Fall 9-1-2022

EDEC 453.01: Early Childhood STEM

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UNIVERSITY OF MONTANA	EDEC 453: EARLY CHILDHOOD STEM

Semester: Fall 2022
Meeting: ED 147 Wednesdays 1:00 – 2:50 PM
Course credits: Three credits
Instructor name: Dr. Allison Wilson
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The Séliš-Qlispé Cultural Committee created the language, *"The University of Montana acknowledges that we are in the aboriginal territories of the Salish and Kalispel people, a number of whom may be present with us today in our course. Today, we honor the path they have always shown us in caring for this place for the generations to come."*

Course Description

This course is designed to address the following questions. How do PreK-3 students construct science and engineering understandings? Which classroom conditions foster opportunities for students to learn and enjoy science and engineering? What teaching strategies engage students in doing and understanding science and engineering? What does it mean to be a culturally responsive science and engineering teacher? Our course will be delivered in a face-to-face format. LAB preschool practicum is a course requirement.

Texts

- Pollman, M. J. (2017). *The Young Artist as Scientist: What Can Leonardo Teach Us?*. Teachers College Press.
- Bybee, R. W. (2011). Scientific and engineering practices in K-12 classrooms: Understanding a framework for K-12 science education. *Science and Children*, *49*(4), 10
- Recommended (not required): Heroman, C. (2017). Making and tinkering with stem: Solving design challenges with young children. National Association for the Education of Young Children.

Resources

- Website: Montana Early Learning Standards
- Website: Next Generation Science Standards
- Website: SpectrUM Making and Tinkering Cookbook
- Website: Tinker Kit: Educators Guide
- Website: StoryMakers: Meaningful Play Designed the Maker Way
- Website: Engineering is Elementary (EiE)

Learning Outcomes

Students who have successfully completed this course will be able to…

1. Synthesize new information with past knowledge, formulate opinions and questions, and communicate and reflect on information related to course content.

2. Identify age-appropriate STEM learning targets and develop standards-based assessments that align with state and national STEM learning standards.

3. Design and facilitate Early STEM learning plans.

4. Design and implement an effective early childhood learning center using knowledge of development, early learning outcomes, and child and environmental assessment(s).

5. Collaborate with families and informal learning environments to advance STEM learning beyond the classroom.

NAEYC and Montana ECE Standards

As a required course for the Early Childhood Education Endorsement Program, this course is designed to prepare students for professional competencies which have been endorsed by the NAEYC, and align with inTASC standards for accreditation. This course attends to and introduces each of the following standards:

NAEYC Standard	InTASC	Assessment Opportunities
NAEYC Standard 2 *Building Family and Community Relationships:* 2a, 2b, 2c	**Standard #4** Content Knowledge	● STEM Lesson Plan and Reflection ● STEM Family Learning Opportunity and Reflection
NAEYC Standard 3 *Observing, Documenting and Assessing to Support Young Children and Families* 2a, 2b, 2c, 2d	**Standard #2** Learning Differences **Standard #3** Learning Environments **Standard #6** Assessment	● STEM Lesson Plan and Reflection ● Integrated STEM Classroom Center ● Making STEM Visible Learning Display
NAEYC Standard 4 *Using Developmentally Effective Approaches to Connect with Children and Families:* 4a, 4b, 4c, 4d	**Standard #7** Planning for Instruction **Standard #8** Instructional Strategies	● STEM Lesson Plan and Reflection ● STEM Family Learning Opportunity and Reflection ● Integrated STEM Classroom Center
NAEYC Standard 5 *Using Content Knowledge to Build Meaningful Curriculum:* 5a, 5b, 5c	**Standard #4:** Content Knowledge **Standard #5** Application of Content local and global issues.	● STEM Lesson Plan and Reflection ● Integrated STEM Classroom Center ● Weekly Reading, Practical and Observation Assignments ● To Pin or Not to Pin
NAEYC Standard 6 *Professionalism as an Early Childhood Educator:* 6c, 6d, 6e	**Standard #9** Professional Learning and Ethical Practice **Standard #10** Leadership and Collaboration	● STEM Lesson Plan and Reflection ● STEM Family Learning Opportunity and Reflection ● Integrated STEM Classroom Center

Course Assignments

Student Success Criteria	Assessment Opportunities
1. I can synthesize new information with past knowledge, formulate opinions and questions, and communicate and reflect on information related to course content.	● Weekly Reading, Practical and Observation Assignments ● To Pin or Not to Pin
2. I can design and facilitate Early STEM learning plans.	● STEM Lesson Plan and Reflection
3. I can identify age-appropriate STEM learning targets and develop standards-based assessments that align with state and national STEM learning standards.	● STEM Lesson Plan and Reflection ● Integrated STEM Classroom Center ● Making STEM Visible Learning Display
4. I can design and implement an effective early childhood learning center using knowledge of development, early learning outcomes, and child and environmental assessment(s).	● Integrated STEM Classroom Center ● Making STEM Visible Learning Display
5. I can collaborate with families and informal learning environments to advance STEM learning beyond the classroom.	● STEM Lesson Plan and Reflection ● STEM Family Learning Opportunity and Reflection

Grading Scale for Your Final Course Grade, Based on Weighted Assignments

A = 95-100%	A- = 90-94%	B+ = 87-89	B = 84-86%	B- = 80-83%	C+ = 77=79
C = 74-76%	C- = 70-73%	D+ = 67-69%	D = 64-66%	D- = 60-63%	F < 60%

1. **Participation (5% Course Grade):** You are expected to fully participate in class activities. A significant component of our class content relies on working collaboratively within your teaching teams and feedback from your ECE cohort peers. In the event that our face-to-face class is moved online participation may be in the form of discussion boards or other virtual zoom activities. Participation will be graded not only based on "attendance" but on preparedness and active engagement with content.

2. **Weekly Reading, Practical and Observation Assignments (20% Course Grade):** Weekly assignments provide practitioner-focused time to make meaning from course readings, videos, and eLearning activities. Assignments vary and may include lesson plan development, practicum observation of activities with children, reflection, action plan, graphic

organizers, and practice using skills in LAB. Weekly assignments are broken up by type and described in more detail below. Points vary based on the weekly content with some assignments weighted more than others.

- **Reading Assignments:** In this course you will complete required readings. At times, you will synthesize your thoughts from the readings in reflections either submitted online or brought to our class meeting.
- **Practical Assignments:** In this course you will complete assignments that are very practitioner-oriented. These help you build your portfolio of resources for your work as an educator. Examples include actions plans, classroom blueprints, and learning plans.
- **LAB Observation and Reflection:** This course has an embedded LAB Preschool component. Throughout the semester you will be asked to complete assignments associated with course content that are associated with your practicum setting. These assignments will require communication with your mentor teacher and course instructor.

3. **STEM Lesson Plans (20% Grade):** Throughout the semester you will write two unique Design Challenge Lesson Plans with a science and engineering focus. Your first lesson will be written for an age group of your choosing (Preschool – Third Grade) and will be implemented in class with your peers. Your second lesson plan will be written for implementation in the LAB preschool classroom. The LAB implemented lesson plan should be unique from the first. Each lesson plan will have a follow-up reflection component. A lesson plan template and rubric with success criteria will be provided.

4. **To Pin or Not to Pin (15% Grade):** Knowing that many teachers search for STEM resources online, you will use a tool to critically evaluate two activities and lesson plans (found on Pinterest or Teachers Pay Teachers) to determine quality. The tool, *Choosing and Using High-Quality Developmentally Appropriate STEM Resources,* consists of two sets of questions you will use to evaluate STEM activities and classroom implementation. An assignment template and rubric with success criteria will be provided.

5. **Integrated STEM Classroom Center (20% Grade):** Using your applied understanding of content from our course text and class discussions you will makeover one unique learning area in your LAB classroom (indoor or outdoor) to intentionally integrate STEM learning opportunities. Your center will include (1) a visible invitation for children, (2) a suggested shared read aloud, (3) new and interesting material (4) intentional organization and aesthetics of materials, (5) posted guiding questions (6) an invitation for engagement with supporting anchor chart, and (5) a documentation display of learning practices you have observed by children (this piece will develop after the space has been made over). It is encouraged that you intentionally integrate your center with the PBL classroom unit. A follow-up reflection will be submitted as a component of the classroom center makeover. A template and rubric with success criteria will be provided. In the event that this assignment is completed in pairs or teams a portion of the grade will include a rubric for collaboration and contributions to group work.

6. **Making STEM Visible Learning Display (10% Grade):** Students will work together to create a bulletin board display that *makes STEM Learning Visible.* The display should tell the story of STEM learning in the LAB. The public display will include student work, a title, purpose and NGSS practices, teacher reflections, student images and words, and an invitation for public comment and conversation. A rubric with success criteria will be provided. The display will be installed prior to the Family Learning night and will remain on display through the end of the semester.

7. **STEM Family Learning Opportunity and Reflection (10% Grade):** A culminating aspect of your Early Childhood STEM course will be hosting an engaging event to promote family STEM learning for children and families of LAB. The event will include multiple classroom areas for engagement, documentation displays of children's STEM learnings and engagement throughout the semester, and supported children's presentations of work. The family event will be hosted at the end of the semester. A rubric with success criteria will be provided and a time and date will be determined. Attendance is required.

Course Agreements

1. **Moodle Course Shell:** You are expected to visit the course website frequently and to submit weekly assignments within articulated time frames. Typically, learning sessions will be open two weeks in advance, since the associated resources, and activities are tied with specific lesson content.

2. **Late Work:** All assignments are due NLT Tuesday at midnight prior to our class session. Acceptance and grading for any assignment submitted late is at the discretion of the instructor and based on prior approval. If late assignments are accepted, they will incur a 10% deduction of points possible for each day late, up to three days late.

3. **Written Expression:** All written assignments that are submitted must be clear, concise, grammatically correct and free from errors in spelling and punctuation. Similarly, online postings may be conversational but must be written in complete sentences with accurate punctuation. Your work should demonstrate creativity as well as depth of understanding of the topic. Please avoid overly vague generalizations and provide specific examples with detail and elaboration in all work. Drafts may be submitted prior to the due date for general feedback. The earlier you submit a draft, the more detailed your feedback. For final submissions, professional writing is expected, following APA (7th ed.) format. Because your responsibility as a professional includes articulate communication of issues in the field, clarity and accuracy in writing will be required for full credit on all graded written assignments. (See Summary of NAEYC Standards, Advanced, 2010.)

4. **Time Commitment**

Face to Face: Students should plan to spend 2 hours per week for our scheduled face to face meeting time. As our course is technically 3 credits, there is a reduced face to face meeting time to account for additional "outside class" preparation related to larger culminating assignments embedded within your LAB practicum experience. This is commensurate with the 15 hours per credit hour of contact time required during the face-face semester (3-credit class x 15 hours = 45 hours for a 3-credit class).

Outside of Class: Beyond our required face to face course meeting, there is an expectation of an additional 1-2 hours of homework each week per credit hour (3 credits = additional 3-6 hours per week). This time accounts for completing the activities and responses in each learning session, with additional time for larger assignments as needed. Basically, you can anticipate a 3-6 hour homework requirement (based on the point in the semester) where you will be completing readings, watching video content, summative reflections and/or knowledge checks. Remember, you do not have a textbook so your required "readings" are a combination of activities.

5. **Accommodations:** Your experience in this class is important, and it is the policy and practice of the University of Montana and the College of Education to create inclusive and accessible learning environments consistent with federal and state law. If you experience barriers based on disability, please seek a meeting with Disability Services for Students to discuss and address them. You may find them in Lommasson Center 154 or call 406.243.2243. If you have already established accommodations with Disability Services for Students, please communicate your approved accommodations to your instructor at your earliest convenience so we can discuss your needs in this course.

6. **Academic Honesty**: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students should be familiar with the Student Conduct Code. The code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321

Course Learning and Conceptual Framework

P-3 Course Learning Framework: The content of this course lends itself specifically to identifying, applying, and reflecting and there will be many opportunities to engage in all these practices throughout the course. Students will see this information presented in a variety of ways to enhance learning.

- ***Identify*** **=** Gain knowledge intentional teaching practices through information presented in a variety of ways that include readings, video, practicum observations, and case scenarios.
- ***Apply*** **=** Set goals, plan, implement strategies. Apply can also involve enacting knowledge within the context of "in class" activities
- ***Reflect*** **=** Observe your practice, assess, analyze, plan for change

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College of Education, Department of Teaching and Learning Conceptual Framework: The following Themes of a Learning Community are provided for an understanding of the College's conceptual framework for professional education programs.

- ***Integration of Ideas***

Members of a learning community look beyond the traditionally segmented curriculum and think creatively about the interrelationships among subject areas. They work with a variety of fields of study and search for unifying themes that cross disciplinary lines. There is an emphasis on explaining realities and dealing with actual problems in contextual learning situations.

- ***Cooperative Endeavors***

In a learning community, knowing and learning are viewed as communal acts, and all members can learn from each other. There is a commitment to engage all learners cognitively and emotionally in acquiring and sharing knowledge that is personally meaningful. In the process, members create a culture that encourages personal responsibility and active commitment to the group and its learning goals.

- ***Respect for Diversity and Individual Worth***

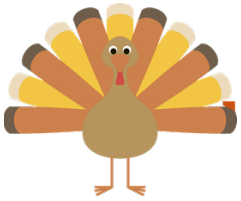
By definition, a learning community embraces diversity, requiring and valuing the input of all voices present. The ethics of care and mutual respect are viewed as essential for supportive learning environments that enhance each member's self-esteem and foster risk-taking, creative conflict, and excellence.

Please Note: This document serves as a guide. I welcome student input and reserve the right to adjust this guide as the semester proceeds. Changes will be written and distributed to the class.

EDEC 453 Course Schedule

Learning Session	Success Criteria	Learning Opportunities	
Week 1 8/31	● I can describe STEM ● I can engage in STEM learning ● I reflect on opportunities for STEM learning ● I can reflect on my current knowledge and comfort with STEM	**Identify**	● **Prior to Class:** PDF *Scientific and Engineering Practices in K-12 Classrooms* (1 – 6) ● Course description, success criteria, agreements, schedule ● What is STEM?
		Apply	● In Class: Marshmallow Challenge
		Reflect	● What is STEM? How do I feel about STEM?
Week 2 9/7	●	**Identify**	● **Prior to Class:** Chapter 1 *A Model for Application of Arts-STEM in Early Childhood Education* ● **Prior to Class:** PDF *Smarter Charts Introduction* ● **In Class:** NSTA Position Statement, Making, Tinkering, and Engineering
		Apply	● **In Class**: Saving Sam Challenge ● **In Class**: Anchor Chart NGSS SEP Practices
		Reflect	● How are the Big Ideas put forth by the NSTA position statement present in our design challenge? What are other opportunities for extended learning?
Week 3 9/14	●	**Identify**	● **Prior to Class:** Chapter 2 *Creativity: The Propeller for Arts-STEM* ● **Prior to Class:** PDF *To Pin or Not to Pin? Choosing, Using, and Sharing High-Quality STEM Resources*
		Apply	● **In Class**: Evaluating to Sink and Float
		Reflect	● What does it mean to be a flexible thinker? ● What lesson plan elements indicate a quality STEM learning experience
Week 4 9/21	●	**Identify**	● **Prior to Class:** Chapter 3 *Building a Creative Ecosystem in the Classroom*
		Apply	● **In Class**:
		Reflect	●

Week 5 9/28	•	**Identify**	• **Prior to Class:** Chapter 4 *Creative Movement and Drama: Their Importance for Math and STEM*
		Apply	• **In Class:**
		Reflect	• **Due Today: To Pin or Not to Pin**
Week 6 10/5	•	**Identify**	• **Prior to Class:** Chapter 5 *Collaborative Interaction with Art Media Using 21st Century Skills*
		Apply	• **Due Today: STEM Lesson Plan 1 Implementation**
		Reflect	•
Week 7 10/12	•	**Identify**	• **Prior to Class:** Chapter 6 *The Elements of Art and the Principles of Design: Their Importance to STEM*
		Apply	• **In Class:**
		Reflect	• **Due Today Online: STEM Lesson Plan 1 Reflection**
Week 8 10/19	**Alternative Class Format** **MFPE/MTAEYC Conference** **Take time to prepare/launch Integrated STEM center**	**Identify**	• **Prior to Class:** Chapter 7 *Music: A Catalyst for Math and the Science of Sound*
		Apply	•
		Reflect	• **Due Today Online: Integrated STEM Center Plan**
Week 9 10/26		**Identify**	• **Prior to Class:** Be prepared lead and share your music and math learning opportunity • **Prior to Class:** Documentation Displays
		Apply	•
		Reflect	•
Week 10 11/2		**Identify**	• **Prior to Class:** *Conclusion: Collaboration for Creativity – A Plan of Action for Arts-STEM*
		Apply	• **Due in Class:**
		Reflect	
Week 11 11/9		**Identify**	• **Prior to Class:**
		Apply	• **Due in Class:**
		Reflect	•

<table>
<tr><td rowspan="3">Week 12
11/16</td><td rowspan="3">Alternative Class Format
NAEYC ANNUAL CONFERENCE</td><td>Identify</td><td>●</td></tr>
<tr><td>Apply</td><td></td></tr>
<tr><td>Reflect</td><td></td></tr>
<tr><td>Week 13
11/23</td><td colspan="3"> 
No Class Today, Enjoy Your Holiday!
Due Online: STEM Lesson Plan 2 Reflection</td></tr>
<tr><td rowspan="3">Week 14
11/30</td><td rowspan="3"></td><td>Identify</td><td>●</td></tr>
<tr><td>Apply</td><td></td></tr>
<tr><td>Reflect</td><td>● Due Today Online: Integrated STEM Classroom Center Reflection</td></tr>
<tr><td rowspan="3">Week 15
12/7</td><td rowspan="3"></td><td>Identify</td><td></td></tr>
<tr><td>Apply</td><td>● Due Today: Making STEM Visible Learning Display
Hosted Event: STEM Family Learning Opportunity Thursday December 8th</td></tr>
<tr><td>Reflect</td><td></td></tr>
<tr><td colspan="4">Finals Week: Due Online, Monday December 12th NLT Midnight: Family Learning Opportunity Reflection</td></tr>
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