Instructor: Dr. Kimberly Vincent  
Course: Math 432-01  
Meeting: TU, TH 10:35-11:50 Sloan 7, spring 2018  
Credits: 3

Instructor email: vincent@math.wsu.edu which is forwarded to my gmail account vincent.kimberly@gmail.com

Office Hours: to be arranged

Phone: 509-335-3143

Office: Morrill 212


Suggested Texts for reference:


Course Links

Common Core State Standards  http://www.corestandards.org/

Office of Superintendent of Public Instruction WA http://www.k12.wa.us/


National Council of Teachers of Mathematics www.nctm.org

Mathematics Association of America www.maa.org

Washington State Mathematics Council http://wsmc.net

Prerequisites: C or better in each of Math 301 and 330, concurrently 320 or 421, have at least junior status and be a math major.

Course Goal and Objectives

The main goal of the course is develop a deep conceptual understanding of precollege mathematics by an examination, from an advanced perspective, a selection of mathematical topics typically taught in high school. Exploring topics from an advanced perspective means that we will draw upon your college mathematics content knowledge to develop critical thinking and skills in the following:
• the historical development of the concepts;
• concept analyses which may include statements of theorems and comparing different definitions of the same concept and the implications of each in terms of applicability and generalizations;
• explicit connections between topics;
• generalizations of problems that yield insights regarding the solutions of simpler, but related problems;
• multiple approaches and representations;
• applications;
• formative assessment, specifically analyzing typical mathematical errors and misconceptions to inform teaching; and
• the trajectory of concept development over the grades as suggested by the Common Core State Standards for Mathematics.

Learning Goals and Evidence of Student Progress Toward the Learning Goals

It should be noted that in all material covered during the semester in class discussion, homework and math tasks will be asking students to use critical thinking, use multiple representations, and master their communication of mathematics as well as explaining mathematics for multiple learning styles. The text and design of the class integrate the learning goals throughout the entire course as instructors model teaching theories students have studied.

Learning Goals/Objectives

<table>
<thead>
<tr>
<th>At the end of the course students will be able to:</th>
<th>This objective will be evaluated primarily by</th>
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</thead>
<tbody>
<tr>
<td>Demonstrate critical and creative thinking</td>
<td>projects, homework, exams</td>
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<tr>
<td>Compare and assess resources when choosing curriculum or developing lessons (information literacy)</td>
<td>projects</td>
</tr>
<tr>
<td>Compare and assess resources to trace an historical trajectory of development for mathematical concept(s) (information literacy)</td>
<td>projects</td>
</tr>
<tr>
<td>Master communicating mathematics with precision and accuracy</td>
<td>Projects, homework and exams</td>
</tr>
<tr>
<td>Flexible in explaining and representing mathematics for multiple learning styles</td>
<td>Projects, homework and exams</td>
</tr>
<tr>
<td>Relate mathematical concepts between topics</td>
<td>Projects, homework and exams</td>
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</tbody>
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Grade Criteria

• Homework 15%
• Participation and Attendance 15%
• Midterm Exam 15%
• Project 40%
• Final Exam 15%
## Grading Scale:

Percentage Earned → Corresponding Grade

- 94-100→A
- 90-93→A-
- 87-89→B+
- 84-86→B
- 80-83→B-
- 77-79→C+
- 74-76→C *
- 70-73→C-
- 60-69→D
- 0-59→F

*minimum grade to pass

## Topics: Tentative Weekly Schedule:

**Week 1:** Chapters one from Wathall, J. T.H (2016). Concept-Based Mathematics Teaching for Deep Understanding in Secondary Classrooms. Corwin mathematics. : (PDF will be provided)

**Week 2:** Chapter two from Wathall, J. T.H (2016). Concept-Based Mathematics Teaching for Deep Understanding in Secondary Classrooms. Corwin mathematics. : (PDF will be provided)


**Week 3:** Project Topic description due

**Week 6:** Exam I

**Week 8:** Project Part 1 Poster Due

**Week 13:** Part 3 Project Lesson Plan Due Gallery walk of student Posters

**Week 15:** Students presentations & Project Part 4 due

**Week 16 Final exam**

The following topics will be from the required text and done in this order. Some topics will have to be cut to fit them all in so we will discuss this once you have the book in hand.

Sections 1-6 Chapter 1 Functions, Guidelines on finding research articles relevant to mathematics education.

Sections 4-6 and 8 Chapter 2 Lines in the Plane (modeling and parameterized families of lines)

Sections 4-6 Chapter 2 Lines in the Plane (modeling and parameterized families of lines)

Sections 4-5 Chapter 3 Quadratic polynomials (quadratic splines, focus and directrix, geometric problems including tangency)

Sections 5-7 Chapter 4 Trigonometry

Chapter 5 Hyperbolic Trig

Chapter 5 Hyperbolic Trigonometry

Sections 5-8 Chapter 6 Rigorous view of number systems

Sections 4-5 Chapter 8 Topics in Number systems including transcendental numbers

Section 6 Chapter 9 Development of exponential functions, Project Part 2 due

Chapter 10 Exponential and Logarithmic Functions History, computation and application
Chapter 10 Exponential and Logarithmic Functions History, computation and application

Homework

Homework will be assigned daily and turned in weekly. The lowest score will be dropped. Be sure to look at the homework procedures (see Appendix A) so that you follow the required format. No late homework will be accepted for any reason. If you miss class when homework is due be sure to look at the homework procedures to follow the procedure for turning in homework.

Project

Each student will be required to complete one project with four parts. Each student will isolate one mathematical concept or topic to research for all parts of this research project.

Part 1 Historical Research: Research the historical trajectory of your mathematics topic. You will be expected to include accurate mathematical representations of the concept(s) as it was developed that demonstrate a conceptual understanding of the mathematics. Create a time line on a poster for display in class.

Part 2 Research Trajectory in Standards and Curriculum: You will outline how your chosen topic is developed over the middle and high school years according to the Common Core State Standards and then to examine how well the curriculum used in one particular WA school district follows this trajectory. This will require thorough research of the Common Core State Standards, recommendations from the Office or Superintendent of Public Instruction and analysis of curriculum. Create a time line poster for display in class.

Part 3 Develop Lesson Plans: You will either explore connections between your chosen mathematical concepts to see how it is threaded through mathematics, or give an interesting and perhaps surprising college level application of your concept within the topic and design a lesson plan (see the attached format used for the Teaching Preparation Assessment that will be required during your student teaching). For example the concept of inverse is threaded throughout mathematics from elementary school through college. Inverse is used in addition, multiplication, and study of functions and allows us to solve equations. Then develop a two lesson plans to explore the connections or the application. You should include one middle school and one high school lesson plan to illustrate an understanding of the mathematics expected at each level as well as an understanding of how the middle school lesson is a building block for the high school lesson. The lesson plans must expect students use high cognitive demand and multiple representations to complete the task laid out in the lesson plan.

Part 4 Final Reflection: You will write a final reflection that outlines the college mathematics that provides the advanced perspective of your topic. You should describe the college level mathematics in enough detail to demonstrate an understanding of the concepts. You will also describe how you made choices in the design of your lesson plans. This should include what criteria you used when comparing different curricula, your rationale for what aspects of the topic you focused each lesson and other factors that impacted your design.
Research for Projects: Students will be required to use APA format for the written portions of their project. The first week students will be given guidelines on choosing research based articles for research.

Grading of Projects: A rubric will be provided that gives more specifics.

**Attendance Policy**

Required and Valued--There are many reasons each class is important to attend.

One reason is to allow you to contribute your ideas in discussions and to benefit from the comments of the instructor and your classmates. You will also experience learning in settings that model strategies we discuss. If you cannot make a class (because of illness or another understandable reason), please inform me in advance. Not all in-class work can be made-up, due to the discussions. However, it is your responsibility to find out what you missed and whether there is work you can make up and what homework assignments you need to complete.

Do not come to class if you are sick. You will be allowed two excused absences due to illness. However if you are home sick be sure your homework is still submitted on time. Check policy on how to turn in homework when you are absent.

**Exam Policy**

☒ No Make ups on Exams. No final exams will be given early.

Exam 1 February exact date to be arranged ☐ Exam 2 April exact date to be arranged ☐ Final Exam Friday see the schedule in zzusis for the exact date and time.

**Academic Integrity**

I encourage you to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Students who violate WSU's Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office of the Dean of Students. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions: http://www.conduct.wsu.edu

**Disability Policy**

Reasonable accommodations are available for students with a documented disability. Access Center will document your disability and provide forms to bring to faculty. If you have a disability and may need accommodations to fully participate in this class, please visit the Access center. All accommodations MUST be approved through the Access Center (Washington Building, Room 217). Please stop by or call 509-335-3417 to make an appointment with an Access Adviser.

**Miscellaneous**

Successful Students: ☒ Understand what they need to be successful and do those things that help them to learn and understand the mathematics ☒ Form study groups ☒ Attend class ☒ Do readings and problems outside of class ☒ Participate in group work and discussions during class rather than observe
Respect: I expect you to treat each other and me with courtesy and respect. That means you come to class prepared to listen and contribute, no cell phones, no browsing the computer, no newspapers, etc. Your attention is on the people in the room. Violations will impact your grade severely. All work shall be turned in on time at the beginning of class. Turn off your cell phones and other electronic devices during class. Work hard and have fun.

WSU Safety Measures: Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Please visit

http://safetyplan.wsu.edu
http://oem.wsu.edu/emergencies

to access the Campus Safety Plan and emergency information.

You should also become familiar with the WSU Alert Site

http://alert.wsu.edu

where information about emergencies and other issues affecting WSU will be found.