

# KSU Distinguished Course Repository

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## Critical Reflections in STEM Education

Jessica R. Stephenson Reaves  
*Kennesaw State University*, [jstep198@kennesaw.edu](mailto:jstep198@kennesaw.edu)

Anna Maria Arias  
*Kennesaw State University*, [aarias5@kennesaw.edu](mailto:aarias5@kennesaw.edu)

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**KENNESAW STATE**  
UNIVERSITY

ECE 7603: CRITICAL REFLECTIONS IN STEM EDUCATION  
SPRING SEMESTER 2023  
SYLLABUS

FACULTY AND COURSE INFORMATION

INSTRUCTOR:

Dr. Name, Title

Department of Elementary and Early Childhood Education

INSTRUCTOR CONTACT INFORMATION:

Office: XXXX

Office Phone: XXX.XXX.XXXX

Email: [netid@kennesaw.edu](mailto:netid@kennesaw.edu)

CLASS LOCATION:

[Online \(D2L\)](#)

CLASS MEETING TIMES:

There are no official meeting times for this class.

COURSE WEBSITE:

[Online \(D2L\)](#)

COURSE COMMUNICATIONS:

**Please use my faculty ([netid@kennesaw.edu](mailto:netid@kennesaw.edu)) as my primary contact. Emails will receive a reply within 48 hours, except on weekends. If you use D2L email system to contact me, you can expect a response time of up to five days.** Office hours will be held virtually by appointment only.

ELECTRONIC COMMUNICATIONS:

The University provides all KSU students with an “official” email account with the address “@students.kennesaw.edu”. As a result of federal laws protecting educational information and other data, **this is the sole email account you should use to communicate with your instructor or other University officials and the account by which they will communicate with you.**

STUDENT SAFETY STATEMENT:

In case of an emergency, please call the Kennesaw State University (KSU) police at 470.578.6666 or use the LiveSafe app. LiveSafe is a free app that is user-friendly and can be used to submit emergencies, safety issues, or general questions straight to KSU Police in real-time. The Office of Emergency Management (OEM) offers free training to faculty, staff, and students year-round. For more information, go to the [OEM website](#) or email the OEM at [oem@kennesaw.edu](mailto:oem@kennesaw.edu). You can also follow OEM on Twitter ([@ksuoem](#)) and Facebook ([@kennesawstateOEM](#)) for up-to-date information on campus closures, delays, and other important information.

#### REQUIRED TEXTS OR TECHNOLOGY RESOURCES:

Georgia State Education Department (2021). *Georgia Standards of Excellence*.  
<https://www.georgiastandards.org/Georgia-Standards>

National Academy of Engineering and National Research Council. 2014. *STEM Integration in K-12 Education: Status, Prospects, and an Agenda for Research*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18612>.

National Academies of Sciences, Engineering, and Medicine. 2018. *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25182>.

National Research Council. 2012. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13165>.

Additional readings provided to you within the course modules on D2L. A list of the additional readings can be found at the end of this syllabus.

#### [Chalk & Wire](#)

#### RECOMMENDED RESOURCES:

American Psychological Association. (2020). *Publication manual of the American Psychological Association*. Washington, DC: American Psychological Association.

Membership in professional organizations, such as the American Educational Research Association, Mid-South Educational Research Association, and the Georgia Educational Research Association. Student rates are available.

#### COURSE DESCRIPTION, CREDIT HOURS, AND PREREQUISITES

*Credit Hours: 3-0-3*

*Prerequisite: ECE 7602*

The purpose of this course is to foster abilities to teach, assess, and critically reflect on STEM learning that supports authentic engagement in interdisciplinary design and inquiry. Students will engage in

making connections to STEM research literature with learning and teaching practice. Field placement in a K-5 learning environment is required for this course, which is typically fulfilled through a candidate's full time teaching position. Other arrangements are permitted but not provided. This placement is the responsibility of the candidate.

## COURSE OBJECTIVES

Course Objective	Class Assignment and Assessment	PSC STEM endorsement
1. Design, refine, and implement a STEM unit that integrates multiple disciplines, supports authentic team projects, and engages local STEM experts.	<b>Refinement of unit plan, Critical friends presentations and reflection</b>	<b>4i-x, 5iii, 3ii, 3iii</b>
2. Analyze teaching practice and student work for evidence of integration of disciplinary practices and support for student reasoning and student-lead design/inquiry.	<b>Critical friends presentations and reflection; final project</b>	<b>4i-x</b>
3. Analyze and reflect on their own teaching critically to consider use of equitable teaching practice and growth as STEM leader.	<b>Critical friends presentations and reflection; discussion posts</b>	<b>1iv, 4i-x, 2iii</b>
4. Discuss and synthesize recent research on STEM education and leadership in STEM.	<b>Discussion posts, Final project</b>	<b>2i, 2ii, 2iii</b>
5. Create a presentation or publication for other teachers based on synthesis of STEM learning research, engagement with local STEM experts, and experience in teaching a STEM unit.	<b>Final project</b>	<b>5iii, 3ii, 3iii</b>

## GENERAL COURSE EXPECTATIONS & REQUIREMENTS

### GENERAL EXPECTATIONS:

This online course requires active participation in professional learning communities, discussion, and other design work in order to support your learning and the learning of others. For support with how to engage in online learning, please see these [KSU online learning resources](#). Assignments are due by 11:59 p.m. on the due date listed. 10% will be deducted for each day late unless arrangements are made with the instructor.

## REQUIREMENTS FOR STUDENTS CONDUCTING RESEARCH:

Student-researchers who conduct projects involving human subjects at variance from or extending beyond a class assignment must consult with their faculty advisor or instructor about securing KSU Institutional Review Board (IRB) approval. Research involving human subjects cannot be conducted without supervision by a faculty advisor and IRB approval and oversight. Moreover, student-researchers must contact any IRB-type organization available in their research setting for approval and oversight. Additionally, student-researchers will be required to complete human subjects ethics training through an online training program before any research activity is allowed to begin in the research setting. Collaborative Institutional Training Initiative (CITI) provides the official certification program for KSU-affiliated personnel and students.

For those in education, it is important to remember that every school district or local education agency has a federally mandated requirement for review of IRB applications for conducting research in public schools. It is up to each student-researcher to learn the appropriate IRB procedures that need to be followed in the research setting. More specifically, student-researchers are required to complete any needed IRB forms, follow accepted policies, and gain approval in writing, consistent with the guidelines set by their research setting, prior to beginning any assigned research project. For more information, visit [KSU's IRB website](#).

## COURSE CONTENT:

- Designing integrated STEM lessons and units
- Incorporating community resources in STEM units
- Supporting groupwork in STEM
- Analyzing assessments in STEM
- Reflecting on equitable teaching practices
- Finding and connecting to research in STEM

## FINAL EXAM:

There is no formal final exam for this course.

## OTHER REQUIREMENTS:

All written work should reflect careful organization of material and the high standards of investigation associated with graduate-level studies. **All work is submitted digitally, using Microsoft Word or its equivalent, and saved as either .doc or .docx files. Please do not submit PDFs, as it is difficult to provide thorough feedback on these documents.** All formal written work should be submitted following APA (7<sup>th</sup> ed.) guidelines. Manuscripts must be proofread to ensure accuracy in spelling, punctuation, and grammar.

## DISCLAIMER:

This syllabus is subject to change as the need arises. These changes should be expected and will be clearly communicated.

## COURSE STANDARDS AND COURSE OUTLINE

This course is part of the Educator Preparation Program (EPP) at Kennesaw State University that is guided by or accredited by the following organization and standards:

[Georgia Professional Standards Commission – Education Preparation Providers and Programs Rule](#)

[Georgia Professional Standards Commission – Program Area Rules](#)

[Georgia Professional Standards Commission – Ethics Standards](#)

[Interstate Teacher Assessment and Support Consortium \(InTASC\)](#)

[Candidate Assessment on Performance Standards \(CAPS\)](#)

[Association of Mathematic Teacher Educators](#)

[National Science Teachers Association -Association of Science Teacher Educators  
StandardsInternational Society for Technology in Education](#)

[International Technology and Engineering Educators Association](#)

**COURSE OBJECTIVES, MODULE OBJECTIVES, & ACTIVITIES:**

Course Objectives	Module Objectives	Discussion Board and Readings	Assignments
<b>Module 1: Introduction and STEM Unit Design (Weeks 1-4)</b>			
<p>Design, refine, and implement a STEM unit that integrates multiple disciplines, supports authentic team projects, and engages local STEM experts.</p>	<ul style="list-style-type: none"> <li>• Identify local resources for supporting your STEM unit including STEM businesses and family connections.</li> <li>• Write at least four lesson plans for your STEM unit.</li> <li>• Provide feedback on others’ STEM units.</li> <li>• Revise and refine your STEM unit.</li> </ul>	<ul style="list-style-type: none"> <li>• Using community resources in STEM discussion board: Learning in Places Collaborative. (2021).; Cloud, K., Bates, C., &amp; Moss-Redman, I. (2021); Tan, E., Barton, A. C., &amp; Schenkel, K. (2018).</li> <li>• Supporting students who are emergent bilinguals and students with (dis)abilities/disability in STEM lessons discussion board: Hoffman; Suh; and Zollman (2021). <u>Good Thinking Sending Learning Style Going Out of Style</u>;</li> </ul>	<ul style="list-style-type: none"> <li>• STEM community resources assignment</li> <li>• Lesson plan assignment</li> <li>• Feedback on other’s assignment and PLC meeting</li> <li>• Final Unit Plan submission.</li> </ul>
<b>Module 2: Groupwork in STEM (Weeks 5-6)</b>			
<p>Analyze teaching practice and student work for evidence of integration of disciplinary practices and support for student reasoning and student-lead design/inquiry.</p>	<ul style="list-style-type: none"> <li>• Identify research articles related to a topic of interest in STEM</li> <li>• Summarize a set of research articles on a related topic in STEM</li> <li>• Discuss and analyze STEM teaching and learning within a professional learning community</li> <li>• Discuss how to support group projects within STEM.</li> </ul>	<ul style="list-style-type: none"> <li>• Supporting groupwork in elementary teaching discussion board: For students: Herrenkohl (2006); Carlone, H., &amp; Smithenry, D. (2014).; Edwards (2003) AND as Teachers: Harris, E., &amp; Rosenman, A. (2017)</li> </ul>	<ul style="list-style-type: none"> <li>• Identify topic and potential articles of interest around STEM learning and teaching for culminating project</li> <li>• Brief summary of 2-3 articles on topics of interest and connections to work in your classroom</li> </ul>

Course Objectives	Module Objectives	Discussion Board and Readings	Assignments
			<ul style="list-style-type: none"> <li>• PLC meeting 2 on teaching STEM unit</li> </ul>
<b>Module 3: Discourse and Argumentation in STEM (Weeks 7-8)</b>			
<p>Analyze and reflect on their own teaching critically to consider use of equitable teaching practice and growth as STEM leader.</p>	<ul style="list-style-type: none"> <li>• Reflect on STEM teaching using CRIOP.</li> <li>• Summarize a set of research articles on a related topic in STEM</li> <li>• Discuss how to support discourse and argumentation in your classroom</li> </ul>	<ul style="list-style-type: none"> <li>• Discourse, Reasoning, Argumentation in STEM: Michaels &amp; O'Connor (2012); Grapin, Haas, Goggins, Llosa, &amp; Lee (2019); Brooks, L. A., &amp; Dixon, J. K. (2013).</li> </ul>	<ul style="list-style-type: none"> <li>• Reflection on STEM teaching 1 due</li> <li>• Brief summary of 2-3 articles on topics of interest and connections to work in your classroom</li> <li>• Proposal of product for final project</li> </ul>
<b>Module 4: Using Assessments to Inform and Improve Instruction (Weeks 9-10)</b>			
<p>Analyze teaching practice and student work for evidence of integration of disciplinary practices and support for student reasoning and student-lead design/inquiry.</p>	<ul style="list-style-type: none"> <li>• Collect student work from unit assessment plan</li> <li>• Reflect on assessment plan alignment and student learning</li> </ul>	<ul style="list-style-type: none"> <li>• Assessments to inform and improve instruction: National Academies of Sciences, Engineering, and Medicine (2017); Keeley (2016);</li> </ul>	<ul style="list-style-type: none"> <li>• Analyses of student work assignment</li> <li>• PLC meeting 3 on teaching practice and student work</li> </ul>
<b>Module 5: Synthesizing our learning (Weeks 11-12)</b>			
<p>Discuss and synthesize recent research on STEM education and leadership in STEM.</p>	<ul style="list-style-type: none"> <li>• Reflect on your STEM teaching using CRIOP.</li> <li>• Synthesize research articles on STEM education.</li> </ul>	<ul style="list-style-type: none"> <li>• STEM teaching and learning (student choice of readings)</li> </ul>	<ul style="list-style-type: none"> <li>• Reflection on STEM teaching 2</li> <li>• Draft of literature for final project</li> </ul>
<b>Module 6: Final Project (Weeks 13-16)</b>			



<b>Course Objectives</b>	<b>Module Objectives</b>	<b>Discussion Board and Readings</b>	<b>Assignments</b>
<p>Create a presentation or publication for other teachers based on synthesis of STEM learning research, engagement with local STEM experts, and experience in teaching a STEM unit.</p>	<ul style="list-style-type: none"> <li>• Create a presentation or publication for other teachers about STEM education.</li> <li>• Reflect growth as a STEM educator.</li> <li>• Provide feedback for others' on their STEM presentations.</li> </ul>	<ul style="list-style-type: none"> <li>• STEM teaching and learning (student choice of readings)</li> <li>• "What is STEM" Reflection</li> </ul>	<ul style="list-style-type: none"> <li>• Outline of final project</li> <li>• Draft of final project</li> <li>• Review of others' final project</li> <li>• Presentation of final project</li> </ul>

## EVALUATION & GRADING SCALE

Your grade in this course is determined based on a 100% scale. The grading scale is as follows:

- A > 89.99%
- B > 79.99%
- C > 69.99%
- D > 59.99%
- F = BELOW 49.99%

## ASSIGNMENTS/REQUIREMENTS

**NOTE: All requirements for assignments will be explicated within modules and assignment guides.**

### **1. Unit Plan Completion and Feedback (20%)**

Using your unit plan from the previous course, you'll complete the daily lessons within your unit plan, to create a cohesive unit aligned with relevant STEM standards. This unit should include at least four individual lesson plans. Utilizing your critical friends group, you'll share your completed unit plan and receive feedback from your group. This assignment includes the planning of your unit, sharing of the unit (standards, lessons, assessment plan), and providing feedback to the members of your group. After receiving feedback, you will have an opportunity to make edits, additions, and other changes before teaching your unit in your placement.

*Due: Module 1*

### **2. Professional Learning Community Meetings and Reflections (20%)**

Throughout the semester, you will engage in a set of professional learning community meetings about implementing a STEM unit in your classroom. With a small group of colleagues from the course, you will have opportunities to reflect on the designing, teaching, and assessment of STEM lessons. The meeting will have different foci around how to support student learning in equitable ways. You will then write reflections on these meetings and your teaching.

*Due: Modules 2-4*

### **3. Discussion Board Participation, Leadership, and STEM Reflection (20%)**

This is an online course designed for you to work at your own pace within the framework of learning modules. Discussion boards are "ongoing" during the time frame of a module, and for benefit to be truly gained, actual written discussions should take place. Participation in discussion should be thoughtful, moving beyond "I agree," "good job," or simple responses that serve to waste the readers' time. In other words, add to the discussion both in quality and in content. You will be expected to read a set of articles and other resources each week on a given topic. Working in groups, you will lead the discussion board for one week by developing meaningful reflection questions, replying to others' ideas, and writing a summary of the discussion. You will also write a post reflection about your learning from the three courses in the STEM endorsement.

*Due: Throughout Modules*

#### 4. Analyzing Student Learning (10%)

You will be reviewing artifacts from classroom data where you will consider the individual items on your assessment and their effectiveness in measuring student learning. You should consider at least two different assessments/points in the unit. Upon which items were your students most successful? Least successful? Reflect on reasons for the levels of performance on those items, including student prerequisite knowledge, instructional strategies, and item design. Explain how you would develop feedback provided to the students that addresses their individual strengths and needs relative to the objectives measured. Describe how you will support students to apply the feedback to guide improvement, either within the learning segment or at a later time.

*Due: Module 4*

#### 5. Culminating STEM Project and Literature (30%)

The culminating project is an opportunity for you to design a way to share your learning with your community. You will use and share your experiences designing, teaching, & assessing your unit, connection to STEM businesses, and research in STEM teaching and learning. You have several options for how to share your learning such as a mini-professional development session for your school or designing a presentation for teacher conference. The project will include a literature review of your topic based on a set of research articles that you have located. Your project will also include how you think about engaging students in STEM and how you consider issues of equity in STEM teaching.

*Due: Module 6*

<b>ASSIGNMENT</b>	<b>POINTS/PERCENTAGE</b>	<b>DUE DATE</b>
Unit Plan with Lessons	20%	Module 1
Professional Learning Community Meetings and Reflections	20%	Modules 2-4
Discussion Board Participation, Leadership, and Final STEM reflection	20%	Throughout
Analyzing Student Learning	10%	Module 4
Culminating STEM Project and Literature Review	30%	Module 6

## COURSE POLICIES

### ATTENDANCE POLICY:

**Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal.**

#### MAKE-UP AND LATE WORK POLICY:

Late work will receive a 10% deduction per day late. Students should consult with the instructor directly about make-up work.

#### QUIZ/EXAM POLICY:

There are no quizzes in this course. There are no exams in this course.

#### COURSE TECHNOLOGY:

Students should possess basic computer (literacy) skills and must have access to both a laptop/desktop and the Internet. University Information Technology Services (UITs) provides students, faculty, and staff with the technology support, training, and services necessary for academic collaboration, research, and innovation. Students can receive technical support from UITs by calling 470.578.3555 or emailing [studenthelpdesk@kennesaw.edu](mailto:studenthelpdesk@kennesaw.edu). Additionally, students in need of technical support can submit an online [Service Request Form](#). For more information, go to the [UITs website](#).

This course will require students to use several educational technologies, including technologies that exist outside of the learning management system. Below is a list of common educational technologies, as well as links to the accessibility & privacy statements for these technologies:

- Adobe (Acrobat Reader) [[Accessibility](#) | [Privacy](#)]
- Chalk & Wire [[Accessibility](#) | [Privacy](#)]
- Desire2Learn (D2L) [[Accessibility](#) | [Privacy](#)]
- Google & YouTube [[Accessibility](#) | [Privacy](#)]
- Microsoft (Office Suite Products) [[Accessibility](#) | [Privacy](#)]
- VoiceThread [[Accessibility](#) | [Privacy](#)]

Prior to logging in to D2L, students should perform a browser check using [USG's BrightSpace Browser Checker](#) to determine if the browser being used is compatible with D2L.

#### FEEDBACK/REPLIES IN A TIMELY MANNER:

Emails and phone calls will be returned within 48 hours, except on weekends. With small assignments, feedback and grades will be made available to students within 14 days of submission, not including weekends. For more substantial assignments, students may expect their grades within three weeks. Should a delay in grading occur, you will be notified via email.

#### COURSE WITHDRAWAL:

The Drop/Add period ends on Month XX at time. The last day to withdraw without academic penalty is Month XX.

#### ACADEMIC INTEGRITY:

Every KSU student is responsible for upholding all provisions of the [KSU Student Code of Conduct](#), as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct

addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.

#### ACCESSIBILITY:

Students with qualifying disabilities under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act who require "reasonable accommodation(s)" to complete the course may request those from Student Disability Services (SDS). Students requiring such accommodations are required to work with SDS rather than engaging in this discussion with individual faculty members or academic departments. If, after reviewing the course syllabus, a student anticipates or should have anticipated a need for accommodation, the student must submit documentation requesting an accommodation and permitting time for a determination prior to submitting assignments or taking course quizzes or exams. Students may not request retroactive accommodation for needs that were or should have been foreseeable. Students should contact the office as soon as possible in the term for which they are seeking accommodations. For more information, go to the [SDS website](#) or call 470.578.2666 for the Kennesaw campus office or 470.578.9111 for the Marietta campus office.

#### FEDERAL, BOR, & KSU POLICY STATEMENTS:

The following Federal, BOR, and KSU Policy Statements are located on the [Academic Affairs website](#). Additionally, should students need additional resources regarding syllabus policies and statements, students may visit the [KSU Student Resources for Course Syllabus website](#), which is maintained by the Office of the Provost. Students are solely responsible for knowing the information outlined in the Federal, BOR, and KSU Student Policies, including:

1. KSU Academic Integrity Statement
2. KSU Disruption of Campus Life Policy
3. KSU Web Accessibility Policy Statement
4. KSU Reasonable Accommodations Policy
5. KSU Enrollment Management/Course Attendance Policy
6. KSU Military Withdrawals Policy
7. Copyright Law
8. Protecting Students' Privacy (FERPA)
9. KSU Sexual Misconduct Policy
10. KSU Course Withdrawal Policy
11. KSU Graduate Course Auditing Policy (Graduate Courses Only)
12. Academic Feedback
13. Netiquette: Communication Courtesy
14. Inclement Weather Policy

#### EDTPA INFORMATION AND EPP POLICY STATEMENTS:

Important information about edTPA and the EPP Policy Statements are located on the [Bagwell College of Education website](#). Students are solely responsible for knowing the information outlined in the EPP

Policy Statements, including:

1. Purpose and Rationale: Conceptual Framework
2. Knowledge Base
3. Use of Technology Statement
4. School-Based Activities Statement
5. EPP Diversity Statement
6. Campus Resources for Writing
7. Accessibility
8. Teacher Education Program Requirement: edTPA
9. edTPA Handbook/Materials Candidate Access

### ADDITIONAL READINGS:

Brooks, L. A., & Dixon, J. K. (2013). Changing the Rules to Increase Discourse. *Teaching Children Mathematics*, 20(2), 84–89. <https://doi.org/10.5951/teacchilmath.20.2.0084>

Burke, C., & Lazarowicz, A. (2021). Building picnic tables... And community: Engineering design principles help students improve a local park while learning about the forces in structures. *Science & Children*, 58(4), 36–40.

Bush, S. B., Karp, K. S., Lentz, T., & Nadler, J. (2014). Community partnerships: Pathways to meaningful mathematics. *Teaching Children Mathematics*, 21(3), 170-176.

Bybee, R. W. (2013). *The case for STEM education: Challenges and opportunities*. Arlington, VA: NSTA Press

Bybee, R. W. (2018). *STEM Education Now More Than Ever*. NSTA.

Cady, J. A., Hodges, T. E., & Brown, C. L. (2010). Supporting language learners. *Teaching Children Mathematics*, 16(8), 476–483.

Capobianco, B.M. & Joyal, H. (2008). Action Research Meets Engineering Design. *Science and Children*, 45(8), 22–26.

Carlone, H., & Smithenry, D. (2014). Methods & Strategies: Creating a “We” Culture: Strategies to Ensure All Students Connect with Science. *Science and Children*, 52(3), 66–71.

Counsell, S., Palmer, M., & Peat, F. (2020, July 1). Shape, Bake, and Grow! Taking to the outdoors in urban settings encourages plant knowledge and healthy lifestyles. *Science and Children*, 57(9), 47.

Cloud, K., Bates, C., & Moss-Redman, I. (2021). Inclusion of Native Culture During Science Instruction: Community resources come together to help teach science lessons. *Science & Children*, 58(4), 24–30.

Dalvi, T., & Wendell, K. (2015). Community-Based Engineering. *Science & Children*, 53(1), 67–73.

- Fisher, D., Frey, N., & Rothenberg, C. (2008). *Content-Area Conversation: How to Plan Discussion-based Lessons for Diverse Language Learners*. ASCD book.
- Harris, E., & Rosenman, A. (2017). Discussing Science in Professional Learning Communities. *Science & Children, 55*(1), 53–57.
- Hayes, M., Smith, P. S., & Midden, W. R. (2020, July 1). Students as Citizen Scientists: It’s Elementary: Principles for effective school-based citizen science. *Science and Children, 57*(9), 60.
- Hoffman, L., Suh, E., & Zollman, A. (2021). What STEM Teachers Need to Know and Do to Engage Families of Emergent Multilingual Students (English Language Learners). *Journal of STEM Teacher Education, 56*(1), 2.
- Kilic, H., Cross, D. I., Ersoz, F. A., Mewborn, D. S., Swanagan, D., & Kim, J. (2010). Techniques for small-group Discourse. *Teaching Children Mathematics, 16*(6), 350–357.
- Keeley, P. (2015). *Science formative assessment, volume 1: 75 practical strategies for linking assessment, instruction, and learning*. Corwin Press.
- Learning in Places Collaborative. (2021). Family and Community Framework for Engagement and Collaboration. Bothell, Seattle, WA & Evanston, IL: Learning in Places.
- McConnell, T. J., Parker, J., & Eberhardt, J. (2017). *Problem-Based Learning in the Earth and Space Science Classroom, K-12*. NSTA Press.
- National Academies of Sciences, Engineering, and Medicine. 2018. *English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25182>.
- National Academies of Sciences, Engineering, and Medicine. 2017. *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/23548>.
- National Research Council. 2000. *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/9853>.
- Rice, N Pappamihel, & Lake, V. (2004). Lesson Adaptations and Accommodations: Working with Native Speakers and ELLS. *Childhood Education, 80* (3), pp. 121-127.
- Sloan, W.M. (2016). Planning for great group work. *Education Update 58* (6).
- Tan, E., Barton, A. C., & Schenkel, K. (2018). Equity and the Maker Movement: Integrating children’s communities and social networks into making. *Science & Children, 55*(7), 76–81.
- Wan, Z. H., Jiang, Y., & Zhan, Y. (2020). STEM Education in Early Childhood: A Review of Empirical Studies. *Early Education and Development, 1-23*.

## ADDITIONAL RESOURCES:

### Websites:

[Building STEM Education on a Sound Mathematical Foundation NCTM Position Statement](#)

[Classroom Resources from NSTA](#)

[English Language Learners in STEM](#)

[STEM Teaching Tools](#)

**Journals for Research Articles:**

[Mathematics Teacher: Learning and Teaching PK-12](#)

[Journal of Engineering Education](#)

[Journal of Research in Science Teaching](#)

[Journal of STEM Education](#)

[Science and Children](#)



## GRADUATE PROGRAMS POLICIES ADDENDUM

### ACADEMIC WRITING:

In many Bagwell College of Education (BCOE) graduate programs, students are required to use the American Psychological Association (APA) in-text citation, reference, and format style. Students may find an overview of this style at the [Purdue Online Writing Lab \(OWL\)](#).

Additionally, graduate students must often cite research and scholarly writing in their academic writing in BCOE graduate programs. The Purdue OWL also offers [guidelines for quoting, paraphrasing, and summarizing sources](#). Inadvertent mistakes with source credit and citation may lead to charges of plagiarism. Students should refer to the discussion on [Cheating & Plagiarism on the Department of Student Conduct and Academic Integrity's website](#) for more information.

### CHALK & WIRE:

Chalk & Wire is an online program that allows users to create electronic portfolios. These portfolios can contain a wide variety of information and media, which can then be assessed by other users. All candidates admitted to teacher education will be required to purchase and use Chalk & Wire throughout their program.

Your professors will provide an overview of how Chalk & Wire will be used in your program, as well as offer initial training on how to use the Chalk & Wire system within your courses. You are encouraged NOT to purchase a Chalk and Wire account until you are specifically asked to do so within a course.

If you have any problems, visit [Bagwell College of Education's Chalk & Wire website](#) or send a detailed description of your issue to [chalkandwirehelp@kennesaw.edu](mailto:chalkandwirehelp@kennesaw.edu).

### CONTINUOUS ENROLLMENT POLICY:

Students enrolled in a graduate degree program must register for, at least, one course in, at least, one semester per academic year in order for the original program requirements for their degree to remain unchanged unless a Leave of Absence has been approved. All students who have registered, at least, once for courses titled thesis, dissertation, or project must be continuously enrolled every semester thereafter, including the semester of graduation. Students are not eligible to receive thesis, dissertation, or project guidance nor use campus resources during any term for which they are not registered. Graduate students must be registered for, at least, one semester hour in the semester they plan to graduate. Summer registration is not required unless summer is the graduation term. If a student has completed all degree requirements and will no longer require any of the campus resources or faculty time, the student may request an enrollment waiver. See the [Graduate Catalog](#) for more information.

### DOCTORAL FORMS AND RESOURCES:

For resources related to required doctoral forms, *BCOE Doctoral Policies and Procedures Handbook*, dissertation deadline dates, and other helpful resources for doctoral students, visit the [Doctoral Forms & Resources website](#).

### GRADUATE CATALOG:

All graduate students should keep apprised of all graduation requirements for the degree they are pursuing. Students have the responsibility to read the KSU Graduate Catalog and know the policies governing their programs. See the [Graduate Catalog](#) for current and archived catalogs.

#### GRADUATE COLLEGE RESOURCES:

For a list of helpful resources for graduate students, visit the [Graduate Orientation Resources website](#).

#### LEAVE OF ABSENCE:

A leave of absence provides a mechanism for graduate students experiencing unusual circumstances to be exempt temporarily from the continuous enrollment policy. A leave of absence requires approval of the Graduate Program Coordinator and The Graduate College. Review the [Leave of Absence Form](#) for additional information.

#### LIBRARY SERVICES:

The KSU Library System assists all students, faculty, and staff with their research needs, including using library databases, accessing books and other materials, and for specialized research needs. Librarians are available for in-person walk-up assistance at library help desks, one-on-one research appointments, and 24/7 via library chat. For more information on library locations, hours, and services, please visit the [KSU Library System website](#).

Additionally, each college at KSU has a designated graduate librarian to support the research needs of students, faculty, and staff. Dr. Olga Koz serves as the library liaison for graduate level programs in the BCOE. Dr. Koz may be contacted via email at [okoz@kennesaw.edu](mailto:okoz@kennesaw.edu). Alternatively, students can make an online or face-to-face appointment with Dr. Koz using the [Library Calendar appointment request form](#). Dr. Koz has also created the [KSU Education Library Portal](#) that provides information on library resources, tutorials, guides, and services for graduate students enrolled in BCOE programs.

#### PETITION TO GRADUATE:

Graduate students should submit a Petition to Graduate during the semester prior to the semester that they plan to graduate. Petition deadlines are firm and are posted on the [KSU Office of the Registrar's Graduation website](#). A Petition to Graduate is valid for two semesters: the semester for which the petition is submitted and the following one. Students who miss their deadline must complete an appeal form and submit it, along with supporting documentation, to the Registrar's Office. To obtain the appeal form, contact the Registrar's Office. For students who miss the petition to graduate deadline and are not granted an appeal by the Registrar's Office, the degree will still be awarded on time, but their commencement ceremony will be delayed until the next semester.

#### RESEARCH CONSORTIUM:

Graduate student who may require assistance with research projects may contact the Research Consortium. The Research Consortium is a faculty-driven organization intended to provide support to faculty and graduate students for research design, implementation, and data analysis. To request services, please speak with your faculty advisor and then request support using the [Research Consortium request form](#).