



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

Curriculum and Pedagogy in Elementary Mathematics – PJ Section
Course #5174
Monday / Wednesday in Room #2049

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Course Description:

The five strands of Mathematics become the curriculum focal points from which a blend of conceptual understanding is paired with methodologies using problem solving as a centrepiece. The primary concern in each topic is developing mathematical understandings, however, teachers also have to “model for students the curiosity, enthusiasm, and joy of learning” (Standards of Practice, p. 7). Issues running throughout the course include equity, special needs learners, the role of manipulative materials, estimation, mental computation, the nature of problem-solving, the use of mathematical games, integration with other subjects, linking mathematics to the real world, patterns and relationships, as well as assessment and evaluation.

Aims, Goals, Objectives, 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.

The mathematics component is intended to:

- provide students with a basic understanding of mathematics in the elementary school curriculum
- introduce a range of classroom strategies for developing children’s mathematical skills and concepts
- provide frameworks which enable teachers to account for their teaching of mathematics.

Course Content:

Weeks 1 / 2	Mathematical development in the early years – Mathematical Thinking
Weeks 3 / 4	Developing an understanding of our numeration system
Weeks 5 / 6	Developing computational procedures
Weeks 7 / 8	Assessment, evaluation, and reporting
Weeks 9 / 10	Fractions, decimals, ratio, and percent
Weeks 11 / 12	Developing Measurement and Geometry concepts & skills
Weeks 13 / 14	Exemplary Mathematics Resources – Planning classroom units
Weeks 15 / 16	Interpreting data: Statistics and Probability
Weeks 17 / 18	Incorporating technology to explore and understand mathematics

Course Materials:

Gadanidis, G. (2004). *Becoming a mathematics teacher* (4th ed.). London, ON: MathAdventures Publications.

Ontario Ministry of Education and Training. (2005). *The Ontario curriculum, grades 1-8: Mathematics*. Toronto, ON / Author: <http://www.edu.gov.on.ca/eng/document/curricul/elemcurric.html>

Ontario Ministry of Education and Training. (1998). *The kindergarten program*. Toronto, ON: Author: <http://www.edu.gov.on.ca/eng/document/curricul/elemcurric.html>

Ontario Ministry of Education. (2003). *Early math strategy: The report of the expert panel on early math in Ontario, 2003*. Toronto, ON: / Author: <http://www.edu.gov.on.ca/eng/document/curricul/elemcurric.html>

Assignments and Other Course Requirements:

50% - Exemplary Mathematics Resources

(a.) Individual Component (20% - Due: Last class before the second practicum): Create a detailed lesson plan (15%) using the template provided (posted on WebCT) to structure your detailed plan. An evaluation rubric (5%) will comprise second element.

(b.) Group Component (30% - assigned presentation time during week 13 or 14): Prepare a Mathematic's unit of work for your classroom. Timeline of the unit will span two school weeks.

1. **What will you teach?** – Choose a set of related specific expectations for the Ministry document.
2. **How will you teach it?** – Prepare a sequence of lesson plans that will build towards the expectations set.
3. **How will you know the expected learning took place?** – Consider the lesson follow-ups/tasks and the opportunities they present to evaluate student competency. This will include a small rubric that would be suitable to measure student performance.

Note: Please refer to the rubric that will be used to evaluate this assignment so that you are aware of all components.

20% - Math4Teachers (using problem solving in a classroom program): During the last class, you will be asked to respond to some of the mathematics and related pedagogy of mathematical situations explored in class in an 'open-book' activity.

30% - Course Participation (Contributions in class, Personal Reflections): Come to class prepared by doing readings and actively participate in classroom activities. Keep a journal of reflections. Optional online extensions will be made available to delve more deeply into each of the modules formally covered in class.

Policy Statements:

Attendance: The B.Ed. and Dip.Ed. programs are intense and demanding programs of professional preparation in which teacher candidates are expected to demonstrate high levels of both academic and professional integrity. Such integrity is demonstrated in part by commitment to and attendance at all classes, workshops, tutorials, and practicum activities. Read more about the Faculty's attendance policy at

<http://www.edu.uwo.ca/preservice/downloads/Attendance.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: If you wish to be absent for a reason other than illness, compassionate leave, or religious observance, or feel you *must* be absent for another reason, your absence is *un*excused. You are responsible for the work you missed, and for any make-up work deemed necessary. You may also pay a penalty for non-participation. Ongoing irregular attendance and multiple unexcused absences will result in referral to the Associate Dean and a change in registration status to conditional. Chronic absenteeism for any reason may provide grounds for withdrawal from the program.

Language Proficiency: In accordance with regulations established by the Senate of the University, all teacher candidates must demonstrate the ability to write clearly and correctly. Work which shows a lack of 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 the teacher candidate for revision to a literate level.

Late Penalties: Normally, the only acceptable reasons for late or missed assignments are illness (for which a doctor's statement may be required) or extreme compassionate circumstances. Unexcused late assignments will be penalized at a rate of 5 % per day, and will not be accepted more than 5 days after the due date unless prior arrangements have been made with the instructor.

Statement on Academic Offences: Scholastic offences are taken particularly seriously in this professional faculty. Teacher candidates should read about what constitutes a Scholastic Offence at the following Web site:

<http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf>

Plagiarism: Plagiarism means presenting someone else's **words** or **ideas** as one's own. The concept applies to all assignments, including lesson and unit plans, laboratory reports, diagrams, and computer projects. For further information, teacher candidates may consult their instructors, the Associate Dean's Office, and current style manuals.

Advice about plagiarism and how to avoid it can also be found on the Preservice website:

<http://www.edu.uwo.ca/preservice/downloads/Plagiarism%20Policy.pdf>

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>)
- 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.

Additional Information:

	Each block consists of two 2-hour periods in sequential weeks sectioned by practicum teaching assignments. A Math4Teachers component helps to connect the theoretical to the practical. The following list sequences the focus of each topic.
1 Weeks 1/2	<p>Mathematical development in the early years – Mathematical Thinking</p> <ul style="list-style-type: none"> • course outline; Ministry documents • early explorations of patterns and relationships • looking for patterning and algebra in the other strands • Math4Teachers: Making 10 • Preparation: Chapters 1- 2 Optional online module 1
2 Weeks 3/4	<p>Developing an understanding of our numeration system</p> <ul style="list-style-type: none"> • the Hindu-Arabic system • understanding place value • reading and writing numbers with understanding • the use of manipulatives and multiple representations • Math4Teachers : Consecutive Number Sums • Preparation: Chapter 3.1 – 3.7 Optional online module 2
3 Weeks 5/6	<p>Developing computational procedures</p> <ul style="list-style-type: none"> • developing algorithms • estimation, mental arithmetic, and number sense • patterns and relationships in computation • consolidating the learning • Math4Teachers: The Handshakes Problem • Preparation: Chapter 4 Optional online module 3
4 Weeks 7/8	<p>Assessment, evaluation, and reporting</p> <ul style="list-style-type: none"> • alternative assessment tasks for mathematics’ thinking and understanding • the provincial testing program and the provincial report card • Math4Teachers: Area and Perimeter - Scruffy’s New Home • Preparation: Chapter 8 Optional online module 4
5 Weeks 9/10	<p>Fractions, decimals, ratio, and percent</p> <ul style="list-style-type: none"> • developing fraction skills and concepts • developing decimal number sense and computation • the meaning of ratio and percent • Math4Teachers: Using School Resources – Selecting / Modifying • Preparation: Chapter 3.8 - 3.10 Optional online module 5
6 Weeks 11/12	<p>Developing Measurement and Geometry concepts & skills</p> <ul style="list-style-type: none"> • children’s understanding of length, area, volume, capacity, mass, • time, temperature, and angles through activity centres • establishing procedures for effective teaching • appropriate instructional sequences and teaching strategies • patterns and relationships in measurement

	<ul style="list-style-type: none"> • development of conceptual understanding through cooperative learning and guided discovery • Euclidean and transformational geometry • two-dimensional shapes and three-dimensional figures • math and art – tessellations • Preparation: Chapter 5 & 6 Optional online module 6
<p>7 Weeks 13/14</p>	<ul style="list-style-type: none"> • Math4Teachers: Air Traffic Controller <p>Exemplary Mathematics Resource</p> <p>Each Group Presentations will present a 15 minute overview of the group’s Mathematics unit plan using presentation software such as PowerPoint or SmartBoard. Unit plans will be uploaded in advance of the scheduled class to the class web pages so that all teachers are able to access all outlines for personal resource repositories.</p>
<p>8 Weeks 15/16</p>	<p>Interpreting data: Statistics and Probability</p> <ul style="list-style-type: none"> • collecting, organizing, and displaying data • communicating about the data collected • the early conceptual development of probability • Math4Teachers #7: Dice Games / (The Hare and Tortoise Race revisited.) • Preparation: Chapter 7 Optional online module 7
<p>9 Weeks 17/18</p>	<p>Incorporating technology to explore and understand mathematics</p> <ul style="list-style-type: none"> • using calculators, computers and related technologies as virtual manipulatives to promote understanding • computer-assisted, computer-managed and toll software • In-Class Math Essay • Preparation: Website activities (www.joyofx.com/bmt) Optional online module 8

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 build and extend their world

About the Instructor:

After ‘many’ years in the classroom, I’m convinced that I now know enough about teaching to begin a career. Such is the nature of how teaching develops. You can learn the ‘basic moves’ in this academic

year at the Faculty of Education, but spend the rest of your life developing the finer skills. There is no career that can potentially create the joy that a person experiences who chooses to teach.

“Children learn in more ways than we’ll ever know how to teach.”

Teaching Outline:

See course content outline

Assignment Guidelines:

The major assignments of this course are intended to be of a most practical nature – it’s what we’ll do as teachers every day of the school year. To this end, note how effectiveness of planning is augmented when teaching teams form to share and extend curriculum ideas.

Readings:

Gadanidis, G. (2004). *Becoming a mathematics teacher* (3rd ed.). London, ON: MathAdventures Publications.

You’ll find this book to be a gentle and encouraging read with a focus on Mathematics’ education that is likely quite radical to what you have experienced in a classroom setting.

References:

Van de Walle, J. (2007). *Teaching Developmentally: Mathematics in the Elementary and Middle School*: Pearson Education Publishers