

Western Education

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EDUC 5136

Teaching and Learning Mathematics

Instructor:

Marja Bertrand

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Office Hours: by appointment

Schedule:

Section 001: Wednesday 2:30PM-4:30PM

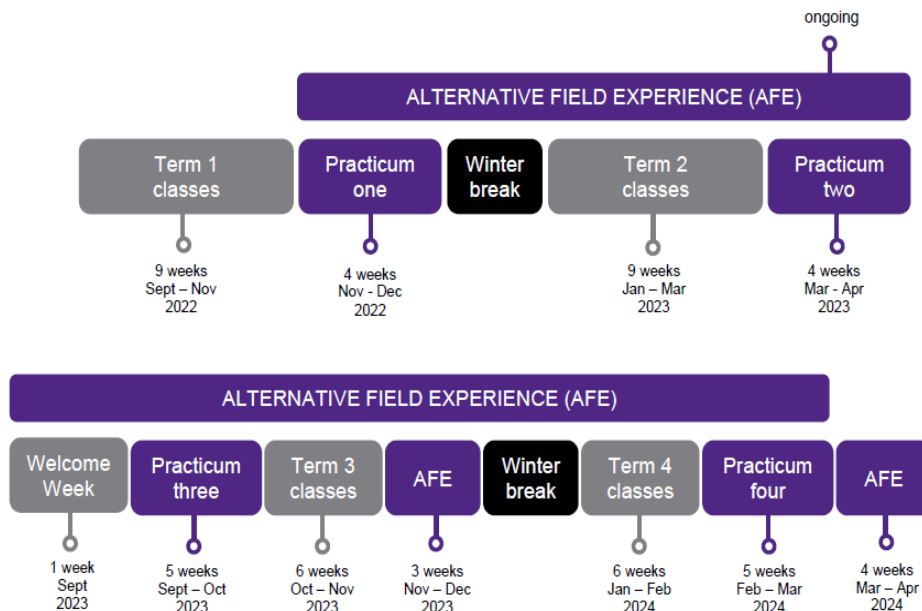
Room: 2040

Program Context:

This is a **J/IS Curriculum Course** taken by Teacher Candidates during **Year 1, Full Year** of the Bachelor of Education.

Bachelor of Education

Program Overview – Class of 2024



Teaching & Learning Mathematics (EDUC 5136)

The professional and theoretical perspectives associated with learning and pedagogy in mathematics. Participants will be expected to reflect critically on both theory and practice, based upon psychological, epistemological, mathematical, and current pedagogical and curricular approaches, in light of how mathematics is taught in schools. 2 hours per week, full year, .5 credit.

Pedagogical content knowledge is teachers' understanding and ability to help a group of students understand specific subject matter using various instructional strategies, representations, and assessments while taking into consideration the contextual, cultural, and social characteristics of the learning environment. The goal of the course is to develop pedagogical content knowledge for teaching intermediate/senior mathematics by putting emphasis on the pedagogy and context of the teaching and learning intermediate/senior mathematics.

This course will focus on introducing the pre-service teachers to:

- the mathematics curriculum for the intermediate and senior grades
- mathematics pedagogy and classroom practice
- creating rich mathematics contexts to engage students
- methods of differentiated instruction
- use of technology to enhance student learning
- resources for lesson and unit planning

Course Materials:

You will be provided with electronic/paper documents and links to various websites. Most of the documents are accessible through <https://theteachercandidate.com>.

Recommended Books (Optional):

You can order these books on amazon (any edition).

Polya, G. (2004). *How to solve it: A new aspect of mathematical method* (Vol. 85). Princeton university press.

Lockhart, P. (2009). *A mathematician's lament: How school cheats us out of our most fascinating and imaginative art form*. Bellevue literary press.

Course Credits: 0.5, Number of Weeks: 18

Week 1: Course Orientation and Exploring Ontario Mathematics Curriculum, Part 1

- Reading Course Syllabus
- Reading Ontario mathematics curriculum

Learning Activities

Type	Name	Description
Discussion	Week 1 Discussion	Online participation in the how to answer the question "When am I ever going to use [insert mathematics topic here]?" Discussion Forum
		In-person: Discussion about the "Key components of the Ontario mathematics curriculum"

Week 2: Exploring Ontario Mathematics Curriculum, Part 2

- The foundational principles of the Ontario Math Curriculum
- Investigating the Ontario Secondary Mathematics Curriculum
- Curriculum Principles and Standards for School Mathematics, NCTM 2000

Learning Activities

Type	Name	Description
Class Activity	Week 2 Activity	Group work and presentations

Week 3: Exploring Ontario Mathematics Curriculum, Part 3

- Secondary Math Pathways
- Academic, applied, destreamed and locally developed courses

Learning Activities

Type	Name	Description
Class Activity	Week 3 Activity	Gallery walk about different secondary math pathways

Week 4: Assessment and Evaluation, Part 1

- Achievement Chart
- Growing Success document: Assessment, evaluation, and reporting in Ontario schools

Learning Activities

Type	Name	Description
Class Activity	Week 4 Activity	Jigsaw co-op activity

Week 5: Lesson Planning, Part 1

- The 4 non-negotiables of lesson planning
- 3-Part Lesson: Origins, structure, and examples

Learning Activities

Type	Name	Description
Discussion	Week 5 Discussion	Online participation in the "Lesson plan expectations" Discussion Forum
		In-person: Discussion about "Lesson planning and the 3-part lesson structure"

Week 6: Lesson Planning, Part 2

- Inquiry-based learning
- Scaffolded investigation
- Problem-solving: Discussing "How to solve it" by G. Polya

Learning Activities

Type	Name	Description
Discussion	Week 6 Discussion	Online participation in the "Choosing of teaching approaches to your lesson plan" Discussion Forum
		In-person: Discussion about "Inquiry-based learning and Kolb's Experiential learning model"

Week 7: Assessment & Evaluation, Part 2

- Tools of balanced assessment

Learning Activities

Type	Name	Description
Discussion	Week 7 Discussion	Online participation in the "Choosing an assessment tool for your lesson plan" Discussion Forum
		In-person: Discussion on the "Different types of assessment practices (as, for and of learning) and tools"

Week 8: Collaboration session

- Differentiated instruction & equity in mathematics
- Strategies for differentiated instruction
- Special education, ELL modifications and accommodations

Learning Activities

Type	Name	Description
Class Assignment	Week 8 Activity	Lesson Plan due

Week 9: Technology in Math Classrooms, Part 1

- Exploring use of technology and coding in math classrooms
- Role of technology in math modeling

Learning Activities

Type	Name	Description
Discussion	Week 9 Discussion	In-person: Discussion about the “Benefits and challenges of implementing technology into the math classroom”

Week 10: Technology in Math Classrooms, Part 2

- Creating technology-based investigation

Learning Activities

Type	Name	Description
Class Activity	Week 10 Activity	Students will start creating their technology-based investigation

Week 11: Culturally Responsive Pedagogy

- Culturally responsive pedagogy in math classrooms
- Culturally responsive teaching and learning in STEM/STEAM

Learning Activities

Type	Name	Description
Discussion	Week 11 Discussion	In-person: Discussion about the “Main components of culturally responsive teaching and learning”

Week 12: Unit Planning, Part 1

- Backward design for unit planning
- Clustering curriculum expectations

Learning Activities

Type	Name	Description
Class Assignment	Week 12 Activity	Technology Assignment due

Week 13: Unit Planning, Part 2

- Summative assessment
- Performance task/culminating activity vs. unit test

Learning Activities

Type	Name	Description
Discussion	Week 13 Discussion	Online participation in the "Choosing curriculum expectations for your unit plan" Discussion Forum
		In-person: Discussion about "Summative vs. formative assessment"

Week 14: Unit Planning, Part 3

- Mathematical modeling as a unit teaching strategy

Learning Activities

Type	Name	Description
Discussion	Week 14 Discussion	In-person: Discussion about "Mathematical modelling from abstract to concrete and visual representations"

Week 15: Curriculum Mapping

- Long range planning in mathematics

Learning Activities

Type	Name	Description
Discussion	Week 15 Discussion	Online participation in the "A sketch of your unit plan's lessons" Discussion Forum
Class Activity	Week 15 Activity	Students will work on their unit plan and culturally responsive lesson

Week 16: Professional Development

- Mathematical Literacy and upcoming changes in the Secondary Curriculum (focus on Data Science)

Learning Activities

Type	Name	Description
Class Activity	Week 16 Activity	Guest speaker for mathematical literacy

Week 17: Collaboration Session

- Financial Literacy as a part of Mathematical Literacy and its place in the secondary curriculum

Learning Activities

Type	Name	Description
Class Activity	Week 17 Activity	Explore mathematical and financial literacy in the secondary math curriculum

Week 18: Wrap-Up

- Unit plans presentations and discussions
- Professional development and next steps

Learning Activities

Type	Name	Description
Class Assignment	Week 18 Activity	Unit Plan due Culturally Responsive Lesson due

Assessment Activities

Type	Name	Description
Assignment	Due Week 8: Lesson Plan	<p>For the fully developed three-part lesson, choose 1 key concept from any Grade 9 - 12 math curriculum that could be addressed within a time frame of a typical lesson in mathematics. This lesson must allow the student to explore and develop their own understanding of the new math learning through problem solving.</p> <p>You must thoroughly describe your “before”, “during”, and “after” parts.</p> <p>Your Three Part Lesson will:</p> <ul style="list-style-type: none">• Demonstrate a clear understanding of the key concept throughout the lesson• Be original work and not a copy from another source or person• Require students to solve a problem that develops a new math concept• Be student directed• Involve the use of one or more problem solving strategies to support student learning• Be typed and error free <p>You can create a lesson plan individually or with a partner.</p>
Assignment	Due Week 12: Technology-Based Teaching Resource	<p>Ontario Ministry of Education (2021) states that students should "apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands."</p> <p>For this assignment, you have to use Scratch or another coding software to create:</p> <ul style="list-style-type: none">- either a scaffolded investigation activity of a mathematical concept- or an interactive demo of a mathematical concept
Assignment	Due Week 18: Unit Plan	<p>There are three components of the task:</p> <ul style="list-style-type: none">• A balanced unit plan, for a topic in the grade 9-12 mathematics curriculum that incorporates a reasonable variety of teaching strategies and assessment strategies. You do not have to include fully developed lesson plans. Brief description of activities suffices.• Fully developed cumulative task (cannot be a test)• A brief presentation of your unit and cumulative assessment to the class

Assignment	Due Week 18: Culturally Responsive Lesson	Develop a mathematics lesson that integrates the main components of culturally responsive teaching and learning. The lesson must be original work and not a copy from another source or person. The lesson plan must develop in-depth mathematics content knowledge and understanding.
		This assignment is to be done in groups
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Assignment	Ongoing: Classwork/Participation	Class work/Participation is assessed but not graded. Attendance is a major but not the only factor. Students are expected to - be prepared for class - be engaged during class - speak up during class
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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 policies 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 on-site) 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.

Ontario Curriculum & Supplementary Resources:



Curriculum & Resources

dcp.edu.gov.on.ca/en

Campus 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