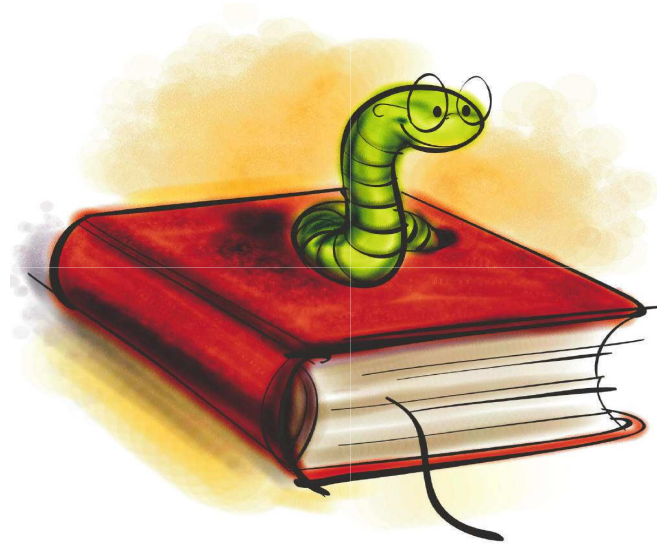


Math Course for Future Elementary Teachers at UBC



Katya Yurasovskaya
CWSEI-Math

Course Description

MATH 230 Introduction to Finite Mathematics

Difference equations, number theory, counting. Intended primarily for students not in the Faculty of Science who wish to have some exposure to mathematical thinking

MATH 335 Introduction to Mathematics

Intensive course with required tutorial. Combinatorics, probability, geometry and elementary number theory. Not for credit in the Faculty of Science.

Course purpose:

- Either course serves as a prerequisite for **Elementary Education Program**

Course Audience

Do you plan to enter Elementary Education Program?

	Yes	Maybe	Total
Fall 2011	30	9	42
Spring 2012	33	7	42

- Majors are Not indicative of future profession: English, Psychology, Drama, etc.
- The course instructor is **not aware** of the course audience and its needs.

Characteristic of Students

- Overwhelmingly female: 4-5 male students in a class of 50-55
- Wide range of abilities and mathematical knowledge:
from inability to multiply fractions (ex: $2/10 * 3/10=20/30$) up to calculus.
- Intense mathematical anxiety:
How did you feel about taking this course when you first registered?
Answer: *worried, scared, anxious, unsure, terrified* (22 out of 29 respondents)
- Expectations of the course to prepare them for their future work as teachers.
- Most students are very hard-working and willing to work hard to succeed, though they need careful guidance in how they need to study.

Main Concerns for Pre-Service and Practicing Elementary Ed Teachers

- Lack of mathematical knowledge
- Lack of Pedagogical Content Knowledge

Societal Implications

- Social gap starts at elementary school level and widens, with children from disadvantaged backgrounds unable to catch up.
- Consistent poor mathematical performance among the US and Canadian students.
- Poor performance in elementary mathematics bars entry to many professions – except elementary education, thus completing the cycle.

Diagnostic Test as Instructor Aid

- Professional plans of students
- Arithmetic and computational fluency
- Knowledge, relevant to elementary education teachers
- Impressions of mathematics. Past mathematical history. Confidence levels

Math 335 - Diagnostic Pre-test - January 2012

Sample

Solution: Number of respondents: 36

1. $\frac{3}{101} \times \frac{101}{5} =$

Solution:

Correct, and simplified: 8 Correct, not simplified: 9
Wrong: 15 Left blank: 4

2. $\frac{1}{2} + \frac{2}{3} =$

Solution:

Correct: 23 Wrong: 12 Blank: 1

3. (a) Compute: $1\frac{3}{4} \div \frac{1}{2}$

Solution:

Know method: Yes: 11 No: 18
Arithmetic correct: Yes: 11 No: 18
Simplified: Yes: 1 No: 28
Left blank: 7

Math 335 - Diagnostic Pre-test - January 2012

Sample

4. Compute perimeter and area of a 4 by 8 rectangle.

Solution:

Perimeter: Correct: 29 Wrong: 7

Area: Correct: 26 Wrong: 10

5. In what year was the last math class you took?

Solution:

2011: 0 2010: 0 2009: 8 2008: 8 2007: 6 2006: 1

2005 or earlier: 13

6. What was the last math class you took?

Solution:

Principles of Math 12: 17

Principles of Math 11: 13

Suggested Course Content

Mathematical Thinking

mental calculation, estimation, number sense

identification of errors in calculation & reasoning; explanation of the errors

Numbers & Operations

number theory concepts: primes, prime factorisation, divisibility, GCF, LCM

fractions/decimals/percent; conversions and equivalents

Geometry & Measurement

Language & Reasoning

mathematical definitions (appropriate precision & rigour)

Other topics to choose from (to enhance overall goals)

arithmetic with different bases

algorithms (history, variety)

Source: Recommendations of The Math for Elementary Education Core Curriculum Subcommittee,

The British Columbia Committee on the Undergraduate Program in Mathematics & Statistics.

See [BCCUPMS report](#) for full list of topics

What do you think?



When dividing fractions,
why do we “flip and
multiply”?

"Just a darn minute! — Yesterday
you said that X equals two!"

References

- **Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States**, Liping Ma (1999)
- **The Mis-Education of Mathematics Teachers**, Hung-Hsi Wu. *AMS Notices*, (2011)
- **What's Sophisticated about Elementary Mathematics**, Hung-Hsi Wu. *American Educator* (2009).
- **Knowing Mathematics for Teaching: Who Knows Mathematics Well Enough To Teach Third Grade, and How Can We Decide?** Deborah Loewenberg Ball, Heather C. Hill, and Hyman Bass. *American Educator* (2005).
- **Mathematics for Elementary Teachers**, BCCUPMS report, 2010
- Semi-structured interviews with faculty: Andrew Adler(UBC), Mark Maclean (UBC), Malgorzata Dubiel (SFU)