Faculty of Education
The University of Western Ontario
B.Ed. Course Outline

Teaching & Learning Mathematics – Primary/Junior
Course # EDUC 5180K
Monday /Tuesday/ Wednesday Room #2051

Instructor:
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519-661-2111 x 87822

Course Coordinator:
Dr. George Gadadonis

Calendar Description:
The professional and theoretical perspectives associated with learning and pedagogy in mathematics will be explored. Participants will be expected to reflect critically on both theory and practice, based on psychological, epistemological, mathematical, and current pedagogical and curricular approaches, including the role of computer coding as a way of teaching mathematics concepts and relationships. Three hours per week, .75 credit, Full Year course.

Learning Outcomes:
“Effective teaching requires the use of a range of teaching styles and techniques. These variations afford teachers the opportunity to make choices, accommodate change, and meet student needs” (Standards of Practice, p. 3). Rather than transmit information, teachers must transform knowledge so as to make it accessible to others. Children learn in a variety of ways; therefore, teachers must have multiple pedagogical strategies to assist Ontario’s diverse and changing society.

Teacher candidates will:

- review, discuss, and reflect on theory and research on teaching and learning mathematics;
- prepare for teaching mathematics in the primary and junior grades in accordance with OCT Standards of Practice;
- discuss a wide spectrum of points of view on mathematics education;
- refine individual points of views and philosophies with regard to teaching and learning mathematics;
- actively engage in mathematics activities and share learning and teaching experiences;
- explore, share, and reflect on technologies in mathematics education that include computer coding;
- actively engage in and reflect on both lesson planning and lesson sequencing which enable
teachers to create optimal classroom environments in which children of all ability ranges might attain a high level of success.

Through active sharing of experiences and active engagement in mathematics activities pre-service candidates will achieve the following course-level learning outcomes:

**Course-Level Learning Outcomes**

**Knowledge**
- Develop knowledge of major mathematical, pedagogical and instructional concepts and strategies.
- Develop a critical understanding of changes in and theories of learning and teaching mathematics, and the application of these changes and theories to the current Ontario curriculum and provincial policy documents.
- Refine the ability to: i) critically gather, review, discuss, and reflect on points of view, theory and research on teaching and learning mathematics; and ii) select the most appropriate and creative options relevant to a teaching and learning situation.
- Develop a critical understanding of how computational thinking promotes understanding of big ideas in Math.
- Develop an understanding of the benefits of working with computer code to enhance mathematical understanding.

**Knowledge of Methodologies**
- Develop a solid understanding of major aspects, a range of strategies and varied methods of teaching, assessment and evaluation of learning mathematics; and refine individual points of views and philosophies with regards to learning, teaching, assessing and evaluating of learning.
- Ability to use technology as a teaching tool, and to understand how mathematics-specific technological tools are changing how mathematics is taught.
- Ability to use computer coding as a teaching tool for teaching mathematics concepts and relationships.

**Application of Knowledge**
- Develop the ability to make critical use of teaching resources, research summaries and policy documents relevant to student learning of mathematics in Ontario elementary schools.
- Develop the ability to adapt and design lesson and unit plans which enable teachers to create optimal classroom environments in which children of all ability ranges might attain a high level of success.

**Communication Skills**
- Develop the ability to interact, to communicate and to collaborate effectively with learners, school staff, members of other professions, learner’s parents/guardians, and the community using language, representations, and reasoning about mathematics learning that is appropriate to the context.
- Develop skills for organizing and managing various classroom styles including skills for managing learning in groups, and learning with physical and digital tools.

**Awareness of Limits of Knowledge**
- Develop the ability to recognize, consult, research, reason and solve problems of practice from a range of contexts, including but not limited to the context of diversity among learners.
- Develop an awareness of how teaching and learning of mathematics changes with changes in society and with advances in technology.

**Autonomy and Professional Capacity**
- Prepare for teaching mathematics in the primary and junior grades in accordance to The Ontario College of Teacher’s “Standards of Practice for the Teaching Profession” and “Ethical Standards for the Teaching Profession.”
- Demonstrate interest and take an active role in one’s own professional journey in learning to teach mathematics as well as articulate an understanding that one’s own knowledge, abilities, skills, values, beliefs, and attitudes influence their decision making in the profession of teaching.
- Demonstrate an understanding that teaching mathematics in ways that develop learners conceptual understanding and procedural proficiency is an ethical and compassionate act.
Course Content:
This course will focus on introducing the teacher candidates to:
- research and theory of mathematics education
- the mathematics curriculum for the primary and junior grades
- mathematics pedagogy and classroom practice including teaching through problem solving, computational thinking, and teaching through student work
- creating rich mathematics contexts to engage students
- differentiated instruction and Universal Design for Learning
- technology to enhance student learning, including computer code
- resources for lesson planning and professional, life-long learning

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<td>Geometry and Spatial Sense Parallel Lines Story + Coding <strong>MINDOMO MAP due</strong></td>
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<td>Home and School Connections Final Reflections Parent Feedback Songs</td>
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**Course Reading Requirements:**

All required readings are on-line

- The Ontario Curriculum, grades 1-8: Mathematics
- A Guide to Effective Instruction in Math K-6: Volumes 1-5
- A Guide to Effective Instruction in Math K-3 and 4-6: (strand specific guides)
- Paying Attention to Algebraic Reasoning
- Paying Attention to Proportional Reasoning
- Paying Attention to Fractions
- Paying Attention to Spatial Reasoning
- Growing Success: Assessment, Evaluation and Reporting (Grades 1-12)

Gadanidis, G. and M. (2016). *20 Math Stories*
Gadanidis, G. (2016). *Surprises for Young Mathematicians*
Gadanidis, G. (2015). *Coding for Young Mathematicians*

**Other Useful Readings:**

- Small, M. (2010). *Big Ideas from Dr. Small, Creating a Comfort Zone for Teaching Mathematics, K-3 and 4-8*, Nelson: USA

**Assignments and Other Course Requirements:**

**IN-CLASS PARTICIPATION AND ON-LINE ASSIGNMENTS 35%:**
**REGULAR ON-LINE AND IN-CLASS ATTENDANCE IS REQUIRED.**

**10% In-class Participation:** Active participation with group work and classroom activities is expected. Completing homework in order to make informed and critical contributions is a vital component.

**10% On-line Participation:** You will participate in on-line discussions in OWL and other on-line platforms. In on-line groups, you will be posting and responding to classmates about assigned readings, classwork, research ideas activities, coding activities, and personal experiences.

**10% Reflection Journal:** You will complete a 1-2 page Reflection Journal based on classroom activities, coding activities, Math4Teachers modules, readings, and personal experiences. This assignment will be submitted through “ASSIGNMENTS” in OWL for assessment and feedback.

**5% MINDOMO Map:** This is a Collaborative Mind Map that you will complete with your on-line group. This assignment will be submitted via the MINDOMO platform.
EXPECTATIONS CONTINUUM ASSIGNMENT 5%:
This assignment will be a small group task done in class. Explanation of the requirements and guidelines will occur in class. This will be submitted by hard copy in class.

LESSON CONSOLIDATION 10%:
Prepare a lesson consolidation for the “Working On It” activity provided in the lesson plan template. You will complete the highlighted sections: “curriculum expectations”, “anticipate student responses”, and “reflect and connect”.

How will you know what to anticipate for student thinking?
Some ideas: Complete the Working On It activity using as many strategies as possible. Complete the Growing Patterns Module from Research Ideas (done for Discussion this week). Read the curriculum expectations. Read the Guides to Effective Instruction - Patterning and Algebra. Use the Ministry monographs: Paying Attention to Algebraic Reasoning and WHAT WORKS? Research into Practice: Exploring the Power of Growing Patterns.
This assignment will be submitted through “ASSIGNMENTS” in OWL for assessment and feedback

DETAILED CODING LESSON PLAN 15%:
Identify the strand and choose the grade and cluster of expectations, based on the “Working on It” coding activity provided. Use the 3-part lesson plan template provided. Discuss your rationale based on “knowledgeable others” and classroom experiences.

LESSON PLAN: What will you teach? – Choose an overall expectation and supporting specific and process expectations from the Mathematics curriculum that address the “Working on It” Coding activity.

How will you teach it? – Prepare a 3-part problem solving lesson plan around the “Working on It Coding activity” that is provided on the template that addresses the expectations. Include math materials, questions, and prompts.

What will you see? Anticipate student responses – What might the students do? What might be common misconceptions? How might students extend the activity? Use diagrams when needed.

How will you know the expected learning took place? – Create a follow-up task (Exit Ticket or Independent Practice). Based on observation and “Reflect and Connect”. Consider the lesson follow-up/task and the opportunities they present to evaluate student competency.

What are the Next Steps? - Focus on the next steps by adding what would come in the next lesson.

RATIONALE: Why did you create the lesson plan this way? Why did you include the activities that you did? Why did you choose the certain format for student sharing and teacher facilitation? – Your instructional decisions should be supported by research documented in your rationale.
BIG PICTURE PLAN 20%:
SMALL GROUP (2-3 STUDENTS) OR INDIVIDUAL

1. Research a mathematics teaching idea that would address the strand and division (primary or junior) that you will be assigned.
2. Based on your research, prepare a sequence of Mathematics lessons (a 5-day continuum).
3. Develop a home-school connection task that continues the learning at home and provides students with an engaging answer to the question, “What did you learn in Math class today?”
4. Develop an assessment plan with strategies, tasks, and tools for the activities in your lessons and a summative assessment task with rubric to follow the 5-day plan.
   You will post the plan on-line in OWL and submit it through “ASSIGNMENTS” in OWL for assessment and feedback.

CULMINATING IN-CLASS ASSIGNMENT 15%:

During the final class you will be asked to respond to some of the Mathematics encountered during Math4Teacher activities, problem-solving, coding, and other pedagogy of mathematical situations explored in class. This will be an "open book" assignment, using the format of a 3-part lesson plan. You will be given a category of curriculum expectations with choice as to the grade level you would prefer. You will design/choose the Getting Started activity, design/choose a Working On It problem(s), anticipate student solutions, and plan the explicit Math ideas you will focus on during the Reflect and Connect portion of the lesson. Developing a follow-up Independent Task (Exit Ticket, Independent Activity) is the final component of the lesson plan. Within the lesson plan, you will include Big Ideas, Differentiated Instruction and Accommodations Ideas, Open Questions to Encourage and Extend Learning, and Assessment. You are encouraged to use words, pictures, symbols, diagrams, tables, etc. Finally, you will include a rationale explaining the value of the components of your lesson plan in relation to the expectations, strand, and grade, as well as exemplary pedagogy for teaching Mathematics today, connecting to course readings, activities, and/or on-line discussions.

The major assignments of this course are intended to be of a most practical nature – they’re what we do as teachers every day.

Be sure to use the rubrics to help plan, monitor, and self-assess as you complete each assignment.

All assignments will be explained and discussed in class but may also be found in Assignment Outlines and Rubrics in the Syllabus section in OWL.
**Policy Statements:**

**Accessibility:** The University of Western Ontario is committed to recognizing the dignity and independence of all students and seeks to ensure that persons with disabilities have genuine, open and unhindered access to academic services. Please contact the course instructor if you require course materials in an alternative format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for information about requesting academic accommodation, or go to the following website: [http://www.edu.uwo.ca/teacher-education/docs/policies/Accessibility_Western.pdf](http://www.edu.uwo.ca/teacher-education/docs/policies/Accessibility_Western.pdf)

**ATTENDANCE:** The B.Ed. program is an intense and demanding programs of professional preparation. You are expected to demonstrate high levels of both academic and professional integrity. Such integrity is demonstrated in part by your commitment to and attendance at all classes, workshops, tutorials, and practicum activities. Read more about the Faculty’s attendance policy on-line at [http://www.edu.uwo.ca/teacher-education/docs/Attendance%20Policy%202016.pdf](http://www.edu.uwo.ca/teacher-education/docs/Attendance%20Policy%202016.pdf)

**EXCUSED ABSENCES:** If you are ill, require compassionate leave, or must miss classes for religious observance, your absence is excused; you will not be penalized but you are responsible for work missed.

**UNEXCUSED ABSENCES:** Any absence that is not a result of illness, bereavement, or religious observance is an unexcused absence. Three unexcused absences will result in you being referred to the Associate Dean and placed on academic probation. Any further unexcused absence will result in failure of the course and withdrawal from the program.

**Language Proficiency:** In accordance with regulations established by the Senate of the University, you must demonstrate the ability to write clearly and correctly. Work which lacks proficiency in the language of instruction is unacceptable for academic credit, and will either be failed or, at the discretion of the instructor, returned to you for revision to an acceptable level.

**Late Penalties:** Normally, the only acceptable reasons for late or missed assignments are illness (which you must report to the Teacher Education Office) or extreme compassionate circumstances. Unexcused late assignments will be penalized at a rate of ____% per day, and will not be accepted more than _____ days after the due date unless prior arrangements have been made with the instructor.

**Academic Offences:** Scholastic offences are taken very seriously in this professional Faculty. You are, after all, going to be a teacher. Read about what constitutes a Scholastic Offence at the following Web site: [http://www.edu.uwo.ca/teacher-education/docs/policies/WEB_ScholasticDiscipline.pdf](http://www.edu.uwo.ca/teacher-education/docs/policies/WEB_ScholasticDiscipline.pdf)

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**Plagiarism-Checking:**

a. All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com ([http://www.turnitin.com](http://www.turnitin.com)).

b. Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.
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SUPPORT SERVICES

A variety of support services are available at Western.

If you need advice or assistance, do not hesitate to get in touch with any of these services.

FINANCIAL ASSISTANCE: Registrarial Services [http://www.registrar.uwo.ca]

WRITING SUPPORT: Student Development Centre [http://www.sdc.uwo.ca/]

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STUDENTS with DISABILITIES: Student Development Centre [http://www.sdc.uwo.ca/]

SOCIAL & CULTURAL ISSUES: University Students’ Council [http://westernusc.ca/services/].

EMOTIONAL or MENTAL DISTRESS: Students who are in emotional or mental distress should refer to Mental Health @ Western [http://www.uwo.ca/uwocom/mentalhealth/] for a complete list of options about how to obtain help.

B.Ed./Dip.Ed. PROGRAM ISSUES: zuber@uwo.ca, Teacher Education Office, room 1131

NEED HELP but not sure what to do: zuber@uwo.ca, Teacher Education Office, room 1131

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NEED HELP but not sure what to do: zuber@uwo.ca, Teacher Education Office, room 1131
About the Course: The course should ‘stretch’ you in new ways:

• to see Mathematics for the beauty that it explores
• to explore patterns and relationships of numbers and shapes
• to develop strategies that enable learners to establish a mathematical basis on which to build and extend their world
• to explore computational thinking and coding as a vehicle for understanding big ideas in mathematics
• to integrate Mathematics with other subjects

About the Instructor: Before teaching here at the Faculty, I spent many wonderful years as a classroom teacher, Itinerant Behaviour Team Leader, and curriculum advisor and presenter with the former Oxford County Board of Education and then the Thames Valley District School Board. Understanding and implementing curriculum effectively has always been a major focus for me in my career. Being involved with presenting Curriculum Institutes, the Social Justice Task Force, Character Education Committee, and the Primary Junior Math Task Force, encouraged me to challenge myself to use diverse strategies to address the different learning styles of all students. My goal is helping each student achieve his/her highest potential in a caring, supportive manner.

For most of my classroom teaching career, I was an Associate Teacher to Teacher Candidates from a variety of Faculties of Education. These experiences enriched my own teaching career and allowed me the opportunity to guide and nurture young professionals to have a positive and life-long influence on our students. Understanding and implementing the theory into practice component of learning is vital. I have also instructed Additional Qualifications courses, both in-class and on-line. This allowed me the opportunity to work with colleagues to continue to develop and apply theories to our real-life practices. This is my fourth year teaching Elementary Mathematics to pre-service teachers. I again look forward to the challenges and rewards of this endeavour – continuing my journey as a life-long learner. This course will give you the foundation for teaching Mathematics. You will refine and perfect your skills during your teaching career and through life-long learning.

“I am a successful teacher if I model being a life-long learner for all of my students”

Office Hours: mutually agreed upon times