 2014 at 11:59 PM   
20% off if handed in by Dec 13, 2014 at 11:59 PM   
30% off if handed in by Dec 14, 2014 at 11:59 PM   
No credit if handed in after Dec 14, 2014

1. Problem Statement:

The objective of this programming assignment bring together several key programming concepts (file input/output, arrays, and classes) to build an interactive program for looking up information about famous computer scientists. To initialize the application, students must read an ascii file called [people.txt](http://csce.uark.edu/~jgauch/2004/F14/hw/people.txt). Each line of the file contains the following pieces of information:

first\_name

last\_name

birth\_year

death\_year

contribution

If you look at the people.txt file, you will notice that the first and last names are single strings, and that the birth and death years are integers. A death year of -1 is used to indicate that the person is still alive. The contribution field is a string with a variable number of words. Therefore, you will have to use getline to read to the end of a line in order to read in the contribution.

Your task is to read/store the information above into an object oriented data structure. Your program should then allow the user to search this data structure for computer scientists three ways: (1) using their first name, (2) using their last name, or (3) using a range of birth years. Your program should print out all records that match the search criteria.

2. Design:

Students are required to define two classes "Person" and "Table" to contain the information in the "people.txt" file. Each line of the input file corresponds to a Person to be inserted into into the Table. Therefore, the data contained in each line should be used to set a Person object's data members. The Table class should contain an **array** of Person objects. Students must define these two classes and specify the constructor destructor functions, the public methods and private variables.

The Person class must contain the following methods.

constructor - to initialize the object.

copy constructor - to copy an object.

destructor - to delete the object.

set - allow the user to set the properties of a person.

get - allow the user to get the properties of a person.

print - print out the record.

read - read a person's properties from a file stream.

The Table class must contain the following methods.

* constructor - to initialize the object.
* copy constructor - to copy an object.
* destructor - to delete the object.
* print - print out all of the records as a nicely a formatted table.
* read - read a list of persons from a file formatted as above.
* search\_first\_name - allows the user to search the table based on a person's first name. All matching records should be printed.
* search\_last\_name - allows the user to search the table based on a person's last name. All matching records should be printed.
* search\_year - allows the user to search the table based on a range of birth years. All matching records should be printed.

The methods above should be used to implement the interactive search program. Students may want to refer to previous labs for examples of file input/output and classes.

3. Implementation:

To simplify the implementation process, you will be given the class definitions for the Person class in a file ["person.h"](http://csce.uark.edu/~jgauch/2004/F14/hw/person.h) and the class definitions for the Table class in ["table.h"](http://csce.uark.edu/~jgauch/2004/F14/hw/table.h). Your task will be to complete the implementations of these classes in two files "person.cpp" and "table.cpp". Then you should implement the user interface for your program in "main.cpp". Remember to use #include at the top of your \*.cpp files to include your class definitions. Also, to compile your program you can use:

g++ -Wall -o hw7.exe person.cpp table.cpp main.cpp

Since you are starting with a the class definition, your first task is to implement each of the methods. It might be a good idea to start with "skeleton methods" to get something to compile, and then add the desired code to each method **incrementally** writing comments, adding code, compiling, debugging, a little bit at a time. Once you have the methods implemented, it should be fairly simple to create a main program that calls these methods to complete your project.

Remember to use good programming style when creating your program -- good names for variables and constants, proper indenting for loops and conditionals, clear comments, etc. Also, be sure to save **backup copies** of your program somewhere safe. Otherwise, you may end up retyping your whole program if something goes wrong.

4. Testing:

Test your program to check that it operates correctly for all of the requirements listed above. Also check for the error handling capabilities of the code. Try your program with several input values, and save your testing output in text files for inclusion in your project report.

5. Documentation:

When you have completed your C++ program, write a short report using the [project report template](http://csce.uark.edu/~jgauch/2004/F14/handouts/report.docx) describing what the objectives were, what you did, and the status of the program. Does it work properly for all test cases? Are there any known problems? Save this report to be submitted electronically.

6. Project Submission:

In this class, we will be using electronic project submission to make sure that all students hand their programming projects and labs on time, and to perform automatic analysis of all programs that are submitted.

**Rename your program and documentation files 123456789.hw7.cpp and 123456789.hw7.docx using your UAID number in place of 123456789, and go the Blackboard site for this class and submit these two files.**

The dates on your electronic submission will be used to verify that you met the due date above.

All late projects will receive reduced credit:

10% off if less than 1 day late,

20% off if less than 2 days late,

30% off if less than 3 days late,

no credit if more than 3 days late.

You will receive partial credit for all programs that compile even if they do not meet all program requirements, so handing projects in on time is highly recommended.

7. Academic Honesty Statement:

 Students are expected to submit their own work on all programming projects, unless group projects have been explicitly assigned.

 Students are NOT allowed to distribute code to each other, or copy code from another individual or website.

 Students ARE allowed to use any materials on the class website, or in the textbook, or ask the instructor and/or GTAs for assistance.

**This course will be using highly effective program comparison software to calculate the similarity of all programs to each other, and to homework assignments from previous semesters. Please do not be tempted to plagiarize from another student.**

Violations of the policies above will be reported to the Provost's office and may result in a ZERO on the programming project, an F in the class, or suspension from the university, depending on the severity of the violation and any history of prior violations.

Programming Project Evaluation

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Name:** | | **Project:** | **Date:** |
| Correctness:  Program compiles  Reads normal input data  Performs correct calculations  Prints results properly  Detects and handles incorrect input data | Score:\_\_\_\_\_\_/ 50 | | |
| **Design:**  Problem decomposition  Choice of data structures  Choice of algorithms  Program efficiency | Score:\_\_\_\_\_\_/ 20 | | |
| **Implementation:**  Function and variable names  Program indenting  Use of white space  Easy to read code | **Score:\_\_\_\_\_\_/ 10** | | |
| **Testing:**  Copy of testing input/output  Test normal input data  Test incorrect input data  Demonstrate special cases | **Score:\_\_\_\_\_\_/ 10** | | |
| Documentation:  Clear and concise comments in code describing the data structures and algorithms  Complete project report describing program design, implementation, and testing | **Score:\_\_\_\_\_\_/ 10** | | |
| **Grader Comments:**  Total:\_\_\_\_\_\_/ 100 | | | |

### 4Gi.5b CSCE 2014: Programming Foundations II, Programming Assignment & Rubric

**CSCE 2014 - Homework 4**

**1. Problem Statement:**

The purpose of this programming assignment is to learn more about sorting algorithms. Your task is to create two sorting functions "corn\_sort" and "hilow\_sort" and use these functions to sort an array of 100 random integer values between [0..999].

The corn sort algorithm is a variation on the traditional bubble sort algorithm. In each pass over the unsorted array, you look at two adjacent values and swap them if they are out of order. With bubble sort, these passes over the data are always going from left-to-right. With corn sort you do one pass from left-to-right followed by another pass from right-to-left and this is repeated until there are no exchanges. Thus with corn sort, we will bubble the largest value to the far right on the first pass, and the smallest value to the far left on the second pass. Hence, we should be able to sort random numbers in fewer passes over the data.

The hilow sort algorithm is a variation on the traditional selection sort algorithm. With selection sort, each pass over the unsorted data selects the smallest remaining data value, and this is stored to the right of the sorted data values. With the hilow sort, each pass over the unsorted data will select the largest and the smallest remaining data values, and these two values will be stored in appropriate locations in the sorted array -- the smallest value to right of previous small values, and the largest value to left of previous large value. Hence with hilow sort, we will move two values into their correct locations with each pass over the data.

**2. Design:**

Students are encouraged to use the sample sorting code in labs 10 and 11 as a framework for creating random data values, and reading and writing ascii sorted and unsorted data files. You should use the same parameters for "corn\_sort" and "hilow\_sort" as the "bubble\_sort" and "selection\_sort" functions.

**3. Implementation:**

You can implement this program using either a bottom-up approach or a top-down approach. If you go for a bottom-up approach, start by creating basic methods and classes, and test theses methods using a simple main program that calls each method. When this is working, you can create the main program that uses these methods to solve the problem above.

If you go for a top-down approach, start by creating your main program that reads user input, and calls empty methods to pretend to solve the problem. Then add in the code for these methods one at a time. This way, you will get an idea of how the whole program will work before you dive into the details of implementing each method and class.

Regardless of which technique you choose to use, you should always develop your code **incrementally** adding code, compiling, debugging, a little bit at a time. This way, you always have a program that "does something" even if it is not complete. Also, remember to keep backup versions of your code, so you always have a version to fall back on if you accidentally delete your code or your changes do not work out.

**4. Testing:**

Test your program to check that it operates correctly for all of the requirements listed above. Also check for the error handling capabilities of the code. You are required to include your testing results in your project report to demonstrate that your program works correctly. To do this use the "script" command to save all program input/output in a "typescript" file, and cut and paste from this ascii file into your program documentation.

**5. Documentation:**

When you have completed your C++ program, use the "Programming Report Template" on the class website to document your programming project. This report has separate sections to describe the problem statement, your design decisions, your implementation process, and your testing results. Each of these sections should be 1-2 paragraphs long, so your completed report will be 2-3 pages long once you have included your testing output.

**6. Project Submission:**

In this class, we will be using electronic project submission to make sure that all students hand their programming projects and labs on time, and to perform automatic analysis of all programs that are submitted. When you have completed the tasks above go to the class web site to "Upload" your documentation (a single docx file), and your C++ program (a single ascii text file).

The dates on your electronic submission will be used to verify that you met the due date above.

All late projects will receive reduced credit:

10% off if less than 1 day late,

20% off if less than 2 days late,

30% off if less than 3 days late,

no credit if more than 3 days late.

You will receive partial credit for all programs that compile even if they do not meet all program requirements, so handing project

Programming Project Evaluation

|  |  |  |  |
| --- | --- | --- | --- |
| **Student Name:** | | **Project:** | **Date:** |
| Correctness:  Program compiles  Reads normal input data  Performs correct calculations  Prints results properly  Detects and handles incorrect input data | Score:\_\_\_\_\_\_/ 50 | | |
| **Design:**  Problem decomposition  Choice of data structures  Choice of algorithms  Program efficiency | Score:\_\_\_\_\_\_/ 20 | | |
| **Implementation:**  Function and variable names  Program indenting  Use of white space  Easy to read code | **Score:\_\_\_\_\_\_/ 10** | | |
| **Testing:**  Copy of testing input/output  Test normal input data  Test incorrect input data  Demonstrate special cases | **Score:\_\_\_\_\_\_/ 10** | | |
| Documentation:  Clear and concise comments in code describing the data structures and algorithms  Complete project report describing program design, implementation, and testing | **Score:\_\_\_\_\_\_/ 10** | | |
| **Grader Comments:**  Total:\_\_\_\_\_\_/ 100 | | | |

### 4Gi.5c CSCE 2114: Digital Design, Programming Assignment

**CSCE2114 Digital Logic – Lab 4**

In this lab, you should write a VHDL code to convert BCD numbers to the corresponding 7-segment displays. First use the code in Part1, this code makes the 7-segment to display characters from 0 to 9.after you successfully downloaded code on the FPGA, show the working design to your TA. Then go to part2 and modify the code in order to show all Hexadecimal characters from 0 to 15, and then see it works.

The steps in both parts are as follows:



SW0-SW3

BCD inputs

Hex 0

Segment display

***1-Start a new project, and then add a VHDL file to your project.***

Click on File -> New Project Wizard -> Next

Click on the upper left … and browse to your design directory, for File name: enter BCD -> Next -> Next

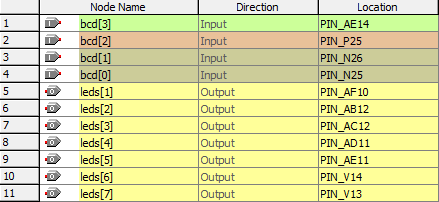
For the Family select Cyclone II, under Available devices select EP2C35F672C6 -> Next -> Next -> Finish

Click on File -> New and select VHDL File. Add the VHDL code or modify it, then save it.

***2-Pin assignment:***

Connect the bcd inputs to switches SW3 - SW0, and the leds outputs to the HEX0 segment display. Notice that the elements in the display (LED elements abcdefg) are used to create the character being displayed.

Go to[DE2 Pin Assignments](http://www.csce.uark.edu/~jparkers/CSCE2114-fall2011/DE2_pin_assignments.csv) link in Digital Desing website to find how FPGA’s pins are assigned. For this lab, the pin assignment should be as follows:



***3-compile your design and the program and configure the FPGA device***.

1-Click on Processing -> Compiler Tool -> Start, when it is finished click on OK and close the Compiler Tool.

Click on Tools -> Programmer you will see that the USB-Blaster is beside the Hardware Setup tab and that the File BCD.sof is listed. Click on the box below Program/Configure then click on Start.

**Part 1**

Implement the VHDL component as described below. This is a binary-coded-decimal (BCD) to 7-segment display decoder. It is meant to display the numbers 0 to 9 on the display. The value displayed is the decimal equivalent of the binary number. Any binary values above 9 are not displayed. You should consider how a character should be displayed. There are 7 elements, what should each character look like?

*c*

*e*

*a*

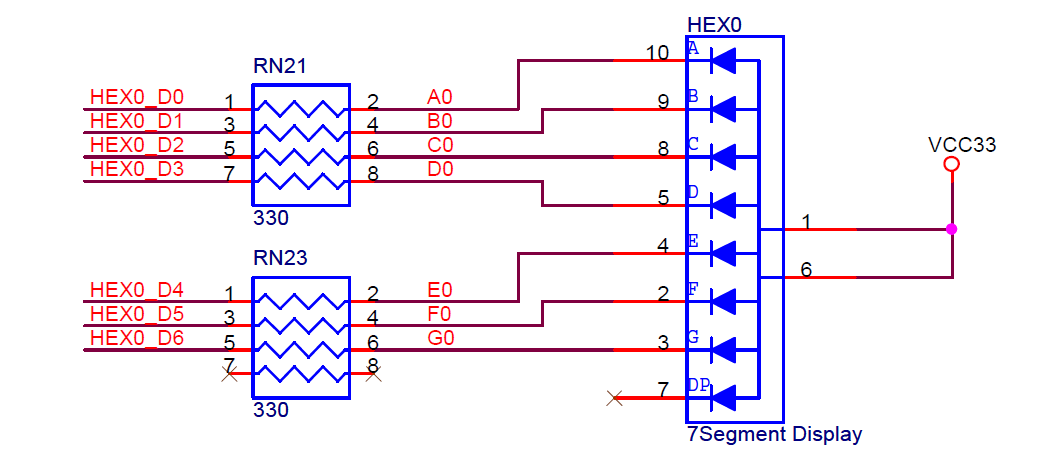
*g*

*b*

*f*

*d*

According to the schematic of DE2 board, for each LED to be turned on, you should send out Zero.



This is a display element that uses a group of 4-bits to display a decimal number. Four bits allow for 16 combinations, the values above 9 are displayed as a blank because they are not decimal numbers.

Debug the design and make the display correct for each character. This requires you to map the pins ( SW3-SW0 and HEX0) to the connections in your schematic.

|  |
| --- |
| LIBRARY ieee ;  USE ieee.std\_logic\_1164.all ;  ENTITY seg7 IS  PORT ( bcd : IN STD\_LOGIC\_VECTOR(3 DOWNTO 0) ;  leds : OUT STD\_LOGIC\_VECTOR(1 TO 7) ) ;  END seg7 ;  ARCHITECTURE Behavior OF seg7 IS  BEGIN  PROCESS ( bcd )  BEGIN  CASE bcd IS -- abcdefg  WHEN "0000" => leds <= "0000001" ;  WHEN "0001" => leds <= "1001111" ;  WHEN "0010" => leds <= "0010010" ;  WHEN "0011" => leds <= "0000110" ;  WHEN "0100" => leds <= "1001100" ;  WHEN "0101" => leds <= "0100100" ;  WHEN "0110" => leds <= "0100000" ;  WHEN "0111" => leds <= "0001111" ;  WHEN "1000" => leds <= "0000000" ;  WHEN "1001" => leds <= "0001100" ;  WHEN OTHERS => leds <= "-------" ;  END CASE ;  END PROCESS ;  END Behavior ; |

*Code 1: BCD to 7-Segment decoder VHDL code.*

Demonstrate the correct function of your circuit to the TA (16 input combinations, and the display). Go over all 16 possible inputs. All characters must be displayed correctly.

**Part 2**

Create a hexadecimal to 7-segment decoder using VHDL. Test your design as you did for part 1. The VHDL component has a 4 bit input and displays the input as a HEX character on a 7-segment display. You must make each HEX character displayed so that they are clearly understood.

**CSCE 3193: Programming Paradigms, Programming Assignment**

**Polymorphism**

This assignment will build on the previous one. In preparation for the next step, use your favorite search engine to learn about inheritance, polymorphism, and abstract methods in Java.

**Make a class named Sprite**. In video game terms, a "sprite" is a picture that moves, as opposed to a "background tile". Make both the Tube and Bird classes extend the Sprite class. Move the member variables that store tube or bird position into the Sprite class (since position is something that all sprites have in common).

**Use polymorphism to animate your sprites**. Add an abstract method to your Sprite class named "update". Also, add an abstract method to your Sprite class named "draw". Child classes will need to implement these two methods. The update method should update the sprite. The draw method should draw the sprite. Move the member variables that hold the images from the View class into the Bird and Tube classes. Change the type of your collection from LinkedList<Tube> to LinkedList<Sprite>. Put the Bird instance in the same collection with all the Tube instances. Change your View.paintComponent method so that it just iterates over all the sprites and calls Sprite.draw. After this change, your View should not know anything about the Bird or Tube classes. It should only know that your game involves a collection of Sprites. It should not contain any special code to handle the bird differently from the tubes. Similarly, your Model.update method should not explicitly call Bird.update. It should just iterate over the collection of Sprite instances and call Sprite.update. Now, make your game work again (without reverting back to the old design). To do this, you will have to move a lot of stuff around and make a lot of changes. (If you find this step painful, that headache you feel is just ignorance leaving your mind =)

**Clean up your code**. Make sure all of your logic is found somewhere that makes sense. For example, if your collision-detection is still in Model.update, move it into Bird.update or Tube.update. (To do that, you might need to pass the list of Sprites to the Bird or Tube constructor. The Bird or Tube can use a member variable to store a redundant reference to that list.)

**Ponder the elegance of how you have improved your code**. Your game does not do any different than it did before the previous two steps. So, why did we do all of that work? Well, your code is now structured differently. Before, your Model and View had to know what kind of game they were implementing. Now, your Model and View are mostly generic, suitable for supporting pretty-much any billboard-style video game. Imagine that your game involved hundreds of different types of sprites.ing your exam electronically. The file was uploaded successfully to the exam and you will receive an email confirmation. (Most interesting video games involve at least several hundred different types of sprites.) If you kept your previous code structure (without polymorphism), your Model and View would become very complex to support so many different types of things. As you added more and more things to your game, the task of adding new things would become increasingly cumbersome. Basically, your game would eventually become so cumbersome to modify, that no one would ever want to do the work necessary to make it the paragon of awesomeness that is the true destiny of your game. With polymorphism, however, each Sprite now encapsulates all of the logic needed for it to participate in the game. In other words, your game is plug-able.  
  
Good coding design tries to keep the engine (which usually consists of a Model, a View, and a Controller) as generic and as simple as possible, and keeps all the complexity in the plug-able components. This is called a "modular design". Modular code can scale to support very large projects without becoming more difficult to work with. Thus, taking some time to keep your code organized can [pay off in the long run](http://xkcd.com/974/). As you add new features to your game in the following steps, try to keep your overall design as modular as possible. That is, try to avoid putting special-purpose logic in your Model, View, or Controller classes.

**Add the ability to call for backup support from Chuck Norris** by clicking the right mouse button. Chuck should come flying onto the screen from the left side. He should be subject to gravity (just like the bird), but should start with both an up-ward and right-ward initial velocity.  
  
If you rapidly click many times, many Chucks should simultaneously come flying onto the screen. When any Chuck falls below the visible window, remove him from the game.

**Enable Chuck to knock down the tubes.** When any Chuck intersects a tube, that tube should acquire the same horizontal and vertical velocity that Chuck has at that moment, and should also become subject to gravity. Make Chuck bounce back from his kick by negating his horizontal velocity. (Nothing happens when Chuck intersects with the bird.) Add an energy cost for calling Chuck, so the bird can commit suicide by calling Chuck too rapidly. Tune the various parameters (Chuck's initial position, Chuck's initial horizontal velocity, Chuck's initial vertical velocity, and the energy cost for calling Chuck) until they feel reasonable.

**Submit** a zip file in [the usual manner](http://uaf45382.ddns.uark.edu:8989/paradigms).

**Rubric:**

If your code builds and runs on the grader's first attempt and it behaves as described, you will receive full credit (minus any late penalty). If the grader notices any problem, he will notify you by e-mail and give you no credit until you submit working code. If your code is messy, that is your problem, and you will suffer the natural consequences of having to deal with your own code in subsequent assignments that build on top of this one. Mwa ha ha ha ha ha ha ha!

**Hints:**

The MouseEvent.getButton() method tells which button was clicked. The right mouse button is MouseEvent.BUTTON3.

**Q: The animation is rather jerky. How can I make it smoother?** A: I added a member variable of type java.awt.Robot to my Game class. In Game.actionPerformed, I call Robot.mouseWheel(0). That seems to trick Java into thinking the mouse is doing something, so it refreshes a bit faster.

If you get a IIOException that says "Can't read input file!", make sure you know what directory you are executing within. Here is a command to print the current working directory:

System.out.println("cwd=" + System.getProperty("user.dir"));

If you are running inside an IDE, the problem is probably caused by the IDE starting in an unexpected folder. The solution is to tell the IDE what folder to start in. Eclipse <sarcasm>conveniently</sarcasm> provides this setting in project->properties->Run/Debug Settings->Default configuration->Edit->Arguments->Working Directory->Other.

**Q: How can I determine whether some Sprite, s, is a tube?** A: One good solution is to add an abstract method to your Sprite class, like this:

abstract boolean isTube();

You could implement Tube.isTube like this:

boolean isTube() { return true; }

You could implement Bird.isTube like this:

boolean isTube() { return false; }

(Another solution is to use "instanceof". However, some languages, like C++, have no equivalent of "instanceof", so your skills will be slightly more portable if you avoid using "instanceof". Since you are in school, I recommend using the isTube solution.)

**Q: Help, my collision detection stopped working. How do I debug it?**

Make your code deterministic. (You can do this by seeding your random number generator with a constant value.)

Test that your code is really deterministic. (Do the tubes appear in the same random places every time? If not, you probably have multiple random number generators in your code. Is there one in every tube?)

Temporarily turn off gravity (so your bird will just hover). You can turn it back on after you are done debugging.

In your Bird constructor, add a line such as "y=246;" to set the vertical position of the bird to wherever it needs to be to reproduce the problem (probably not 246). Now, you can reproduce the problem consistently and deterministically every time you run your program.

Add a frame counter, and print the frame number to the console. (1, 2, 3, 4, ...)

Run your program again and watch the bird hover into a tube. Note approximately which frame the collision detection fails to work on. (For example, let's say it fails in frame 493.)

Add a line of code just before your collision detection code that says

if(frameCount == 493) {

System.out.println("put a breakpoint here");

}

and put a breakpoint on the print line.

Run in the debugger until it hits your breakpoint, which is right before the problem occurs. (If you didn't get it exactly right, that's okay. Just adjust the fram number until it breaks right before the problem.)

Step through your collision detection code. Look at your variable values. See why your collision detection code does not do what it is supposed to do.

Fix the problem.

**BIOL/CHEM/PHYS 3273 UAteach Research Methods**

**Inquiry 4: Final Inquiry**

**Description**: Final Project

Due Dates:

* Final data sets need to be brought to class on Wednesday, April 27th.
* Data collection should be finished by the end of the week of April 25th.
* Your Final Report (or at least a complete draft) is due on the last day of class, i.e., by 4:30 PM on Wednesday, May 4th.
* Final presentations are also due by the last day of class.

**Purpose**: Carry out a final project, incorporating skills gained during class. In this project, you will create a quantitative data set either in a controlled laboratory setting or by data mining and conduct a statistical analysis of the data.

**Background**: You have carried out and observed a number of inquiries of different types during the semester. Your goal now is to combine the skills gained in these different inquiries into a final project. These projects begin with curiosity, proceed with experimental design and obtaining data, continue with statistical analysis and modeling, and the ability to access and use the scientific literature. All of these aspects of doing research will be combined as you conduct a final research inquiry.

**End Products**: A final report and a final presentation.

**Report**: At the conclusion of this project, you will write a final report on your inquiry in the format of a scientific paper. This report should be 8 – 12 type pages single-spaced, typed pages in length, although you may exceed this within reason, if you like, particularly if you have extensive appendices. Use the following checklist as you put together your report:

The title page should include both the title and abstract, but no page number.

Every page except the title page should have a page number.

Your report should be typed and single spaced, using either an 11 or 12 point font.

All tables and graphs should have a caption and caption number and should be referred to in the narrative of your report.

Make sure all data tables include appropriate units

Make sure all axes on graphs have appropriate titles and units.

Include error bars on all graphs.

Be sure to include appropriate references to sources in your narrative with a list of at least 10 sources or references at the end of the report.

Make sure to discuss safety and ethical issues in the Experimental Design and Procedures section.

Take care to write creatively with proper grammar and spelling. Significant point deductions will result for poorly written reports.

Please include the following sections in your report:

**Title Page**. This should include a title, course name, affiliation, and date.

**Abstract**. The abstract is a single paragraph explaining the purpose of your inquiry. Follow this with a brief summary of the main results of your investigation and analysis. It should be written in the present or past tense. Write this section after all other work is completed. Your goal is to write a single paragraph explaining your work that could be published separately in a newspaper or conference proceedings explaining what you have done. Place the abstract on the title page.

**Introduction and Background**. This section should explain the theme of your inquiry, your motivation for doing it, and it should give the necessary background information to set the stage for your report. Start with an **introduction** that hooks your reader by explaining the significance of the research and your motivation for doing it. Follow this with **background** information with the goal of bringing your reader up to speed with the current state of knowledge in the area of your investigation. A background discussion typically defines terms and discusses other work that has been done on which the current inquiry is building. A discussion of models and theories may be appropriate for this background discussion. It is also typical to have many references to other literature in this section. Somewhere in the **Introduction and Background** section, you should give a succinct statement of either (i) the hypothesis you are testing along with the null hypothesis or alternative hypotheses, or (ii) the specific functional relationship you are measuring along with the independent, dependent, and any control variables. Your reader should leave this section knowing exactly what you are testing and measuring.

**Experimental Design and Procedures**. Write this section with enough detail that another researcher could use it to reproduce your experiment. Include a description of all the equipment and materials used, schematic diagrams and/or photos of your apparatus along with a detailed description of how you built and used the equipment. Describe your final refined method that was used in your data collection. It is also fine to have some discussion of methods that didn’t work discovered along the way. Finally, it is imperative that you discuss **safety and ethical issues** in this section!

**Data**. In this section, show representative data tables and graphs of raw data. If you took large data sets, **do not** include tables and graphs of all of your data; instead, show representative data in this section to indicate the type and quality of your data for the reader and put the larger data sets in an appendix.

**Results and Analysis**. Describe and show your analysis of the data shown in the last section here. Be sure to include discussions of errors (and error propagation, if appropriate), what you did to reduce errors. Give an appropriate statistical treatment of your data and discuss whether your results are statistically significant or not. Tables and graphs resulting from the analysis of your data should be shown in this section. Included error bars on all graphs and discuss how these error bars were calculated. Make sure all axes are appropriately labeled with units. Similarly, all columns in a data table should have units and an appropriate number of significant figures. Trend lines and other fits to your data should be shown and discussed. Finally, be sure to state clearly whether your hypothesis was confirmed or not and/or describe the form of the relationship you discovered in your measurements.

**Conclusions**. Summarize briefly your results in a concluding paragraph or two. This is also a good place to discuss modifications to your experiment that could improve the results of future experiments.

**Appendices**. Include one or more appendices here as appropriate. One appendix should include specifications sheets and calibration procedures of majors equipment used. Another might include sample Human Subject Consent forms used, if human subjects were part of your investigation. It is also appropriate to put large data tables and/or sets of graphs in an appendix, if your inquiry resulted in such large sets. If you wrote any computer code for your analysis, it may be appropriate to put a list of this code in an appendix.

**References**. Put a complete list of references here. Refer to each reference in an appropriate manner in the narrative of your report.

**Comment**: You have signed up for credit in Physics, Chemistry, or Biology, and you must carry out a final project relevant to the discipline for which you have signed up. If you want to carry out a project in Earth Sciences or Computer Science, please discuss this with the instructors.

**Grading**: This inquiry will be evaluated according to the Inquiry 4 grading checklist. The due date for at least a complete draft of your report will be on the last day of class: May 4, 2016, with the final report due by the final exam date (Wednesday, May 11 at 3:15). Please email drafts of your report to your instructors with questions as needed for comments. The instructors will read over drafts that you send via email and provide comments.

**Presentation**: You will give an oral presentation of your work on Inquiry 4 to the class either on the last day of class or during the Final Exam period. The format of the presentations will be the same as that of the Inquiry 2 presentations.

Inquiry 4 Grading Checklist

Student: Evaluator:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | **Points** | **Points** |
| **#**[**\***](#_bookmark0) | **Category** | **Description** | **Possible** | **Earned** |
| 1 | Title | Title, Author, Affiliation, Date | 5 |  |
| 2 | Abstract | One paragraph description of inquiry and key results | 15 |  |
| 3 | Introduction & | Hooks reader and succinct statement of hypotheses and/or relationship to be explored | 10 |  |
|  | Background | Discussion of motivation for inquiry, all appropriate terms defined, current state of knowledge given, etc., with good references to sources. | 15 |  |
| 4 | Exp’tal Design & | Diagrams and photos of equipment with good descriptions of design and construction. | 15 |  |
|  | Procedures | Specific step-by-step procedures for taking data, with discussions on accounting for error. | 15 |  |
|  | Safety & Ethics | Discussion of safety, use of human subjects, etc. | 20 |  |
| 5 | Data | Presentation of data tables and/or graphs | 20 |  |
| 6 | Results & Analysis | Tables and Graphs calculated from data, discussion of errors and error propagation, statistical analysis, trends and results of inquiry. | 50 |  |
| 7 | Conclusions | Summary and future directions. | 15 |  |
| 8 | Appendices | Appropriate appendices: Equipment specs, human subject consent forms, long data tables, computer code, etc. | 10 |  |
| 9 | References | Complete references to sources | 10 |  |
|  |  | **Total**: | 200 |  |

Note that points will be deducted for a poorly worded and organized report that shows poor grammar and spelling. Be creative and thoughtful with your writing and give careful consideration to the overall organization of your report.

Evaluator’s Comments**:**

\* Refer to the numbered items on the previous pages for more detailed descriptions of each part of this rubric.

**Inquiry 4 Presentation Grading Rubric**

Student Name Presentation on

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Description** | **Points Possible** | **Points Earned** |
| **1** | Electronic | Title slide (Name, Title, and Learning Objective) | 5 |  |
| **2** | Electronic | The Question | 5 |  |
| **3** | Electronic | Why is it Interesting & Important? | 5 |  |
| **4** | Electronic | The Investigation | 5 |  |
| **5** | Electronic | Data Summary | 5 |  |
| **6** | Electronic | Data Interpretation | 5 |  |
| **7** | Electronic | Error Analysis | 5 |  |
| **8** | Electronic | What was learned | 5 |  |
| **9** | Electronic | Improvements | 5 |  |
| **10** | Electronic | Further Research | 5 |  |
| **11** | Electronic | Formative Assessment | 5 |  |
| **12** | Electronic | Aesthetically Pleasing Presentation | 5 |  |
| **13** | Live | Engagement | 6 |  |
| **14** | Live | Audience participation is integral part of entire presentation | 12 |  |
| **15** | Live | Presentation lasts at least 6 minutes but no more than 8 minutes. | 6 |  |
| **16** | Live | Demonstration or hands-on activity teaching the procedure | 6 |  |
| **17** | Electronic | Presentation Reflection based upon formative assessment | 10 |  |
|  |  | Total Points | 100 |  |

It is assumed that all portions of the electronic presentations will appear in the live presentation.

## 2Gii. Relative Placing where Assessments occur throughout the Program

### 2Gii.1 Pre-licensure Checklist (includes suggested times for completing Praxis requirements)

[**UAteach**](http://teach.uark.edu) **Pre-licensure Checklist**

University of Arkansas

College of Education and Health Professions: [Office of Teacher Education](http://teacher-education.uark.edu)

Arkansas law and UA teacher education accreditation policies govern regulations for teacher licensure. You are responsible for knowing these regulations and for completing all the requirements in a timely fashion. The checklist below is a useful tool to help you track your progress as you move through the UAteach Program, and it is not an official document. See the [Office of Teacher Education](http://teacher-education.uark.edu) website and the [Arkansas Department of Education](http://www.arkansased.gov/) (ADE) for the rules and regulations regarding teacher licensure.

|  |  |  |
| --- | --- | --- |
| ***Your Name:*** | ***UA Student Id. #:*** | ***Last 4 digits of SS#:*** |
| ***Phone No.:*** | ***Major:*** | ***Anticipated Grad. Date:*** |

Please check (√) the boxes below to indicate you have completed each item on the checklist below, and put your initial at the end of each statement to indicate you have read it. If you have questions about this checklist, see your UAteach Advisor.

**PHASE 1** *(During Knowing & Learning/Classroom Interactions):*

* Read the [Background Check Requirements](http://ofpl.uark.edu/background/index.php) and schedule a [Livescan Background Check](https://ofpllivescan.acuityscheduling.com/schedule.php)
* (*Costs: $39.73 for ASP/FBI & $10 for CM)*
* Check that background checks are approved ([How to Check Background Check Status](http://teacher-education.uark.edu/background/checkingbackgroundcheckstatus.pdf)).
* Apply for [Admission to Teacher Education](http://teacher-education.uark.edu/admissions/index.php) ($50) (Option A)
* Meet GPA Requirement: **2.75 GPA** *before* being recommended for teacher licensure
* 1Pass [Praxis](http://www.ets.org/praxis) Core (*Code # 5751 for all 3 tests combined) -$150*
* Praxis Core Reading Test *Code # 5712 minimum score 156)-$90*
* Praxis Core Writing Test *(Code # 5722 minimum score 162)-$90*
* Praxis Core Math Test *(Code #5732 minimum score 150)-$90*
* 2Pass the [Praxis](http://www.ets.org/praxis) Principles of Learning and Teaching Test Grades 7-12 *(Code # 5624 min. score 157)- $146*
* Get Graduate Progress Summary (GPS) from [Fulbright Advising Center](http://fulbright.uark.edu/advising-center/) (as soon as you have 80 hours of course credits)

**PHASE 2** *(Semester before Internship- usually during PBI):*

* Submit specified assignments to Chalk & Wire
* Pass the [Praxis II](http://www.ets.org/praxis) (Content Test) in your field *(biology, chemistry, mathematics, physics, computer science)-$120 ea.*
* Attend a UA Licensure Meeting the semester *before* you begin your internship.
* Complete all content area coursework the semester **before** the teaching internship.
* Meet GPA Requirement (**2.75 GPA)** before being recommended for teacher licensure.
* Apply for graduation (on your [UAConnect](https://uaconnecttst.uark.edu/) Account)*-$75*

**PHASE 3 *(****Early in Internship:)*

* Read the [Background Check Requirements](http://ofpl.uark.edu/background/index.php) and schedule a [Livescan Background Check](https://ofpllivescan.acuityscheduling.com/schedule.php) (again)- New background checks must be completed before being issued an initial license if your existing background check is over one year old (*Costs: $39.73 for ASP/FBI & $10 for CM)*
* Check that background checks are approved ([How to Check Background Check Status](http://teacher-education.uark.edu/background/checking-background-check-status.pdf)).
* Complete AR Ideas PD: [AR Ideas portal.](http://ideas.aetn.org/)
* Parental Involvement- 2 hrs.
* Child Maltreatment- 2 hrs.
* Teen Suicide- 2 hrs.
* Dyslexia-1 hr
* Send AR Ideas Certificates to Myra Haulmark ([mailto:haulmark@uark.edu](mailto:Haulmark@uark.edu)).
* Pay [ADE Licensure Fee](http://www.arkansased.gov/divisions/human-resources-educator-effectiveness-and-licensure/educator-licensure-unit/educator-licensure-application) online($75)
* Submit all documentation listed on the [Licensure Checklist Form](http://ofpl.uark.edu/licensure/index.php) to Dr. Myra Haulmark, Director of Teacher Licensure, and meet all requirements before **April 1st or December 1st** *(of graduation semester).* You can check your status using the [*My Online UARK Licensure Checklist*](http://licensureuark.knack.com/licensure-checklist-progress).
* Submit specified assignments to your E-portfolio & Chalk & Wire
* Request an [official transcript](http://registrar.uark.edu/_resources/pdf/transcript_request_form.pdf) (post graduation) be sent to UA Teacher Education ([mailto:haulmark@uark.edu.](mailto:Haulmark@uark.edu)

Notes:

*Effective September 1, 2014, students may use either ACT or GRE in lieu of the Praxis Core if they meet cut scores:* ***ACT:*** *Composite 24; Reading 22, Writing 22, Math 22/* ***SAT****: Composite 1090; Reading 510, Writing 510, Math 510/* ***GRE****: Reading 142; Math 142; Writing 3.5*

*Must also take the PLT Grades 5-9 if seeking middle school endorsement. Must also take an Arkansas history course if seeking MS endorsement*

Revised 1/24/2017 (pdw)

### 2Gii.2 The UAteach courses with the assessments mentioned above occur approximately in this timeframe (students with fewer than4 years may double up on certain courses.)

|  |  |  |
| --- | --- | --- |
|  | FALL | SPRING |
| Freshman | ARSC 1201: Inquiry Approach to Teaching | ARSC 1221: Inquiry-based Lesson Design |
| Sophomore | STEM 2103: Knowing & Learning | STEM 2203: Classroom Interactions |
| Junior |  | BIOL/CHEM/PHYS 3273:  UAteach Research Methods |
| Senior | STEM 3303: Project-based Instruction | STEM 4409: Clinical Supervised Teaching (internship)  TESS Summative Evaluation  Teacher Candidate Dispositions Inventory |

### 2Giii. How Assessment Data will be Collected and used for Program Improvement.

Although Praxis exam results are kept by our Office of Teacher Education, the student’s UAteach advisor closely monitors the student’s progress on passing Praxis exams. An example of action taken based on noticing a trend of non-passing Praxis exam results from another discipline, the MATH Content Praxis 5161, we began offering Praxis Prep evenings to support student improvement on this exam. We would do the same for Computer Science if needed.

The instructors of the UAteach courses meet frequently both formally and informally to discuss alignment of program goals throughout our courses. As we review assignments such as the samples provided and other assessments, including observation of our students’ teaching, when we notice that students are deficient in a certain competency, we discuss what we could add or emphasize more in that course or earlier courses in order to support our students. The University of Arkansas Office of Teacher Education conducts an exit survey of our intern teachers and provides us with their responses as to how well they feel our program prepared them for teaching. We review these results and discuss ways that we can improve based on their feedback. We have excellent communication between our instructors and are very dedicated to making our program the best that it can be, which we know is an ongoing process.

## 2H. Field Experience: Course Practicums and Semester Internship

UAteach students engage in field experience in 5 of the 6 courses , including a semester internship guided by mentor teachers in local schools and U of A instructors. By the end of the program, the students have been to upper elementary/middle schools, junior highs, and high schools. In scheduling the field experience, we strive for a variety of school experiences in rural and urban/suburban as well as diverse populations and economic status. A matrix of UAteach field experience is provided below.

**UAteach FIELD EXPERIENCES for Computer Science Licensure Students**

Students who are pursuing Computer Science as initial licensure will be advised to prepare for an additional area of licensure, either Mathematics or a Science. To support this, their pre-internship field experiences will include exposure to the other discipline as well as at least one practicum in computer science. During the semester internship, these students will have 2 Computer Science rotations: Grades 9-12, and Grades 7-8.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **UAteach**  **Field**  **Experiences per course** | Credit Hours | Grade Levels | # of Observation events | # of  Teaching events | # of Lessons developed and taught | Min. # of times students get observed by program staff  (does not include mentor teachers) | **Total # Field Hours (minimum) for this course** |
| **STEP 1** ARSC 1201 | 1 | 4-6 | 2 | 3 | 3 | 1 | 5 |
| **STEP 2** ARSC 1221 | 1 | 7-8 | 2 | 3 | 3 | 1 | 5 |
| **Knowing & Learning**  STEM 2103  *(no practicum, but 2 hours of clinical interviews with students from a former mentor’s class are required)* | 3 | 4-12 |  | 2  (student interviews, not teaching) |  |  | 2 |
| **Classroom Interactions**  STEM 2203 | 3 | 9-12 | 3 | 3 | 3 | 1 | 6 |
| **Project-based Instruction**  STEM 3303 | 3 | 7-9 | 4 | 4 | 4 | 1 | 8 |
| **Teaching Internship**  STEM 4409 | 9 | 7-8 and  9-12 |  |  |  |  | **420** hours – 2 rotations-  split 25% and 75% at grades 7-8 and 9-12, depending on student preference |
| **TOTAL FIELD HOURS** |  | | | | | | **446** |

5. Admission Requirements

Students can enter the UAteach program at varying times in their degree programs, although they typically enter as sophomores. With our first two courses characterized as ‘try it out’ courses, which are open to all students at the University of Arkansas, we wait until students are in the third or fourth courses, STEM 2103 or STEM 2203, to have them formally apply to the Office of Teacher Education within the College of Education & Health Professions for admission. Students are advised that they need a 2.75 by the time they graduate.

6. Retention Procedures

A UAteach faculty advisor works closely with each student, meeting at least once per semester, to ensure that they are progressing successfully through the UAteach courses as well as their degree requirements. In the year before the semester internship, a formal advising session occurs to confirm the student’s commitment, as well as dispositions, to becoming a teacher.

Strategies for helping students complete our program:

* The greater struggle is not with the UAteach courses, but with the subject area courses in the students’ disciplines, and of course, they must be successful in those courses to be able to teach. As students in our program get to know one another quite well through being in classes together, partnering for practicum and projects, and involvement in our student organization, an internal support system has evolved among students. They form study groups for their content courses, and some offer one-on-one tutoring for those in need. A camaraderie forms as students progress through our program. In part, this is facilitated by our physical space, a house on the edge of campus where students are comfortable gathering.
* The UAteach faculty divide up the advising responsibilities by subject area. Our Biology ‘master teacher’ advises the UAteach Biology majors and serves as a mentor as a Biology educator, and the same holds for our Chemistry/Physics ‘master teacher’, advising and mentoring our Chemistry and Physics majors. Because our current Computer Science majors also intend to teach mathematics, our Mathematics ‘master teacher’ advises and mentors them. As we focus on our advisees, we get to know them well and can have conversations with them about a variety of issues that may impede their success in the program, for instance, recommending a student for speech therapy so that future students can understand. On semesters when our students are not taking a UAteach course, we contact them during registration time to make sure they are on track. We also recognize if our program is not the best fit for them and recommend other programs or career paths that may interest and suit them more.
* Another example of our proactive responses to problems : The Praxis Math Content exam has been difficult for some students to pass, which is an obvious barrier to licensure. Consequently we hold Praxis Prep events, provide study materials, and have had conversations with faculty members in the Mathematics Department to brainstorm ways to support the mastery of the content.
* In summary, we are dedicated to producing well-qualified math/science/computer science teachers, and if we detect an issue, we are going to address it so that our students can be successful and go out to contribute as teachers in these important subjects.

7. Exit Requirements

* TESS Summative Evaluation
* EBI exit survey
* Focus group interview
* Submissions to Chalk and Wire
* E-Portfolio

8. Candidate Follow-up Procedures

The Office of Teacher Education tracks students after graduation. In addition, the UAteach program keeps a listserve of our graduates and regularly invites them to return to campus for a variety of UAteach events. Our goal is to stay in touch with them to add to their support system, and to devise a platform in which they can stay in touch with one another for peer support.

9. Faculty

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NAME | Highest Degree | Professional Experience | Courses Taught | Date of  TESS Training |
| Stephen Burgin | PhD | Secondary Chemistry Teacher, 6 yrs  Assistant Professor of Science Ed, 5 yrs | STEM 2103  STEM 2203 | 1/11/17 |
| Michelle Childress | M Ed | Secondary Chem/Physics Teacher, 10 yrs  Clinical Asst. Instructor, 1.5 years | ARSC 1201  ARSC 1221 | 8/17/16 |
| Kim McComas | PhD | Secondary Math Teacher, 20 yrs  Assistant Clinical Professor, 4.5 yrs | ARSC 1201  ARSC 1221 | 8/17/16 |
| Peggy Ward | PhD | Secondary Biology/Sci Teacher 18 yrs  Comm. College Biology Instructor, 4 yrs  Assistant Clinical Professor, 3.5 yrs | STEM 3303  STEM 4409 | 8/17/16 |

10. Institutional Resources Dedicated to Program Support

The UAteach program is housed in its own building, containing 2 classrooms, 4 faculty/staff offices, 2 meeting rooms, a science lab, and an equipment storage room. Our previous grant funding via the UTeach Institute has allowed us to purchase ample technology and teaching supplies for inquiry-based teaching, and our current funding continues to support our classroom and office needs. Other than faculty, our staff includes a director, assistant director, a co-advisor in the College of Education & Health Professions, and a co-advisor in the Fulbright College of Arts and Sciences. Six part-time work-study students are hired to help with the daily needs of faculty and staff.

11. Implementation

As this proposal is simply asking for an additional area of initial licensure to be earned through the existing UAteach program, implementation will mostly consist of ‘business as usual.’ All the courses are in place, we have informed and had discussions with the related departments, and we already have interested students whom we will inform as soon as our program of study is approved. We will need to add ‘Computer Science’ to our recruiting materials, and inform faculty advisors that the option of earning teacher licensure through the UAteach program exists so that they can share the information with students. We are excited and proud to be able to have this option to offer our students.