# NEW RIVER COMMUNITY COLLEGE

## DUBLIN, VIRGINIA

## COURSE PLAN

**Course Number and Title:**      MTH 151 – Mathematics for the Liberal Arts I

**Prepared by:**      Caroline M. Abbott          Spring, 2007
                            (Instructor)                                    (Date)

**Approved by:**                                          Spring, 2007
                            (Interim Dean)                              (Date)

## I.      Course Description

Presents topics in approaches to problem solving, sets, logic, numeration and mathematical systems, geometric systems and elementary computer concepts. Prerequisites: satisfactory score on appropriate proficiency examination (or) check catalogue, and MTH 03, MTH 04, and MTH 06 or equivalent. Equivalent high school courses are Algebra I, Algebra II and Geometry. Lecture 3 hours per week. (3 credits)

## II.      Introduction

This course in intended for transfer students in majors other than sciences, business, engineering, and other mathematics related areas. It fulfills the requirements for two-year student in Computer Information Systems.

This is a survey course. The emphasis will be on four major topics–approaches to problem solving, sets, logic, mathematical systems, and geometric systems.

## III.      Specific Objectives

1.      Distinguish between deductive and inductive reasoning.
2.      Determine the most probable next term in a list of numbers.
3.      Use inductive reasoning to predict the next equation in a list.
4.      Use the method of Gauss to find sums.
5.      Use successive differences to determine the next number in the sequence.
6.      Use formulas to find sums.
7.      Use formulas to find numbers in a pattern.
8.      Use strategies for problem solving.
9.      Perform basic calculator operations.
10.      Estimate answers to problems.
11.      Interpret pie charts, bar graphs, and line graphs.
12.      Explore properties of prime and composite numbers.

13.  Find natural number factors.
14.  Use divisibility tests.
15.  Find prime factorization.
16.  Explore perfect and amicable numbers.
17.  Determine whether numbers are abundant or deficient.
18.  Write even numbers as the sum of two primes.
19.  Find twin primes.
20.  Describe sets, list elements and use set-builder notation.
21.  Identify finite and infinite sets.
22.  Find n (A) for each set.
23.  Use set symbols.
24.  Determine whether two sets are equal, equivalent, both, or neither.
25.  Identify subsets and proper subsets.
26.  Find the number of subsets and proper subsets.
27.  List the subsets of a set.
28.  Find complements of sets.
29.  Find intersections, unions, and complements of given sets.
30.  Describe sets in words.
31.  Find Cartesian products.
32.  Use Venn diagrams to find intersections, unions, and complements.
33.  Write descriptions of Venn diagrams.
34.  Give cardinality of unions, intersections, and Venn diagram regions.
35.  Solve survey problems.
36.  Explore transformation geometry.
37.  Explore non-Euclidean geometry, topology, and networks.
38.  Explore chaos and fractal geometry.
39.  Identify statements.
40.  Write negations of statements containing quantifiers.
41.  Use Euler diagrams to determine whether an argument is valid or invalid.
42.  Identify compound statements.
43.  Convert between statements and symbols.
44.  Find truth values of compound statements.
45.  Construct truth tables.
46.  Use conjunction, disjunction, and exclusive disjunction.
47.  Use De Morgan's Laws to negate compound statements.
48.  Tell whether conditionals are true or false.
49.  Write converse, inverse, or contrapositive.
50.  Write "if then" statements.
51.  Tell whether biconditionals are true or false.
52.  Negate conditional statements.
53.  Rewrite a conditional as a disjunction.
54.  Use truth tables to decide whether a pair of statements is equivalent.
55.  Use a truth table to decide whether an argument is valid or invalid.
56.  Use computer logic to add binary numbers.
57.  Convert Egyptian numerals to Hindu-Arabic form and vice versa.
58.  Convert Chinese numerals to Hindu-Arabic form and vice versa.
59.  Use the Egyptian algorithm to find products.
60.  Write  numbers in expanded form.
61.  Simplify numbers in expanded form.

62. Add and subtract in expanded form.
63. Identify numbers represented on abaci.
64. Use the lattice method, Napier's rods, and the Russian peasant method to find products.
65. Use the nines complement method to perform subtractions.
66. Practice basics of different numeric bases.
67. Convert between decimal form and other bases.
68. Convert between non-decimal bases.

## IV. **Instructional Procedures**

The primary instructional techniques will be lecture and problem solving. Emphasis will be placed on discussing assigned homework in class. Students will be encouraged to ask questions and respond to questions asked by either the instructor or another student.

## V. **Instructional Materials**

A. Student Materials
   1. Textbook: <u>Mathematical Ideas</u>, $10^{th}$ Edition
      Authors: Miller, Heeren, and Hornsby
      Publisher: Addison-Wesley Longman, 2001
      Date: 2001. ISBN: 0-321-21863-9

   2. MathXL Access Code, bundled with textbook or purchased separately. ISBN: 0-201-72611-4

   3. A calculator with algebraic logic. TI 36X preferred.

B. Instructor Materials
   1. The instructor will use chalkboard and electronic media.
   2. The instructor will prepare handouts to supplement material in the book when appropriate.

Additional resource materials for some New River Community College classes can be found on the NRCC Web-based learning site at nr.edu/learninglinks.

The NRCC community values the pluralistic nature of our society. We recognize diversity that includes, but is not limited to, race, ethnicity, religion, culture, social class, age, gender, sexual orientation and physical or mental capability. We respect the variety of ideas, experiences and practices that such diversity entails. It is our commitment to ensure equal opportunity and to sustain a climate of civility for all who work or study at NRCC, or who otherwise participate in the life of the college.

**VI.** <u>**Course Content**</u>

       Chapter 1 - Approach to Problem Solving
       Chapter 5 - Sections 1, 2, & 5 - Number Theory
       Chapter 2 - Sets
       Chapter 9 - Sections 6, 7, 8 - Geometry
       Chapter 3 - Logic
       Chapter 4 - Numeration and Mathematical Systems

**VII.** <u>**Evaluation**</u>

A student's final grade is determined through a variety of assessments. The breakdown is as follows:

| Category | Total Points Possible | Percent of Final Grade |
|---|---|---|
| MathXL Homework | 75 | 7.5 |
| Quizzes | 125 | 12.5 |
| Project | 150 | 15 |
| Miscellaneous | 50 | 5 |
| Tests | 400 | 40 |
| Final Exam | 200 | 20 |
| TOTAL | 1000 | 100 |

The following grading scale is used:

| | Least Number of Points Needed |
|---|---|
| 90 - 100 = A | 900 |
| 80 - 89 = B | 800 |
| 70 - 79 = C | 700 |
| 60 - 69 = D | 600 |
| 0 - 59 = F | |

Assignments submitted through Blackboard or MathXL are due by 11 a.m. on the due date. Assignments turned in in class are due at the beginning of class. Assignments turned in late do not receive full credit.

If a student has an average of 90 (A) on all four unit tests and has a final average of at least 90 (A) on all four unit tests, all eleven quizzes, the project, the MathXL homework, and the miscellaneous assignments, the student will not be required to take the final exam and will receive an "A" for this course.

<u>Homework</u> – Each section has a MathXL assignment, a book assignment, or both. Each MathXL assignment counts 5 points. Your MathXL score will be converted to a 5-point scale.

<u>Quizzes</u> – There are eleven (11) quizzes throughout the semester. They are either

administered through MathXL or distributed in class to be completed outside of class. Either way, the quiz problems are similar to those encountered in homework. There is also a 25-point cumulative quiz.

Project – The project has two componenets: a general exploration of the topics presented in sections 9.6, 9.7, and 9.8 of the textbook with worksheets for each section and a more-specific exploration in greater depth of one of the topics. Each component is worth 75 points for a total of 150 points.

Miscellaneous – These will be announced in class and/or in Blackboard.

Tests – There are four (4) 100-point tests. There are no make-up tests. If a student misses a test, the grade for that test is "0".

Final Exam – There is a 100-point comprehensive final exam. For points, the final exam score is recorded twice. The final exam grade also replaces the lowest test grade if doing so is to the student's advantage. Everyone takes the final exam.

Disability Statement – If you are a student with a documented disability who will require accommodations in this course, please register with the Disability Services Office located in the Counseling Center for assistance in developing a plan to address your academic needs.

Please feel free to talk with me privately concerning your accommodations and we will work together with the D.S.O. staff, Jeananne Dixon and Phyllis Holliman (Rooker Hall, Counseling Center).

## VIII. **Withdrawal Policy**

### **Student Initiated Withdrawal Policy**

A student may drop or withdraw from a class without academic penalty during the first sixty percent (60%) of a session. For purposes of enrollment reporting, the following procedures apply:

a.      If a student withdraws from a class prior to the termination of the add/drop period for the session, the student will be removed from the class roll and no grade will be awarded.

b.      After the add/drop period, but prior to completion of sixty percent (60%) of a session, a student who withdraws or is withdrawn from a course will be assigned a grade of "W." A grade of "W" implies that the student was making satisfactory progress in the class at the time of withdrawal, that the withdrawal was officially made before the deadline published in the college calendar, or that the student was administratively transferred to a different program.

c.      After that time, if a student withdraws from a class, a grade of "F" or "U" will be assigned.  Exceptions to this policy may be made under documented mitigating circumstances if the student was passing the course at the last date of attendance.

A retroactive grade of "W" may be awarded only if the student would have been eligible under   the previously stated policy to receive a "W" on the last date of class attendance. The last date of attendance for a distance education course will be the last date that work was submitted.

Late withdrawal appeals will be revised and a decision made by the Director of Student Services.

### Instructor Initiated Withdrawal Policy

A student who adds a class or registers after the first day of class is counted absent from all class meetings missed.  Each instructor is responsible for keeping a record of student attendance in each class.

Students who have not attended class or picked up/accessed distance learning materials by the last day to drop class and receive a refund must be withdrawn by the instructor during the following week.  No refund will be applicable.

Since attendance is not a valid measurement for Distance Education (DE) courses, students may be withdrawn due to non-performance.  Students should refer to his/her DE course plan for the instructor's policy.

When a student's absences equal twice the number of weekly meetings of a class (equivalent amount of time for summer session), the student may be dropped for unsatisfactory attendance in the class by the instructor.

When an instructor determines that absences constitute unsatisfactory attendance, an Instructor Withdrawal Form should be completed and submitted to the Admissions and Records Office within five days of when the student met the withdrawal criteria.  The last date of attendance must be documented.  A grade of "W" will be recorded during the first sixty percent (60%) period of a course.  Students withdrawn after the sixty percent (60%) period will receive a grade of "F" or "U" except under documented mitigating circumstances when a letter of appeal has been submitted by the student.  A copy of this documentation must be placed in the student's academic file.

The student will be notified of the withdrawal by the Admissions and Records Office.  An appeal for reinstatement into the class may be approved only by the instructor.

## IX.    Attendance Requirements

Attendance will be a factor in grading.  If the student has missed no days, three (3) percentage  points will be added to his/her final average prior to assigning a letter grade.  If he/she misses exactly one (1) day, two (2) points will be added.  If he/she misses exactly two (2) days, one (1) point will be added.  With classes that meet Tues. and Thurs., each class meeting counts 11/2 days for this purpose.

Attendance on a test day or exam day is mandatory because there are no make-up tests.

The attendance requirements outlined in the College's Instructor Initiated Withdrawal Policy will be followed.

## X.   Student Help

Help is available to students in several forms including:

a.   A videotape series on CD-ROM is provided with the text for student convenience.

b.   Math Tutor Center (http://www.awl.com/tutorcenter)
Live one-on-one tutoring is available to students who purchase the text.  A Tutor Center registration number is bundled with the text.  Students can contact the Tutor Center via toll-free phone, fax, e-mail, or Internet.

c.   A web site for this text (http://www.awl.com/mhh) provides additional resources for students.

d.   I am available for help by phone, e-mail, voice mail, or during office hours.

e.   Other students taking the course are often a good source of help.

f.   The "Academic Assistance" in Martin Hall has both student and professional tutors.

## XI.   Instructor

Caroline M. Abbott
Office:              43 Godbey Hall
Office Hours:        MWF:  10:00 - 11:00 a.m., 12:30 - 2:30 p.m.
                     Tu:     1:30 - 2:30 p.m.
                     Additional hours by appointment only
Phone:               674-3600, ext. 4264
E-mail:              nrabboc@nr.edu