COURSE TITLE: **MATH IN OUR LIVES**

WA CLOCK HRS: 60
OREGON PDUs: 60

NO. OF CREDITS: **6 QUARTER CREDITS**
[semester equivalent = 4.00 credits]

INSTRUCTOR: **Patricia Dickenson**
thewiredprofessor@gmail.com

COURSE DESCRIPTION:
This course meets OSPI's STEM requirements

When mathematics is taught with real-world lessons, students not only experience math in practice, but develop the skills, strategies and conceptual understanding which promotes transfer to long-term memory. This approach to designing math instruction averts the typical question “Why do I need to learn this.” The challenge for teachers is where and how to integrate real-world lessons into core curriculum. This course for K-8 teachers focuses on 3 pedagogical practices: Problem-based learning, Project-based learning, and Inquiry around five foundational skills for mathematics: Fractions & Decimals, Problem Solving, Whole Number Operations, and Place Value & Numbers. You will learn how you can reinforce, introduce and assess these key concepts through real-world math. Research suggests a strong foundation in these areas are the key for algebra success and to prepare students for higher-level math. You will learn how to create tasks that are rooted in a real-life connection to these concepts to introduce, develop and master skills. This approach to designing instruction will help your students remember what you taught and why it is of value, and develop a love of mathematics by rooting instruction in their lives. A course for K-8 teachers looking to move their mathematics practice into a student centered approach with real-world application.

This course will use the book The Classroom Chef: Sharpen Your Lessons, Season Your Classes, Make Math Meaningful by John Stevens & Matt Vaudrey. The cost of the book is approximately $18.00 on Amazon.

There is also a $5.00 materials fee payable to instructor after registration for activity pack with classroom lesson plan examples and templates for use in Google Slides and Google Docs.

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

- Gained knowledge of the pedagogical approaches to integrate real-world math into units of study in K-8 mathematics.
- Developed an understanding of application of real world mathematics and how to motivate and engage students throughout tasks.
- Developed the ability to plan, teach and assess real-life lessons into a unit of study.
- Learned how to integrate technology into a variety of pedagogical mathematics practices.

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

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

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
The course text, *The Classroom Chef: Sharpen Your Lessons, Season Your Classes, Make Math Meaningful,* by John Stevens and Matt Vaudrey (ISBN# 0988217686) is available from Amazon for approximately $18 used.

In this course you will also receive access to a Google Folder with examples of Real-world Math Projects in the K-8 grade span. Projects contain videos, presentation material, rubrics and criteria charts for student use

None. All reading is online.

MATERIALS FEE
$5.00 materials fee payable to instructor after registration. This includes: an activity pack, classroom lesson plan examples, and templates for use in Google Slides and Google Docs.

ASSIGNMENTS REQUIRED FOR HOURS OR UNIVERSITY QUARTER CREDIT

A. INFORMATION ACQUISITION
Assignments done in a **course forum** will show responses from all educators active in the course. Feel free to read and respond to others comments.

Assignment #1: My Math Experience

In 250-500 words write about your professional situation, your reasons for taking this course and what you hope to take away. In addition, write a brief history your your experiences as a student learning math and how you feel your past experiences shape your attitudes and beliefs about learning math. Feel free to respond to any other posting from educators who are also taking this course.

Assignment #2: Realistic Math in our Classroom
In the following videos you will observe Dr. Dickenson working in a 6th grade and 2nd grade class. The 2nd grade class has students engaged in a scavenger hunt where they find arrays in their classroom. The 6th grade class has students working on Google Slides to construct an equation using virtual manipulatives. In the videos determine how the teacher builds on students prior knowledge and personal experiences to shape their learning experience. View Dr. Dickenson's teaching videos (2nd grade class & 6th grade) and presentation on teaching arrays

Second Grade: https://youtu.be/IslKAeYEW7U

Sixth Grade: https://youtu.be/2UfuRY67LFQ

View the videos on The Teaching Channel to see how other teachers are incorporating Real Life problem solving into their math practice

A Geometry Project with Algebra Connections: https://www.teachingchannel.org/videos/teaching-geometry-with-algebra

How Tall is the Flagpole? https://www.teachingchannel.org/videos/similar-triangles-geometry-lesson-nea

Read the article on Realistic Mathematics Education (RME). See Google Folder

In a 500 word essay:

- Summarize one video each from Dr. Dickenson and from the Teaching Channel (a total of two videos) you viewed and how the teacher uses math to connect concepts to students' lives
- Identify which principles of Realistic Mathematics Education are evident in the video and describe the evidence you see.
- Explain how you might connect realistic mathematics in the context of your math instruction.

Assignment #3: Math All Around Us
Create a slide show of photos where you see math all around you (minimum of ten photos). For example: a picture of a book shelf or window pane could be used to associate a multiplication array of two rows and three columns (2x3). You may use Google Slides or Powerpoint to share your photos. In each slide share where is the math and how you might connect the photo to the math in students' lives.

Assignment #4: Connecting our Students' Lives to the Math
Mathematics must be rooted in the lives of the students' we teach. Our country is incredibly diverse with over 320 million citizens representing over six races and at least 350 languages spoken in US Homes. As teachers we need to know our students in order to plan meaningful instruction. Read the Article "Math is Everywhere: Connecting Mathematics' to Students' Lives" and watch the TED talk video. Reflect on how the home and school context influences how students learn math.

Then in 500-750 word essay describe:

- How your students' background (language, funds of knowledge and experiences) and home life influence learning math. If you are not currently in a classroom look at school data demographics for an area you would like to teach.
- How do you imagine you should teach or will teach students whose background and ethnicity is different from you.
- What information in the TED video and article will shape your practice and what goals will you set to support all learners.

Assignment #5: Designing Instruction
Overview all five websites and review one of them in detail for ideas on teaching lessons that are based-on real life math. Select a lesson from one of the sites that you would like to plan for your class. Identify the grade level standards, the concepts addressed, and determine what modifications you would make so that the lesson is culturally relevant and connected to the lives of the students you teach. Complete the lesson using the Lesson Plan Template in the Google Drive folder.
https://drive.google.com/open?id=1YOKgqc8SzReLEDUqqlm14eJAP8ubS1VA

- PUmas: https://pumas.gsfc.nasa.gov/
- Annenberg Learner: www.learner.org
- CIESE: http://www.k12science.org/materials/k12/technology/online-collaboration/
- Better lessons: https://betterlesson.com/common_core_math
- Mathalicious: http://www.mathalicious.com/

Assignment #6: The Classroom Chef
In our text, The Classroom Chef, Authors Stevens and Vavdrey provide you with a menu of ideas to "sharpen your lessons, season your classes, and teach math in a meaningful way." In this assignment you will create a menu to spice up your math instruction. Include a minimum of four ideas in each of these areas: entree, side dishes, appetizer, and desert. Share your ideas on a Google Slide show with a slide for each menu area. Use images, links and multimedia to demonstrate how you will spice up your instruction. Send the URL to your instructor for feedback.

Assignment #7: Creating a Mindset for Problem-based Learning
Read the article Problem-Based Learning in Mathematics by Roh, Kyeong Ha (2003) and review the video Five Principles of Extraordinary Math Teaching by Dan Finkel https://youtu.be/ytVneQUA5-c

1. Identify a Question related to a math Concept . You may use one of the Three Acts Math Task by Dan Myers here http://blog.mrmeyer.com/category/3acts/ . See a list of math tasks arranged by standard here: https://docs.google.com/spreadsheets/d/1jXSt_CoDzyDFeJimZxnhgwOVsWkTQEsfqouLWNNC6Z4/pub?output=html

2. Give students time to grapple and struggle with the question.

3. Record students questions, observations, and curiosity.

4. What happened when you did not have the answer? Did they argue, answer for each other?

5. How did you allow your students to play with math?

Based on your reading of the article and viewing of the TED Talk reflect on this activity and how it impacted your practice and how you view teaching of math Reflection: In an 500 word essay

1.Share the task you created or used with your students.

2. What did you notice when students were beginning to struggle? What did their behaviors show you?

3. How did you feel when students came to you with questions and you did not answer?

4. Did you have difficulty saying yes to student ideas? How did that shift students behaviors and discussion in the class?

5. Did the task support students in thinking about math and how it is connected to their lives? Why or why not?

Assignment #8: Project-based Learning in Math
Project-based learning in math allows students to apply what they have learned into a real-life context. In the Google Folder you will see several examples of project based activities that include students designing a floor plan of their home based on skills related to area and multiplication, to designing a restaurant menu using their knowledge of decimals and percents. With project-based units the emphasis is on application and not teaching of isolated skills. Here are a few additional articles and videos that emphasize the importance of PBL in math: https://www.edutopia.org/article/using-quests-project-based-learning

Edutopia: https://www.youtube.com/watch?v=GvvFdNWvSRI#t=0m53s . (Healthy Restaurant Project)

5 Components to PBL: https://www.youtube.com/watch?v=hnzCGNnU_WM

Connecting Math to our Lives: http://us.iearn.org/integration-plans/connecting-math-to-our-lives (middle school)

What's for Dinner: http://us.iearn.org/integration-plans/finding-solutions-to-hunger

Complete the Project Design Overview template that is in the Google Folder and upload as instructed.

Assignment #9: Course Forum Project vs Problem
Both project based learning and Problem-based learning are rooted in making math connected to students' lives. However these two instructional approaches are vastly different and require distinct differences in planning, assessment and instruction. Consider these approaches and in 250-500 words discuss the pro's and con's for each approach.

Assignment #10: Online Games and Projects
Assignment #8: Online games & projects

1. Experiment with 4-6 of the games on the web site

Math Game Time: http://www.mathgametime.com/math-games

Teacher Prep Tech: https://makingmathconnection.blogspot.com/2018/08/tech-tools-for-teaching.html

Greg Tang Math: https://gregtangmath.com/games

Johnnie's Math Page: https://www.jmathpage.com/

2. Explore 4-6 of the hands-on projects .

Real World Math Retrieved from: http://www.realworldmath.org/

National Weather Service Retrieved from: http://www.weather.gov/owlie/

Floor Plan Your Classroom: Retrieved from: http://www.math-kitecture.com/floor.htm

PlaneMath Retrieved from: http://planemath.com/

Center for Innovation in Engineer Retrieved from: http://www.k12science.org/materials/k12/technology/online-collaboration/

Education World Retrieved From: http://www.educationworld.com/a_lesson/dailylp/dailylp/dailylp008.shtml

Nasa Resources: https://www.nasa.gov/stem/foreducators

Math Gameathon: https://www.mindresearch.org/gameathon

Rethink Math: http://www.rethinkmathteacher.com/5-end-of-the-year-projects/?fbclid=IwAR1gEvZ1dsphmqJ6DkCH3HhiXE7UaC3_sa4R0pRToPjZ0UqmfDKe2ZE8PBI

3. Briefly describe in 300-600 words each game or hands-on project and indicate which of these you may find useful in your

teaching.

Assignment #11: Course Forum Creating The Math Class You Want Your Children to Be In
Watch the Dan Myer's Video: Math Class Needs a Makeover .

Share in the Course Forum your vision of the math classroom you want your children to be in. Describe what you see the teacher doing and what the students are doing. How are text books, technology and tolls being used and what is the structure of the class and the tasks that students are engaged in? You may include an illustration or a photo of your classroom as well.

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 active in the course. Feel free to read and respond to others comments.

Assignment #12: Meeting Math Standards with Real-life Math lessons
Examine your state's math standards for your grade level and create a video-based math problem that is rooted in the lives of your students. This should include three acts based on Dan Myer's 3 Act Math Task. You can use your phone or ipad to create a video. Your first video should set up the problem (situation) and your final video should share the solution. You only need to create two videos. The second act of the problem gives students additional information and/or provides an opportunity to ask question and share what they notice and wonder. Each video should be no longer than 3 minutes.

Your lesson plan should include the standard, task, solution, possible ways to solve, and a link to your video.

Create a video on your smartphone or tablet. You can upload the video to Youtube or Vimeo to share a link.

To learn how to upload a video to Youtube click here.

Assignment #13: Lesson Adaptation
Take one of the lessons from this course (it can be your own work or something you found interesting on a site) and try the lesson in your classroom.

- Share at least two samples (photos) of student work from your class. Reflect on student evidence in a 250-500 word commentary on what your student work sample demonstrates in terms of their ability to understand the concept and their engagement and motivation to do the work.
- Submit your lesson to your instructor via the lesson tab below.
- Share what you've learned with other teachers taking our courses by checking the lesson library box when you submit your
- lesson. (https://www.hol.edu/lesson-plan-library)
- Sample Lesson Plan Template: https://www.hol.edu/about/lesson-template/

OR

Assignment #13-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.)
- Write a 500+ word article concerning any noteworthy success you've had as a teacher with one or more students.

Assignment #14: (500 Level ONLY)
A. Professional Development Presentation

Prepare a Powerpoint, Keynote or video presentation for staff or parents in which you show how to integrate real-life math into concepts in math.

or

B. Project-based Learning Unit:

Create a Project-based learning Unit that includes rubrics for student evaluation and templates for student use in the task. Include a calendar for teaching the unit over a period of time and determine what specific skills you will teach each day to provide students with the skills to apply the concepts in a given task.

or

C. Create an Assignment

An assignment of your choice given your instructor's prior approval.

C. INTEGRATION PAPER
Assignment #15: (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 350-500 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:
Please indicate by email to the instructor if you would like to receive comments on your assignments.

QUALIFICATIONS FOR TEACHING THIS COURSE:
Dr. Patricia Dickenson is an Associate Professor of Teacher Education. She is the Program Lead for the Bachelors of Arts In Interdisciplinary Studies with the Preliminary Multiple and Single Subject Credential. She is also the Course Lead for several Courses at National University including: TED 350 Math and Science Methods, ITL 516 Elementary Math Methods, ITL 518 Elementary Science Methods, TED 300 Foundations in Education, TED 310 Educational Psychology. Her research area focuses on mathematics

professional development and technology. She has worked in higher education for the past 8 years and was a mathematics coach and elementary school teacher for the Los Angeles Unified school district for over ten years. Dr. Dickenson has published two books and has over 12 book chapters and articles. She recently received the National Council of Teaching Mathematics Grant for Classroom research,

BIBLIOGRAPHY

MATH IN OUR LIVES

Stevens, J., & Vaudry M., (2016) The Classroom Chef: Sharpen your lessons, season your classes, make math meaningful, Dave Burgess Consulting Inc, 2016, paperback, 224 pages, ASIN: B01DX6X464. In THE CLASSROOM CHEF, math teachers and instructional coaches John Stevens and Matt Vaudrey share their secret recipes, ingredients, and tips for serving up lessons that engage students and help them “get” math. You can use these ideas and methods as-is, or better yet, tweak them and create your own enticing educational meals. The message the authors share is that, with imagination and preparation, every teacher can be a Classroom Chef.

Real World Math Retrieved from: http://www.realworldmath.org/

National Weather Service Retrieved from: http://www.weather.gov/owlie/

Floor Plan Your Classroom: Retrieved from: http://www.math-kitecture.com/floor.htm

PlaneMath Retrieved from: http://planemath.com/

Center for Innovation in Engineer Retrieved from: http://www.k12science.org/materials/k12/technology/online-collaboration/

Education World Retrieved From: http://www.educationworld.com/a_lesson/dailylp/dailylp/dailylp008.shtml

Math Forum: http://mathforum.org/workshops/sum96/data.collections/datalibrary/lesson.ideas.html

Education World Inflation Lesson Retrieved: http://www.educationworld.com/a_lesson/03/lp298-02.shtml