

COURSE TITLE: MATHEMATICAL MINDSETS: Every Student Can Do Math

WA CLOCK HRS: 50

NO. OF CREDITS: 5 QUARTER CREDITS
[semester equivalent = 3.33 credits]

OREGON PDUs: 50

PENNSYLVANIA ACT 48: 50

INSTRUCTOR: Suzanne Warner
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COURSE DESCRIPTION:

Create a mathematics classroom atmosphere where students no longer fear math, no longer have anxiety about math, and no longer think they are simply just not good at math. Jo Boaler is a Stanford University professor with research-based and field-tested strategies whose book *Mathematical Mindsets* will help you create a math classroom where students experience mathematics through a positive growth mindset method. Videos and additional website readings will complement the *Mathematical Mindsets* book. Teachers will learn to create mathematical tasks, assessments, and feedback that encourage student growth, understanding, and joy as their students master mathematical ideas and concepts.

This course is appropriate for teachers K-12.

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

- An understanding of how the brain functions when students learn math, make mistakes, and struggle.
- The ability to create mathematical mindsets in their students.
- Learn how to create rich mathematical tasks.
- The knowledge to create heterogeneous groups that lend themselves to higher level mathematical thinking.
- Learn how to create assessments for a growth mindset.
- Strategies for creating a classroom based on positive growth mindset.

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%
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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

Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching by Jo Boaler and Carol Dweck is approximately \$11 at Amazon.com

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MATERIALS FEE

Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages & Innovative Teaching is approximately \$11 at Amazon.com

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: COURSE FORM: The Brain, Math Learning, and the Power of Mistakes and Struggles

- View Jo Boaler's TED Talk about math and surprising facts about learning.
- <https://www.youtube.com/embed/3icoSeGgQtY?autohide=1&controls=1&showinfo=0> Read the first two chapters of *Mathematical Mindsets*: Chapter 1: The Brain and Mathematics Learning and Chapter 2: The Power of Mistakes and Struggle.
- in 250-500 words introduce yourself, share your experiences teaching math, what you would like to achieve in this course and share your thoughts and reflections on Jo Boaler's TED Talk and the first two chapters, with commentary on how the brain learns and the powers of making mistakes and struggling in learning.

Feel free to respond to any other postings from educators who are also taking this course.

Assignment #2: COURSE FORUM: The Creativity and Beauty in Mathematics

- View Conrad Wolfram's (director of Wolfram-Alpha) talk *Stop Teaching Calculating, Start Learning Maths!*
 - <https://www.youtube.com/embed/xYONRn3EbYY?autohide=1&controls=1&showinfo=0> Read Chapter 3 in *Mathematical Mindsets*: The Creativity and Beauty in Mathematics.
 - In 250-500 words summarize both the video and the reading, sharing your thoughts and reflections. Consider the following questions in your response:
 - What is the difference between mathematics and calculating?
 - How have the skilled valued by the top Fortune 500 companies changed over time and how does this relate to the video and reading?
- Feel free to respond to any other postings from educators who are also taking this course.

Assignment #3: Creating Mathematical Mindsets: The Importance of Flexibility with Numbers

- Read Chapter 4: Creating Mathematical Mindsets: The Importance of Flexibility with Numbers in *Mathematical Mindsets*.
- Complete **the Review Questions**.
- In 1-2 paragraphs, identify what portions of this chapter most resonate with you, with focus on the topics of memorization of math facts, math practice, and math talks.

Assignment #4: COURSE FORUM: Rich Mathematical Tasks

- Read Chapter 5 in *Mathematical Mindsets*: Rich Mathematical Tasks.
- Read the following two articles on mathematically rich tasks:
 - <https://nrich.maths.org/6299>
 - <http://nrich.maths.org/5662>

In 250-500 words summarize the readings, as well as share your reflection and thoughts of how you may be able to design tasks that fit your classroom.

(Note: if you are taking this class for 400- or 500-level credit, you will have the opportunity to create tasks in Section B.)

Feel free to respond to any other postings from educators who are also taking this course.

Assignment #5: Mathematics and the Path to Equity

- Read Chapter 6: Mathematics and the Path to Equity
- Complete the Review Questions.
- In 1-2 paragraphs, summarize the reading with a reflection component of your own experiences as a math student and the topic of equity.

Assignment #6: COURSE FORUM: From Tracking to Growth Mindset Grouping

Read Chapter 7 in *Mathematical Mindsets*: From Tracking to Growth Mindset Grouping.

In 250-500 words summarize the reading with commentary on the following:

- How are students grouped in your classroom/school?
- Would it be possible to create groups with a growth mindset? Why or why not?

Feel free to respond to any other postings from educators who are also taking this course.

Assignment #7: COURSE FORUM: Assessment for a Growth Mindset

- Read Chapter 8 in *Mathematical Mindsets*: Assessment for a Growth Mindset.
- Watch the following videos on assessment for a growth mindset:
 - [Why do people get so anxious about math?](#)
 - [Assessment for Learning](#)
 - [Self- and Peer-Assessments](#)
- In 250-500 words summarize the reading and videos, as well as share your reflections and thoughts of how you may be able to design assessments that fit your classroom. (Note: if you are taking this class for 400- or 500-level credit, you will have the opportunity to create assessments in Section B.)

Feel free to respond to any other postings from educators who are also taking this course.

Assignment #8: Teaching Mathematics for a Growth Mindset

- Read Chapter 9: Teaching Mathematics for a Growth Mindset in *Mathematical Mindsets*
- Browse Stanford University's youcubed website: <https://www.youcubed.org/> You may want to look at the Students Tab to watch a video made for students or the Parent Tab to review resources for parents. Look through whatever areas are of most interest and use to you and your students.
- In 500 words (or more), write a culminating analysis of the readings - the book, websites, and videos - share what you learned and how you will use your new knowledge.

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 #9: Creating Mathematically Rich Tasks

Take a look at a number of mathematically rich tasks created by Shell Centre for Mathematical Education: http://www.educationaldesigner.org/ed/volume1/issue3/article9/pdf/burkhardt_09_fig3.pdf. You may also want to revisit Chapter 5 in *Mathematical Mindsets* as well, the section of designing mathematically rich tasks, pages 76-91.

In 500 words (or more), describe of the math lessons you currently teach, how you teach it, and student response. Then rewrite the [lesson](#) using one or more of the six suggestions from *Mathematical Mindsets*, thus creating a lesson that is designed for better learning and mathematical richness. **If possible, teach your newly created lesson, summarizing and reflecting on the experience for both you and your students. Submit your lesson along with samples of exemplary student work (via video, photos, scans of essays etc) and include any rubric used for assessment purposes. Once your lesson is done, upload it into [The Heritage Institute lesson library](#) following the correct methods to properly classify it.

**Note: If it is summer nad/or you simply do not have a current class to teach this lesson, then simply complete the first part of this assignment without the implementation component.

Assignment #10: Creating Mathematically Rich Assessments

In 500 words (or more), describe one or two math assessments you currently give your students, how you grade them, and student response. Then rewrite each of the assessments using one or more of the suggestions from *Mathematical Mindsets*, thus creating assessments that are designed for better learning and mathematical richness. **If possible, give one or more of your newly created assessments, summarizing and reflecting on the experience for both you and your students.

Note: You may also want to revisit Chapter 8 in *Mathematical Mindsets*, the section of designing mathematically rich assessments, pages 150-169.

**Additional Note: If it is summer nad/or you simply do not have a current class, then simply complete the first part of this assignment without the implementation component.

Assignment #11: 500 LEVEL ASSIGNMENT

In addition to the 400 level assignments, complete one of the following:

Option A)

Create a PowerPoint presentation about *Mathematical Mindsets* that could be used as an in-service to colleagues in your school.

OR

Option B)

Interview 2-3 teachers in your building who have experience with creating positive mindsets and learning opportunities for students. Write a 500-word (or more) paper summarizing what they said and how it relates to what you've learned in this class.

OR

Option C)

Read one of the books listed in the bibliography of this syllabus or the textbook. Write a 500-word (or more) summary comparing and contrasting the premise of your chosen book with *Mathematical Mindsets*.

C. INTEGRATION PAPER

Assignment #12: (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?
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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:

Suzanne Warner, M.S., received her Masters Degree in Education from the University of Rochester, New York. She has taught mathematics in the middle school, high school, and college settings, most recently in Oregon. Suzanne has been lauded by administrators, colleagues, students and parents regarding her teaching and classroom management skills. Her students enjoy learning in a respectful, productive environment, where each student is in control of her/his own learning and behaviors. She strongly believes that all students want to do well, and creates a teaching environment for them to succeed.

When not in the classroom, Suzanne enjoys spending time with her family reading, hiking, backpacking and traveling.

BIBLIOGRAPHY

MATHEMATICAL MINDSETS: Every Student Can Do Math

Boaler, Jo, *What's Math Got to Do With It? How Teachers and Parents Can Transform Mathematics Learning and Inspire Success*, Penguin Books, 2015, paperback, 72 pages, ISBN 978-0143128298, In this straightforward and inspiring book, Boaler outlines the nature of the problem by following the progress of students in middle and high schools over a number of years, to find out which teaching methods are exciting students and getting results. Based on her research, she presents concrete solutions that will help reverse the trend, including classroom approaches, essential strategies for students, advice for parents on how to help children enjoy mathematics, and ways to work with teachers in schools.

Humphreys, Cathy and Ruth Parker, *Making Number Talks Matter: Developing Mathematical Practices and Deepening Understanding, Grades 4-10*, Stenhouse Publishing, paperback, 200 pages, ISBN: 978-1571109989, Making Number Talks Matter is about the myriad decisions facing teachers as they make this fifteen-minute daily routine a vibrant and vital part of their mathematics instruction. The book offers practical ideas for using Number Talks to help students learn to reason numerically and build a solid foundation for the study of mathematics.

Pearce, Margie and K.M. Walton, *Teaching Numeracy: 9 Critical Habits to Ignite Mathematical Thinking*, Corwin, 2011, paperback, 240 pages, ISBN 978-1412992237, American students are losing ground in the global mathematical environment. What many of them lack is numeracy—the ability to think through the math and apply it outside of the classroom. Referencing the new common core and NCTM standards, the authors outline nine critical thinking habits that foster numeracy and show you how to: Monitor and repair students' understanding, Guide students to recognize patterns, Encourage questioning for understanding, Develop students' mathematics vocabulary. Included are several numeracy-rich lesson plans, complete with clear directions and student handouts.

Ricci, Mary Cay, *Ready-to-Use Resources for Mindsets in the Classroom: Everything Educators Need for School Success*, Prufrock Press, 2015, paperback, 184 pages, ISBN 978-1618213969, Ready-to-Use Resources for Mindsets in the Classroom provides educators with all of the tools they need to help students change their thinking about their abilities and potential. Featuring ready-to-use, interactive tools such as planning templates, letters for parents, preassessments, compare and contrast charts, online resources for parents, lists of books that teach perseverance, handouts that teach students about their brains, self-reflection checklists, surveys, and a unique study guide for the original book, this book is perfect for schools looking to implement the ideas in Mindsets in the Classroom quickly, easily, and successfully. When students believe that dedication and hard work can change their performance in school, they

grow to become resilient, successful students. This book contains everything schools need to create a growth mindset school culture in which work and effort can lead to success!

Smith, Margaret Schwan and Mary Kay Stein, *5 Practices for Orchestrating Productive Mathematical Discussions [NCTM]*, NCTM, 2011, paperback, 104 pages, ISBN 978-0873536776, The 5 Practices framework identifies a set of instructional practices that will help teachers achieve high-demand learning objectives by using student work as the launching point for discussions in which important mathematical ideas are brought to the surface, contradictions are exposed, and understandings are developed or consolidated. By giving teachers a road map of things that they can do in advance and during whole-class discussions, these practices have the potential for helping teachers to more effectively orchestrate discussions that are responsive to both students and the discipline.

Willis, Judy, *Learning to Love Math: Teaching Strategies that Change Students Attitudes and Get Results*, Association for Supervision & Curriculum Development, 2010, paperback, 195 pages, ISBN: 978-1416610366, With a straightforward and accessible style, Willis shares the knowledge and experience she has gained through her dual careers as a math teacher and a neurologist. Readers will learn how to: Improve deep-seated negative attitudes toward math, Plan lessons with the goal of achievable challenge in mind, Reduce mistake anxiety with techniques such as errorless math and estimation, Teach to different individual learning strengths and skill levels, Spark motivation. And more! With dozens of strategies teachers can use right now, *Learning to Love Math* puts the power of research directly into the hands of educators.