

Faculty of Education: Fall 2010-2011

Mike McCabe

michaelm@nipissingu.ca

www.nipissingu.ca/education/michaelm

519-752-1524 x 7507

Office Hours: Wednesdays 12:30-4:30 or by appointment

Course Outline:

EDUC 4334 : Junior/Intermediate Mathematics

Textbook: (strongly suggested)
Elementary and Middle School Mathematics: Teaching Developmentally
Second Canadian Edition., (Van de Walle)

Ontario Curriculum: Mathematics - Grades 1-8, Ontario Ministry of Education and Training, 2005). (provided by Nipissing for use in class and available on at <http://www.edu.gov.on.ca/eng/curriculum/elementary/math18curr.pdf>)

Introduction:

Welcome to the Junior/Intermediate Division Mathematics Education course. Mathematics will function as a series of 12, 2 hour classes on Wednesday mornings beginning September 15, 2010.

Calendar Description:

Mathematics provides a rationale for curriculum design particular to mathematics, through the examination of curriculum guidelines established by the Ministry of Education for the Junior and Intermediate divisions, and consideration of planning appropriate curriculum units. The course includes a study of the aims, scope, sequence and structure of mathematics, and an introduction to the media and materials particular to mathematics education. These studies are guided by the underlying structure and unifying principles of mathematics. The intent of teaching mathematics is the development of basic mathematical concepts in students in the Junior and Intermediate divisions through the use of current approaches which link mathematical understanding to development in youth.

Course Expectations:

Our focus is on grades 4 to 8 but mathematics education across the full Junior/Intermediate grade range will be discussed.

I) By the end of the program, students should have developed:

- an appreciation of the interconnectedness of mathematics topics and concepts
- an appreciation of the interconnectedness of mathematics and other subjects
- an appreciation of the value of using a variety of approaches to mathematical instruction
- an appreciation of the use of various instructional media in teaching mathematics

- an appreciation of the need to incorporate the calculator, computer, and other technology as tools for student learning in mathematics
- an appreciation of the meaning and significance of communicating mathematically
- an appreciation of the meaning and significance of reasoning mathematically, including the development of critical levels of mathematical thinking, and problem solving skills
- an appreciation of the practical value of mathematics, including its significance for everyday life and careers

II) By the end of the course, students should be beginning to develop:

- an understanding of the general nature of mathematics
- an understanding of the structural and developmental nature of school mathematics
- an understanding of the currently accepted psychological bases for learning mathematics, and their significance for teaching mathematics, including the need to teach a topic using (a) multiple strategies based on learning styles and developmental stages, and (b) multiple conceptual representations, incorporating into instruction concrete (physical manipulative), semi-concrete (pictorial), and abstract models
- an understanding of the process nature of mathematics teaching and learning
- an understanding of the language of mathematics necessary and appropriate for Junior/Intermediate divisions
- an understanding of mathematical problem solving
- an understanding of formative evaluation in school mathematics, including the need for diagnosis and remediation
- an understanding of summative evaluation in school mathematics, including the use of methods other than pencil and paper tests.

III) By the end of the course, students should be able to:

- identify the major strands - in Junior/Intermediate mathematics
- identify the major topics within each of the major J/I mathematics strands
- identify some of the interconnections among the strands of school mathematics
- develop instructional strategies appropriate for children and adolescents based on current development theories.
- create lessons based on the developmental nature and curricular scope of school mathematics
- teach and model various mathematical problem solving strategies
- incorporate various media into the processes of teaching mathematics
- incorporate motivational strategies into lessons
- identify and develop various formative and summative mathematics evaluation strategies
- develop diagnostic methods for J/I mathematics topics and suggest remedial measures
- incorporate technological devices, such as the calculator and the computer, into lessons, as appropriate.

Course Content:

The expectations will be met through an exploration of the teaching of concepts and skills in the following Junior/Intermediate Mathematics Topics:

- (a) Numeration and number sense, with particular attention to multiple representations of number and equivalence; natural numbers, whole numbers, integers, and rational numbers; ordinality and cardinality; place value; factors; and prime and composite numbers.
- (b) Operations of addition, subtraction, multiplication, and division of whole numbers; of fractions; of decimals; of integers.
- (c) Ratio and percent.
- (d) Data management, including graphing
- (e) Probability
- (f) Patterns, numerical and other
- (g) Geometry: Plane and solid geometry; transformational geometry; coordinate geometry
- (h) Measurement
- (i) Elementary algebraic equations; variables
- (i) Problem solving and inquiry
- (k) Integrating mathematics across the curriculum

Final Comments:

Because of the limited time available in the course, there will necessarily be variation in the manner and depth to which these topics are covered in class.

The course will be developed with three considerations in mind:

- (a) an appropriate mathematics developmental sequence,
- (b) the on-campus/practice teaching structure of the year, and
- (c) your needs and concerns in terms of mathematics.

EDUC 4334-MATHEMATICS
Suggested Schedule: 2010-2011

TOPICS	
(I)	<ul style="list-style-type: none">- School math: trends- Introduction to teaching/learning math- Math and the consumer (real life math)
(II)	<ul style="list-style-type: none">- Problem solving and inquiry- models and examples; strategies—traditional and invented- evaluating problem solving, evaluating manipulative activities.
(III)	<ul style="list-style-type: none">- Understanding and teaching for number sense- Place value- Basic operations
(IV)	<ul style="list-style-type: none">- Exploring proportionality- Teaching for understanding in fractions, decimals, and percent
(V)	<ul style="list-style-type: none">- A look at assessment in mathematics
(VI)	<ul style="list-style-type: none">- Conceptual development - an example- Measurement through activities
(VII)	<ul style="list-style-type: none">- Exploring data management- Emphasis on graphing activities- Exploring probability: ratios
(VIII)	<ul style="list-style-type: none">- Geometry: introduction to content and pedagogy- Introduction to Geometry
(IX)	<ul style="list-style-type: none">- Introduction to patterning and algebra in the junior and intermediate divisions.

Evaluation Structure:

Evaluation within the course consists of a number of small assignments, and one in-class quiz. It is hoped that the submission of a number of the activities will result in the creation of teaching resources for all students. Instructions on submission will be given in class.

- | 1. Curriculum and Issue Familiarization Activities | 50% | Date Due |
|--|------------|-------------------|
| a. Curriculum Document and response to readings | | Sept. 29 |
| <ul style="list-style-type: none">➤ Read pp. 1-9 of the Ontario Mathematics Curriculum and the readings provided. <p><i>Respond to what you have read</i></p> <ul style="list-style-type: none">➤ What appears to be the main focus of mathematics teaching and learning?➤ What may have changed since you were an elementary school math student?➤ What surprised you? What challenged you? | | |
| b. I Have... Who Has.... Cards | | Oct. 13 |
| <ul style="list-style-type: none">➤ Create two (2) complete and different sets of “I have..., who has...” cards from two different strands of the math curriculum, at particular grades. Each set should have 30 cards and should meet particular grade-appropriate expectations. | | |
| c. Who am I Cards? | | Oct. 20 |
| <ul style="list-style-type: none">➤ Make 20 “Who Am I?” cards. These should aim to meet grade-specific expectations from each of the curriculum strands. | | |
| d. Alternative Teaching Strategy Presentation | | Sign-up |
| <ul style="list-style-type: none">➤ Each person will have the opportunity to present a teaching/learning strategy that provides children the opportunity to discover doing of math in an alternative manner (than traditional pedagogy). These strategies are sometimes referred to as “math tricks”. Presenters should prepare a 3-5 min. lesson on “how to” teach the alternative strategy and where it fits into the curriculum. | | |
| e. EQAO Grade 6 Math Test | | Nov. 17 |
| <ul style="list-style-type: none">➤ Each person will be given the opportunity to complete the math component of the Grade 6 EQAO test
(see: http://www.eqao.com/pdf_e/09/6e_Math_web_0609.pdf)➤ There completed test will NOT be graded but rather used as a vehicle for discussion of the test, the design, the purpose and the strategies teachers can employ to assist students. | | |
| f. Problem of the Week | | Most weeks |
| <ul style="list-style-type: none">➤ A “Problem of the Week” will be posted on most weeks. Students will be asked to respond by<ul style="list-style-type: none">➤ Completing the problem (trying to get the answer)➤ Discussing the strategies used to attempt to solve the problem. | | |

2. In-Class Quiz

50%

Date Due

The quiz will emphasize mathematics curriculum and instruction strategies rather than mathematics content and will be practical in nature. Students will be provided with a thorough review of necessary materials.

Nov. 24

More details on each element will be forthcoming.

Evaluation Policy:

1) Late assignments

In cases where assignments cannot be submitted on time, please notify the instructor. An acceptable alternate due date will be discussed. Because all parties are adults, a particular level of trust, mutual respect and professional integrity will guide this policy. There will not be any penalty for lateness.

In situations where presentations are due, there is particular need to have your material prepared on the date.

2) Incompleted assignments or quiz

A mark of '0' (zero) will be assessed for each assignment or quiz that is not completed and handed in by Dec 3, 2010.

3) All other policies related to attendance, course completion, students with differing abilities and student appeals will be guided by the official Nipissing University Calendar.

Curriculum and Issue Familiarization Activities

50%

EVALUATION:

ACTIVE PARTICIPATION: Throughout the course the expectation was for you to participate in all facets of the program and complete all areas as described in the “Evaluation Structure” parts 1a. through f. above. In addition, you were encouraged to work in a cooperative manner with your peers and to maintain a positive, productive attitude throughout each component of the program.

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
<ul style="list-style-type: none">participated actively only with encouragement from othersrequired constant reminders regarding staying on task and using materials appropriatelywas absent or late from more than two classes	<ul style="list-style-type: none">participated actively needing only occasional encouragementrequired occasional reminders regarding staying on task and using materials appropriatelywas absent or late from one or two classes	<ul style="list-style-type: none">participated actively on your own initiativefollowed instructions regarding activities without delay and actively engaged during all planned activities and discussionhad (near) perfect attendance	<ul style="list-style-type: none">participated actively in a manner that encouraged others to participatecompleted all assignments, and followed instructions regarding activities without delay and took leadership role in set-up and discussion.had perfect attendance

LEVEL ACHIEVED: _____

Quiz Rubric

50%