MATH 160A: Higher Arithmetic
3 Credits, 3 hours lecture

This course is restricted to students of Elementary Education. It will provide them with an elementary introduction to Logic, Sets, Number Theory, Representations of Numbers, Number Systems, and Probability Theory.

Prerequisites: MATH 30-1 or MATH 30-2 or permission of the Program Chair

Instructor

Instructor Name: Matthew Morin
Office location: S211E
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matthew.morin@keyano.ca

Office Hours

Monday	10:00 – 12:00
Thursday	13:00 – 15:00
Friday	14:00 – 15:00

Hours of Instruction

Tuesday	14:00 – 15:00 (S216)
Wednesday	11:00 – 12:00 (S216)
Friday	13:00 – 14:00 (S216)

Required Resources
No course textbook. Resources available on Moodle (http://ilearn.keyano.ca).

Recommended Resources
The Math Fair Booklet; Ted Lewis.

Course Outcomes

Upon successful completion of the course, student will be able to:
- Compute arithmetical expressions of numbers using the correct order of operations.
- Evaluate arithmetical operations in the context of sets, logic, and other areas.
- Explain the difference between exact division and division with remainders.
- Use divisibility rules to determine whether a large number is divisible by certain small factors (such as 2, 3, 4, 5, 6, 8, 9, 10, 12).
- Utilize the arithmetic of remainders (modular arithmetic) to answer questions about divisibility.
- Demonstrate how to find the greatest common divisor of a pair of numbers by comparing factors, using prime factorizations, and by using the Euclidean algorithm.
- Compute prime factorizations and use these to answer problems regarding divisibility, such as finding greatest common divisors and least common multiples.
- Perform basic arithmetic of numbers using alternative numeration systems.

Evaluation

Assignments	15%
Math Fair	15%
Midterm Exam	25%
Final Exam	45%
Total	100%

A grade of C- is required for progression or transfer.

Assignments:

In any mathematics course the best way "to learn" is "to do." The instructor can teach you about the course ideas and demonstrate the mechanics of solving the problems—and can make it look very easy—but growing adept at solving these problems will take a lot of practice and can be a struggle. Although the assignments do not count for a large part of your final grade they are essential in preparing you for the types of problems you will be solving on the exams.

The assignments should be typed or written neatly, stapled, and handed in on the assigned due date. A cover page is not required, but the assignment should show the assignment number, the course number, and the student's name (printed, not written). The problems should be solved in the order given. A late assignment may be accepted, or may incur a penalty.

Although you may work with other students while completing assignments, it is essential that the work you present is your own—see the section on academic misconduct below. Using other students solutions as your own may result in serious academic penalties. If you work with other students on assignment problems, be sure that you know how to solve the problems and that you write out your own solutions in your own words.

Math Fair Project:

As individuals or in small groups, each "group" will be responsible for creating a project for a Math Fair activity to be used in this semester. This activity should be approachable without any specific mathematical knowledge, but it should make use of mathematical thinking (logic, problem solving, etc.). Specific details will be provided in-class and on our Moodle page.

Tests:

All tests will be written and are closed-book. Although calculators are not often needed, they are allowed for exams in this course. The topics covered by each test will be described in advance in-class and these details will be posted on Moodle. These tests are meant to test how well you have "mastered" the subject matter. Satisfactory completion of the relevant assignment problems, reading the relevant textbook sections, and studying the course notes is the very minimum amount of work that should prepare you for the types of problems that could appear on a test. However, as tests are cumulative, you may be solving problems that require ideas that bridge across several sections of the course.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory **Progression**	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	C-	1.7	60 – 63.9	
Poor **Minimum Pass**	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

Proposed Schedule of Topics

Week	Dates	Topic	Chapter Sections
1	Sept. 5 - Sept. 9 (Classes begin Sept. 7)	Arithmetic, Operations and Properties	Topic 1: Abstract Arithmetic
2	Sept. 12 - Sept. 16	More Properties of Arithmetic	Topic 1: Abstract Arithmetic
3	Sept. 19 – Sept. 23	Operations/Arithmetic (cont.)	Topic 1: Abstract Arithmetic
4	Sept. 26 – Sept. 30	Set Theory,	Topic 2: Sets
5	Oct. 3 – Oct. 7	Logic, Divisibility, Divisibility Rules	Topic 3-1: Divisibility
6	Oct. 10 – Oct. 14 (No Classes on Monday—**Thanksgiving**)	Greatest Common Divisor, Euclidean Algorithm	Topic 3-2: Divisibility
7	Oct. 17 – Oct. 21	Prime Numbers, Fundamental Theorem of Arithmetic	Topic 3-3: Divisibility
8	Oct. 24 – Oct. 28	*Midterm*, Applications of Primes	Topic 3-3: Divisibility
9	Oct. 31 – Nov. 4	Word Problems, Extended Euclidean Algorithm,	Topic 4: Diophantine Equations
10	Nov. 7 – Nov. 11 (No Classes on Wednesday, Thursday, Friday—**Reading Days, Remembrance Day**)	Diophantine Equations	Topic 4: Diophantine Equations
11	Nov. 14 – Nov. 18	Remainders, Congruence	Topic 5: Modular Arithmetic
12	Nov. 21 – Nov.25	Modular Arithmetic, Divisibility Rules	Topic 5: Modular Arithmetic
13	Nov. 28 – Dec. 2	Historical Numeration Systems	Topic 6: Numeration Systems
14	Dec. 5 – Dec. 9 (**Classes end Dec. 8**)	Arithmetic in alternate bases	Topic 6: Numeration Systems
	Dec. 12 – Dec. 16	*Exam Period*	

Please Note:
Date and time allotted to each topic is subject to change.

Performance Requirements

Student Responsibilities

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a students' learning experience. Second, attending class is a good way to keep informed of matters relating the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College 2016-2017 credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found at http://ilearn.keyano.ca/. Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

Specialized Supports

Counselling and Disability Services

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

SKILL Centre

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

Authorization

This course outline has been reviewed and approved by the Program Chair.

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Matthew Morin, Instructor

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Louis Dingley, Chair   Date Authorized

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Guy Harmer, Dean   Date Authorized

Signed copies to be delivered to:
Instructor
Registrar's Office