



Syllabus: Winter/Spring II 2024 : 3/4/24 - 4/27/24

**Course Information Course Title:** Methods of Integrated STEM Education

**Course Number:** EDCI 55800 | Online Asynchronous

**Course Credit Hour(s):** 3

**Prerequisite(s):** N/A

**Instructor(s) Contact Information:** Dr. Nathan Mentzer

**Phone:** 494-0298

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**Office Hours:** By appointment

**Course Description:** This methods course will focus on operationalizing the theoretical pedagogical approaches to integrated Science, Technology, Engineering and Mathematics (STEM) education. Students will collaboratively and cooperatively investigate, plan and deliver integrated learning experiences appropriate for secondary education. Course content will blend philosophical considerations with practical application.

**Learning Resources, Technology & Texts Required Resources:**

1. [Brightspace Course Website](#)
2. Burden, P. & Byrd, D. (2013). *Methods for Effective Teaching: Meeting the Needs for All Students, 6th edition*. Boston, MA: Pearson.

**Additional Course Readings** (Available in Course LMS and subject to change):

Berland, L. K., & Steingut, R. (2016). *Explaining variation in student efforts towards using math and science knowledge in engineering contexts. International Journal of Science Education, 38(18), 2742-2761.* 2

Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory Into Practice, 31(2), 132-141.*

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. Available online: [http://www.nap.edu/catalog.php?record\\_id=18612](http://www.nap.edu/catalog.php?record_id=18612)

National Academy of Engineering (2008) *Changing the conversation: messages for improving public understanding of engineering*. National Academies Press.

National Academy of Engineering (2009). *The Bridge linking engineering and society*, pp 5-10. Washington, DC.

National Council of Teachers of Mathematics (2000). *Executive Summary: Principles and Standards for School Mathematics*. Reston, VA.



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National Research Council. (2009). *Engineering in K-12 education: Understanding the status and improving the prospects*. Washington, DC: National Academies Press.

National Research Council. (2011). *Report Brief: A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.

**Learning Outcomes At the end of this course, students should be able to:**

1. Engage in instructional conversations, collaboratively share instructional resources, and develop a sense of community for integrated STEM learning and teaching.
2. Contextualize STEM learning in authentic contexts.
3. Explain and apply socially and culturally relevant pedagogy in the context of STEM learning.
4. Discuss levels and types of integrated STEM content, pedagogy, and ways of knowing.
5. Develop and disseminate integrated STEM learning experiences.
6. Implement, assess and reflect on integrated STEM learning experiences.
7. Articulate a framework that explains integrated STEM education.
8. Adapt existing singular discipline curriculum resources to leverage connections across disciplines to facilitate integration.

**Assignments:** Specific assignment deadlines and evaluation criteria are located in the course Learning Management System (LMS). In addition to the following assignments, students are required to read assigned articles each week as scheduled in the course LMS. There will be three reading reflection quizzes on readings throughout the semester. Throughout the course, you will complete individual assignments and activities, discussion boards, and small group assignments. Details on these assignments, along with rubrics to guide evaluation, and guidelines on discussion participation and evaluation are posted in the LMS.

Late work will not be accepted for full credit unless there is an emergency and you have received instructor permission in writing as early as possible. Assignments will receive a 10% deduction for each business day the assignment is late. All deliverables for this course are steppingstones in a progression to build a sense of academic community and facilitate feedback in the development of the Integrated STEM unit (culminating experience for this course). As such, missing an assignment or turning it in late prevents you from getting feedback and disrupts the development of your project. With only a few exceptions, such as replies to discussion posts, all work in this course can be started early. So, if you need extra time or you anticipate having less time available during a week of the course, you are encouraged to work ahead. If you choose to work ahead, please work in a linear sequence through the assignments as they build sequentially on each other and let the instructor know you would appreciate feedback early.

The following table is summary of the key course assignments:

Points	Assignments
50	Nature of STEM Disciplines
50	Classroom Management Observation
50	Integrated STEM Observation
80	Lesson 1 Delivery
30	Lesson 1 Delivery Reflection
20	Lesson 1 Delivery Peer Evaluation
100	Lesson 2 Delivery
40	Lesson 2 Delivery Reflection
20	Lesson 2 Delivery Peer Evaluation
100	Lesson 3 Delivery
40	Lesson 3 Delivery Reflection
20	Lesson 3 Delivery Peer Evaluation
90	Lesson 4 Delivery
40	Lesson 4 Delivery Reflection
40	Lesson 4 Assessment Commentary
100	Final Paper
30	3 Reading Reflections
100	Participation
<b>1000</b>	<b>Total</b>

**Grading Scale:** In this class, grades reflect the sum of your achievement of learning outcomes throughout the semester. You will accumulate points as described in the assignments portion above, with each assignment graded according to a rubric. In this percentage-based system, rounding and decimals become important. At the end of the semester, final grades will be calculated by translating your percentage of points earned out of 1000 points into a letter grade. The following table is a summary of the grading scale:

Start %	Letter	GPA
92.5	A	4
89.5	A-	3.7
86.5	B+	3.3
82.5	B	3
79.5	B-	2.7
76.5	C+	2.3
72.5	C	2
69.5	C-	1.7
66.5	D+	1.3
62.5	D	1
59.5	D-	0.7
0	F	0



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**Attendance Policy:** Students are expected to complete the modules, and complete the course assignments. Students are responsible for material covered in modules, as well as material that is assigned via Brightspace or other computer mediated delivery systems.

This course follows the [University Academic Regulations](#) regarding class attendance, which state that students are expected to be present for the classes in which they are enrolled. Participation will be taken at the end of each module and lateness in assignments will be noted. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification is not possible, contact me as soon as possible by email or phone. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Unless it falls under the University excused absence regulations (see below), any work due should be submitted on time via our course Brightspace.
2. If that day's class involves assessed work such as a test or presentation, you and I will plan if and how you can make up the work, following the assignment guidelines. This plan must be done before the next class period, so again, email me immediately when you know that you will miss class.
3. The most important consideration in any absence is how it will affect your achievement of the assignment objectives and the course learning outcomes.

For cases that fall under excused absence regulations, you or your representative should contact or go to the [Office of the Dean of Students \(ODOS\) website](#) to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS 5 for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so plan ahead.

**Conflicts with Religious Observances:** The University values a community with diverse backgrounds and traditions and recognizes that conflicts between regularly scheduled curricular activities and religious observances of some members of our community can arise. Students requesting special consideration in scheduling are encouraged to make this known to instructors as far in advance as possible, minimize the length of the absence, and be flexible in arranging alternative times to complete any assignments they might miss.

**Grief Absence Policy for Students (GAPS):** If you experience the death of a family member or close friend, notify the Office of the Dean of Students at 765-494-1747. Given proper documentation, the instructors will excuse the student from class and provide the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments.

**Military Absence Policy for Students (MAPS):** If you are required to complete mandatory military service, notify the Office of the Dean of Students (ODOS) at 765-494-1747 to request that a notice of the leave be sent to instructors.



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**Academic Integrity Purdue Honors Pledge:** “As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breeches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu) or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

You are expected to do your own work. You need to properly cite ideas that are not your own, following APA format. Work in this course is to be original work and not an assignment that was completed for another class or project. Furthermore, you are expected to do high quality work and submit your assignment on the dates they are due. You are expected to prepare for each class session by reading all assigned resources and fully participating in class discussions. The quality and quantity of comments will be used to determine participation grades.

**Academic Dishonesty Statement:** “Purdue prohibits ‘dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.’ (Part 5, Section III-B-2-a University Regulations). Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly and indirectly, other parties in committing dishonest acts is in itself dishonest’ (University Senate Document 72-18. Dec.15, 1972).”

**Copyright Statement:** See the University Policies and Statements section of Brightspace for guidance on Use of Copyrighted Materials. Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university’s right to use those works for educational purposes. Students may not copy, reproduce, or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

**Course Evaluation Statement:** During the last two weeks of the semester, you will be provided with an opportunity to evaluate this course and your instructors. Purdue now uses an online course evaluation system. Near the end of classes, you will receive an official e-mail from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University.

**Nondiscrimination Statement:** Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the



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institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue's full [Nondiscrimination Policy Statement](#) is included in our course Brightspace under University Policies and Statements.

**Accessibility Statement:** "Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone at 765-494-1247." Students may present a "Letter of Accommodation" at any point in the semester.

**Mental Health/Wellness Statement:** If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 a.m.- 5 p.m.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services](#) (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

**Basic Needs Security:** Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday.