EDUC 5485
Designing Aesthetic Experiences for Young Mathematicians

Instructor:
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E: dtangred@uwo.ca
Office Hours: TBA on individual basis

Schedule:
Section 001: Thurs 4:30PM-6:30PM,
Room: 2046

Program Context:
This is a Specialty Course taken by Teacher Candidates during Year 1, Full Year of the Bachelor of Education.
Designing Aesthetic Experiences for Young Mathematicians (EDUC 5485)

Teacher candidates will engage in arts informed design of mathematics learning experiences, based on personal interests and needs, and perceived mathematics learning needs of Primary/Junior students. Teacher candidates will develop a capacity for addressing the "artistic puzzle" of making mathematics learning experience a "story" worthy of human attention. 2 hours per week, full year, .5 credit.

The teacher candidates in this course will begin to learn how to design aesthetic mathematical experiences for primary and junior students that include the following:
- a beautiful mathematical idea
- an engaging story about a mathematics concept
- a surprise or wonder at the way a problem could be solved in many ways
- excitement for learning math concepts
- solving problems in novel and creative ways
- working cooperatively to develop understanding
- investigating mathematics links to the world around them

Number of Credits : 0.5

Number of Weeks: 18

Week 1: Introduction to Course, Assignments & Each Other

- 1. Introductions
- 2. Bitmoji Classrooms
- 3. How education has changed during the pandemic
- 4. Teaching strategies
- 5. Amazing race
- 6. Who is a mathematician? What is math aesthetics? What myths surround the notion of mathematics?
- 7. Which one doesn't belong? (WODB)
Week 2: Curriculum and Pedagogy in Mathematics

- 1. How is math beautiful? How do you feel about teaching math?
- 2. PMI: Positive Minus Interesting
- 3. Who is a mathematician?
- 4. Which one doesn't belong (WODB) and estimation jars
- 5. 3 Part Lesson
- 6. New math curriculum: coding

Week 3: Curriculum and Pedagogy in Mathematics

- 1. Assessment
- 2. Let's create our own mathematical clothesline
- 3. CRA Model
- 4. Choice boards
- 5. 3 Act Math

Week 4: Designing an Aesthetic Experience

- 1. 3 Act Math
2. Polygons and patterns
3. Fractal.
4. Measurement projects
5. Mini lesson
6. Review assignment

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<th>Learning Activities</th>
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<th>Name</th>
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<tbody>
<tr>
<td>Assignment</td>
<td>Week 4 Online component</td>
<td>Share completed aesthetic experiences</td>
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**Week 5: In Class Assignment and Planning**

1. Assignments overview and due
2. Long term planning
3. Rubrics
4. Google Classroom

**Week 6: Math circles**

1. Tactile items
2. Circles
3. Building thinking classrooms - Peter Liljedhal. VPNS

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<td></td>
<td></td>
<td>In Y. Li, E. Silver, &amp; S. Li (eds.), Transforming Mathematics Instruction: Multiple Approaches and Practices. (pp. 127-144). New York, NY: Springer.</td>
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**Week 7: Early Number Sense & Math Games**

- 1. Math games
- 2. Subitizing
- 3. Verbal counting
- 4. Number identification and counting. Object counting and cardinality

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**Week 8: Rich Math Tasks & Assignment 3**

- 1) Students will explore a variety of rich mathematical tasks and create a task analysis.
- 2) They will gather in groups and select an idea to attempt throughout their practicum.
- 3) In the new year, students will share one task they attempted and outline curriculum expectations along with other themes touched on through the course (30%)  

**Learning Activities**

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<tr>
<td>Assignment</td>
<td>Week 8 Assessment Activities</td>
<td>Students work in groups to plan a task analysis. Teacher candidates will share at least one idea next week and share it to OWL.</td>
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**Week 9: Task Analysis & Growing Patterns**

- If you asked teachers what they found beautiful in mathematics, would they be able to:
  - describe a beautiful mathematical idea?
  - tell an engaging story about a mathematics concept?
• relay a surprise or wonder at the way a problem could be solved in many ways? If you asked students how they knew they were in math class, would they describe:

• the excitement of learning new concepts?
• how they solve problems in novel and creative ways?
• how they all work together to cooperatively learn new concepts?
• how mathematics is linked and related to so many things around them?
• What possible answers might you get to these questions in your school board? Your school/department? Your classroom?

• Exploring Growing Patterns

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<td>Assignment</td>
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**Week 10: Task Analysis Presentations Assignment 3 Presentation**

• 1) Students to present one task analysis to the class
• 2) Teacher candidates are highly encouraged to utilize creative measures to present material
• 3) All task analysis' are to be posted to OWL
• 4) More to come in class (30%).

**Week 11: Math Centres**

• 1. What are math centres? Guest presenter

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**Week 12: Math Escape Rooms**
Learning Activities

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<tbody>
<tr>
<td>Assignment</td>
<td>Week 12 Assessment Activities</td>
<td>Post a Maker education activity you would like to attempt on OWL</td>
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<td><a href="http://llk.media.mit.edu/courses/readings/maker-mindset.pdf">http://llk.media.mit.edu/courses/readings/maker-mindset.pdf</a>;</td>
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<td>Stager. Academica Business College. <a href="https://www.youtube.com/watch?v=kFolerX_RiQ">https://www.youtube.com/watch?v=kFolerX_RiQ</a>;</td>
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Week 13: Coding & Computational Thinking in K-8

- 1. Unplugged grids and loops
- 2. Micro:bit. Write the code to create a thermometer
- 3. Scratch coding
- 4. Assessment
- 5. Knowledgehook

Learning Activities

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| Assignment      | Week 13 Assessment Activities | Teacher candidates will choose one of the suggested activities that were
|                 |                             | organized using Gardiners multiple intelligences. Activities to be posted on
|                 |                             | OWL.                                                                        |

Week 14: Math Circles

- 1. Explore math circles and their relevance
- 2. Why are circles difficult?
- 3. Big Idea: What do we want students to take away?
Learning Activities

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**Week 15:** Computational Thinking & Coding

- 1. What is computational thinking?
- 2. Why is this relevant in 21st century classrooms?
- 3. Explore micro:bit (interactive microcontroller)

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**Week 16:** Patterning, Algebra & Graphing

- 1. Patterning rules
- 2. Oreo
- 3. Placemats
- 4. Decimals

**Week 17:** Long Term Planning in a Mathematical program

- 1. Guided math
- 2. Long term planning
- 3. Gap closing
- 4. Resource sharing

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<td>Assignment</td>
<td>Week 17 Resource Document</td>
<td>Share Interactive Resource Document</td>
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**Week 18:** Missing Week
### Assessment Activities

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<td>Report</td>
<td>Due Wk 05: Resource Sharing</td>
<td>Teacher candidates will bring in a resource (idea, community connection for field trip, experiment, lesson, etc.) which your group will share with the class. You will be responsible for providing ideas pertaining to curriculum, along with a detailed sequence of events (how, when, why). These will be uploaded onto OWL. Please focus on creative solutions. Both slides and documents are adequate but consider additional mediums including video, audio, web applications, etc. Materials to be shared and posted to OWL.</td>
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<tr>
<td>Report</td>
<td>Due Wk 07: Interactive Poster</td>
<td>Students will create an interactive poster which can be created in a variety of ways. Work to be completed in class. Students evaluated based on application of ideas, creativity, and pedagogical outcomes. <em>alternative assignment available if required</em></td>
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<tr>
<td>Report</td>
<td>Due Wk 10: Task Analysis</td>
<td>Teacher candidates are responsible for creating a task analysis which includes, a detailed overview, lesson, and reflection based on in class experience. Students will explore a variety of rich mathematical tasks and create a task analysis. They will gather in groups and select an idea to attempt throughout their practicum. In the new year, students will share one task they attempted and outline curriculum expectations along with other themes touched on throughout the course. Teacher candidates are responsible for creating a task analysis which includes, a detailed overview, lesson, and reflection based on in class experience. Materials to be shared and posted to OWL.</td>
</tr>
<tr>
<td>Report</td>
<td>Due Wk 16: Math &amp; Art Aesthetics Choice Board</td>
<td>Complete one of these activities paying attention to your reactions to it. Write a brief description of what you did, how you felt and what you learned. Include pictures or some way of sharing your creation (200 words). Reflect on how the aesthetic dimension of your activity changed the learning of mathematics.</td>
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<td>Summative Assessment</td>
<td>Ongoing: Professionalism &amp; Participation</td>
<td>Consistently demonstrates respect, integrity, and embodying the traits of a professional educator.</td>
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This course meets the following Course Outcomes:

Mathematical Idea: A beautiful mathematical idea.
Engaging Story: An engaging story about a mathematics concept.
Surprise or Wonder: A surprise or wonder at the way a problem could be solved in many ways.
Solving Problems in Creative Ways: Solving problems in novel and creative ways.
Work Cooperatively: Working cooperatively to develop understanding.
Investigating Mathematics Links: Investigating mathematics links to the world around them.
How to Protect Your Professional Integrity:

The Bachelor of Education is an intense and demanding program of professional preparation. Teacher Candidates are expected to demonstrate high levels of academic commitment and professional integrity that align with both Western University’s Academic Rights and Responsibilities and the Professional Standards and Ethical Standards set by the Ontario College of Teachers. These expectations govern your time in class, in your Practicum, in your Alternative Field Experiences, and include the appropriate use of technology and social media.

The Teacher Education Office will only recommend teacher candidates for Ontario College of Teachers certification when candidates have demonstrated the knowledge of, and adherence to, the faculty polices throughout the two-year program.

To review the policies and practices that govern the Teacher Education program, including attendance, plagiarism, progression requirements, safe campus and more, visit: edu.uwo.ca/CSW/my-program/BEd/policies.html

Faculty of Education Pass/Fail Policy:

All courses and assignments in the Bachelor of Education are assessed as Pass/Fail.

Instructors will make the Success Criteria of the assignments clear, and refinements of the criteria may take place in class as a means of co-constructing details of the assignments in the first two weeks of a course. This will allow for differentiation of process, product and timeline depending upon student needs.

Success Criteria will

- Articulate what needs to occur to demonstrate learning outcomes for a course/assignment;
- Inform the instructional process so that teaching can be adapted to ensure students continue to remain on track to meet the criteria as needed and appropriate.
- Align with the assignments created to provide opportunities for students to demonstrate the knowledge, skills and abilities they are working toward;
- Establish clear descriptive language that allows Teacher Candidates to identify, clarify and apply the criteria to their work and to their engagement in peer feedback;
- Focus the feedback on progress toward meeting the overall and specific tasks/assignment goals for the course.

Participation:
Participation is essential to success in the Teacher Education program. As a professional school, you need to treat coming to class as showing up for work in the profession. If you are not in class, you cannot participate. Actively participating in discussions, peer reviews/feedback, group work and activities is integral to the development of your own learning and to the learning within your classroom community.

Given the varied experiences of Teacher Candidates in the program, you may engage with ideas/concepts or skills that are familiar or unfamiliar to you.

A Professional Teacher Candidate is one who:

- Arrives in class (virtual or online) on time, and prepared. This includes completing any readings, viewing assignments or tasks in advance of class as requested.
- Listens to others and contributes thoughtfully to discussions;
- Models respectful dialogue and openness to learn, monitors, self-assesses and reformulates one’s prior beliefs and understandings in light of new information;
- Monitors and addresses their wellness, practices self-care, and seeks appropriate support when necessary.

Support Services & Resources:

- **Health and Wellness**
  uwo.ca/health
- **Peer Support**
  westernusc.ca
- **Learning Skills**
  uwo.ca/sdc/learning
- **Indigenous Services**
  Indigenous.uwo.ca
- **Student Accessibility Services**
  sdc/uwo.ca/ssd
- **Writing Support**
  writing.uwo.ca
- **Financial Assistance**
  registrar.uwo.ca
- **Not sure who to ask?**
  Contact the Teacher Education Office at eduwo@uwo.ca