COURSE TITLE: **BUILDING A STEM CULTURE: A Roadmap for Success**

WA CLOCK HRS: **30**
OREGON PDUs: **30**
PENNSYLVANIA ACT 48: **30**

NO. OF CREDITS: **3 QUARTER CREDITS**
[semester equivalent = 2.00 credits]

INSTRUCTOR: **Lori Gibson**
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COURSE DESCRIPTION:
In an ever-evolving world, STEM (Science, Technology, Engineering, and Math) education is vital in preparing students for the future. This course is tailored for all educators, but especially those new to the world of STEM who may feel overwhelmed at the idea of one more thing! The good news is that you can incorporate authentic STEM learning into what you are already doing in your work with students. The author of the course text, Daily Stem: How to Create a STEM Culture in Your Classrooms & Communities, has developed effective and practical resources, including a podcast, a website, and a book to empower fellow educators for STEM teaching and authentic STEM learning for students. By the course's end, you will know how to encourage a STEM culture in your classroom by having the knowledge and practical skills needed to build your confidence and a roadmap forward so you can inspire and equip the next generation of innovators and problem-solvers.

This STEM course satisfies the OSPI requirement for recertification in Washington. It is appropriate for Pre-K through grade 12 teachers, administrators, support staff, and parents. You can customize your assignments to fit your circumstances.

LEARNING OUTCOMES: Upon completion of this course, participants will have:

- An understanding of the importance of STEM for students and developing a STEM culture in schools.
- Identified and described the four (4) steps for how to start building a STEM culture in the classroom/school.
- An understanding of the role of “making” as the action step of STEM and how to provide maker opportunities for students.
- An understanding of how literacy and other subjects can be intertwined in a STEM initiative for building STEM mindsets and skills.
- Discussed the value of expanding the understanding of what makes a job STEM and learn strategies for sparking interest in students for STEM careers.
- Identified and described the four (4) basic steps for building a STEM culture with students that includes quality and consistent parent engagement.

COURSE REQUIREMENTS:
Completion of all specified assignments is required for issuance of hours or credit. The Heritage Institute does not award partial credit.

The use of artificial intelligence is not permitted. Assignment responses found to be generated by AI will not be accepted.

HOURS EARNED:
Completing the basic assignments (Section A. Information Acquisition) for this course automatically earns participants their choice of CEUs (Continuing Education Units), Washington State Clock Hours, Oregon PDUs, or Pennsylvania ACT 48 Hours. The Heritage Institute offers CEUs and is an approved provider of Washington State Clock Hours, Oregon PDUs, and Pennsylvania ACT 48 Hours.

UNIVERSITY QUARTER CREDIT INFORMATION

REQUIREMENTS FOR UNIVERSITY QUARTER CREDIT
Continuing Education Quarter credits are awarded by Antioch University Seattle (AUS). AUS requires 75% or better for credit at the 400 level and 85% or better to issue credit at the 500 level. These criteria refer both to the amount and quality of work submitted.

1. Completion of Information Acquisition assignments 30%
2. Completion of Learning Application assignments 40%
3. Completion of Integration Paper assignment 30%

CREDIT/NO CREDIT (No Letter Grades or Numeric Equivalents on Transcripts)
Antioch University Seattle (AUS) Continuing Education Quarter credit is offered on a Credit/No Credit basis; neither letter grades nor numeric equivalents are on a transcript. 400 level credit is equal to a "C" or better, 500 level credit is equal to a "B" or better. This information is on the back of the transcript.

AUS Continuing Education quarter credits may or may not be accepted into degree programs. Prior to registering, determine with your district personnel, department head, or state education office the acceptability of these credits for your purpose.

ADDITIONAL COURSE INFORMATION

REQUIRED TEXT
Woods, Chris (2020). Daily Stem: How to Create a STEM Culture in Your Classrooms & Communities. Monee, IL: Code Breaker Inc. ISBN 978-1777225544 is available new and used from Amazon for approximately $23 plus shipping. It is also available from other booksellers.

None. All reading is online.

MATERIALS FEE
None

ASSIGNMENTS REQUIRED FOR HOURS OR UNIVERSITY QUARTER CREDIT

A. INFORMATION ACQUISITION
Assignments done in a course forum will show responses from all educators who have or are taking the course independently. Feel free to read and respond to others' comments.
Group participants can only view and respond to their group members in the Forum.

Assignment #1: INTRODUCING YOURSELF
Read the Introduction: STEM IS NOT A CLASS YOU TEACH and Chapter 1: STEM AND WHY IT'S IMPORTANT from the course text and introduce yourself with a 1-2 page statement that includes:

- Description of your current professional situation.
- What brings you the most joy, and what are your greatest challenges in your work?
- What outcomes do you hope to achieve in taking this course?
- What are some of your thoughts from this initial reading from the course text?

Assignment #2: STEM & HOW TO START
Read Chapter 2: STEM AND HOW TO START

- Write a 1-2 page summary that includes the following:
- Identify and describe the four steps on how to start building a STEM culture in your school.

Assignment #3: STEM & MAKING
Read Chapter 4: STEM AND MAKING
Write a 1-2 page summary that includes the following:

- Discuss the value of students engaging in maker opportunities as they are the “action step” of STEM.
- Describe at least two (2) classroom examples of how to engage students in maker opportunities that build their STEM mindsets.

Assignment #4: STEM, LITERACY & OTHER SUBJECTS
Read Chapter 5: STEM AND LITERACY and Chapter 6: STEM AND OTHER SUBJECTS
Write a 1-2 page summary that includes the following:

- Describe the value of connecting STEM with literacy and give at least two (2) examples from the text.
- Describe the idea that building a successful STEM culture requires being purposeful about connecting STEM learning to every subject and giving at least two (2) examples from the text.

Assignment #5: STEM, CAREERS & THE WORDS WE USE
Read Chapter 7: STEM & CAREERS and Chapter 8: STEM & THE WORDS WE USE, and please watch the short video in the bibliography, “The Future of Work: Will Our Children Be Prepared?”

Write a 1-2 page summary that includes the following:

- Describe the author’s expansive view of what makes a job or career “STEM.”
- Discuss the value of sparking interest in STEM careers to building a STEM culture.
- Describe how the words educators use can encourage or discourage a STEM mindset in their students and how that impact relates to their belief in themselves as they prepare for their future careers and lives.

Assignment #6: STEM, FAMILIES & COMMUNITY
Read Chapter 10: STEM, FAMILIES & COMMUNITY
Write a 1-2 page summary that includes the following:

- Describe the value of extending a school’s STEM culture into partnerships with families and the community.
- Identify and describe the four (4) basic steps for building a STEM culture that includes quality and consistent parent engagement.

For Hour participants: Go to Section C – The integration Paper for the additional assignment required for Hours.

ADDITIONAL ASSIGNMENTS REQUIRED FOR UNIVERSITY QUARTER CREDIT

B. LEARNING APPLICATION
In this section, you will apply your learning to your professional situation. This course assumes that most participants are classroom teachers who have access to students. If you do not have a classroom available to you, please contact the instructor for course modifications. Assignments done in a course forum will show responses from all educators who have or are taking the course independently. ?Feel free to read and respond to others' comments. Group participants can only view and respond to their group members in the Forum.

Assignment #7: SCHOOL WIDE CULTURE

Apply all of your learning from this course by responding to one (1) of the following options:

Option A)
There is great value in sharing your learning and discussing it with fellow colleagues. This is especially true when discussing issues around school-wide culture. The author wrote … "Creating a STEM culture in your school is a big challenge. It's not something that happens the moment the school board approves a STEM initiative, a STEM lab, or a STEM class…Every kid who gets to experience learning with a STEM
focus is going to be better prepared for the future… Their future."

Interview two colleagues and talk about their beliefs, perspectives, and experiences on the topic of STEM learning and building a sustainable classroom and school-wide STEM culture. To document the completion of this assignment, include the following:

- The date of the conversation(s)
- The role of the colleagues with whom you spoke (colleague, supervisor, friend, etc.)
- Why did you choose these two colleagues to interview
- A 4 – 5-page summary highlighting key insights from your conversation(s).

OR

Option B)
Another assignment of your own design, with the instructor's prior approval, is equivalent in rigor and length to Option A.

Assignment #8: LESSON PLAN
Complete one (1) of the following options:

Option A)
Adapt a lesson to reflect what you've learned in this course.

- Implement your lesson with students in your classroom.
- Write a 250-500 word commentary on what worked well and what could be improved.
- Include any student feedback on your lesson.
- Share what you've learned with other teachers taking our courses by also contributing your
- Lesson to The Heritage Institute Lesson Library here.
- Upload your lesson plan.

OR

Option B)
Use this option if you do not have a classroom available.

- Adapt a lesson to reflect what you've learned in this course. (Do not implement it.)
- Share what you've learned with other teachers taking our courses by contributing your Lesson to The Heritage Institute Lesson Library here. Sample Lesson Plan Template
- Write a 500+ word article about what you learned from this course.
- Please refer to the guidelines on our blog What Works: Teaching at its Best before writing your article.
- When you submit your article to your instructor, please also email a copy to Renee Leon, THI blog curator and media specialist. (renee@hol.edu)
- Indicate whether or not you are OK with having your article considered for publishing on our website.
- Submit your modified lesson along with your article via email to your instructor.

Assignment #9: (500 Level ONLY)
Complete the following:

Conduct additional reading of the literature of at least 200 pages total from at least two (2) sources from the bibliography, community-based resources, websites, or other sources with the instructors' prior approval. The purpose of this reading is to focus on one topic that you would like to investigate in-depth (e.g., how to create a STEM focus for family/school /community partnerships, how to develop opportunities for students to explore STEM careers, how to create a sustainable STEM culture community-wide). In a paper of at least 5 (five) pages, discuss in detail the information you have acquired and the impact it will have on your students/school.

AND

Create a presentation (PowerPoint, Google Slides) to share with your staff summarizing each section from this course's six (6) learning outcomes. Be sure to focus on practical strategies/resources for educators. When you submit your presentation, please include a 1-2 page paper including the date, description of the audience, and comments or feedback received, including changes you could make for

further presentations of the material.

C. INTEGRATION PAPER
Assignment #10: (Required for 400 and 500 Level)

SELF REFLECTION & INTEGRATION PAPER
(Please do not write this paper until you've completed all of your other assignments)

Write a 400-500 word Integration Paper answering these 5 questions:

1. What did you learn vs. what you expected to learn from this course?
2. What aspects of the course were most helpful and why?
3. What further knowledge and skills in this general area do you feel you need?
4. How, when and where will you use what you have learned?
5. How and with what other school or community members might you share what you learned?

INSTRUCTOR COMMENTS ON YOUR WORK:
Instructors will comment on each assignment. If you do not hear from the instructor within a few days of posting your assignment, please get in touch with them immediately.

QUALIFICATIONS FOR TEACHING THIS COURSE:
Lori Gibson, M.A., E.S.A., is a dedicated school counselor with a wealth of experience in the field of education. She holds a Master's degree in counseling psychology from Gonzaga University and a Bachelor of Arts degree in both education and psychology from Whitworth University. With a career spanning 31 years, Lori has contributed her expertise to various educational institutions, including North Chicago High School in Illinois, Lake Washington School District and Spokane Public Schools, both in Washington state. For the past 21 years, Lori has been an instructor at The Heritage Institute, where she is deeply passionate about empowering fellow educators to excel in their noble work within schools. In today's evolving educational landscape Lori understands the shift on many fronts - including the mandates to integrate technology, embrace neurodiversity, foster social and emotional growth and dig deep to understand the neurological basis for challenging behaviors. Lori recognizes that our students, pre-K to 12th grade face an array of challenges, from learning, social and emotional gaps due to the ripples of the pandemic, family stressors, poverty, the impact of social media and entitlement issues, among others. She firmly believes that educators must be equipped with the latest research and practical strategies to address these multifaceted needs effectively. In her courses, Lori's primary aim is to provide educators with respectful and encouraging guidance to navigate these challenges. Her courses and workshops are designed to empower teachers and administrators with the knowledge and tools necessary to create a supportive and inclusive environment that prioritizes the well-being and development of every student so they can be about the business of learning!

BIBLIOGRAPHY

BUILDING A STEM CULTURE: A Roadmap for Success

- Dziengel, Ana (2018). STEAM, Play & Learn 20 Fun Step-By-Step Preschool Projects About Science, Technology, Engineering, Art, And Math! Lake Forest, CA: Walter Forest Publishing. ISBN 978-1633225268. This is an early education resource as a way to simply expose children to open-ended projects that encourage problem-solving and creativity.
- Emdin, Christopher (2022). STEM, STEAM, MAKE, Dream: Reimaging the Culture of Science, Technology, Engineering, and Mathematics. Rexford, NY: Houghton Mifflin Harcourt. ISBN 978-1-328-03428-1. This is a must-read text for all educators K-12. The author reinvisions STEM culture and learning in a more accepting and accessible way. The goal of Dr. Emdin's work is to make sure that ALL students can grow their STEM identity and empower them for the skills and mindsets for successful futures.
- Hoffer, Wendy Ward (2016). Cultivating STEM Identities: Strengthening Student and Teacher Mindsets in Math and Science by Portsmouth, NH: Heinemann Publishing. ISBN 9780325078205. This text is especially geared toward educators who are overwhelmed at the thought of incorporating STEM into their classrooms. The author lays out specific mindsets and specific strategies for developing educator confidence and skills, so that their students will have bright STEM futures.
- Mukherjee, Sumita (2019). Women in STEM: Women Who Changed Science and the World Pioneers in Science, Technology, Engineering and Math. Independently published. ISBN 978-1095366653. This is an inspirational book about women scientists who made advancements in a STEM field and changed the world.
- Woods, Chris (2020). Daily STEM: How to Create a STEM Culture in Your Classrooms and Communities. Monee, IL: Code Breaker Inc. ISBN 978-1777225544. This is the course text. The author is an inspirational high school math teacher who has developed effective and practical resources including a podcast, a website, and a book to empower fellow educators for STEM teaching and authentic STEM learning for students. He states that his mission is simply to build educators' confidence, skills, and resources so that STEM is infused into their classrooms and schools for the benefit of all students. In addition: At the end of

each chapter there is a QR code to watch a short video by Chris for further enrichment.

WEBSITES AND VIDEOS:

Can Design Thinking Fix Education? – Imagine a Place
https://youtu.be/6LMwQkiUXnA

Design Thinking: A Problem Solving Framework
https://youtu.be/kfBa2AdjRB4

Empowering Students with Design Thinking
https://youtu.be/fuPWtw9ljk4

Failure is Knowledge, Knowledge is Success - TEDX Tim Gibson
https://youtu.be/pwnWFNoe7Pw

High Tech High – model school system/resources
https://www.hightechhigh.org/teachercenter/improvement-teams/growth-mindset-in-stem/

I don't do Math | Emily Calandrelli | TEDxOregonStateU
https://youtu.be/y44nqo11Fh0

Innovation Playlist: Failure and a Growth Mindset
https://youtu.be/G5YrL49RTCo

One Stone (high school and resources/digital opportunities for high school students)
https://onestone.org/stem-mindsets (scroll down to the STEM stories)

PBS KIDS DESIGN SQUAD GLOBAL
https://pbskids.org/designsquad/

President Obama on the Importance of STEM (2015)
https://youtu.be/5IljiPJQgSU

The Big List of STEM Board Games - Cali Wright, Mind Research Institute
https://blog.mindresearch.org/blog/stem-board-games

The Future of Work: Will Our Children Be Prepared?
https://youtu.be/59d3UZTUFQ0

The Mind Research Institute Stem Resources
https://www.mindresearch.org/stem-resources