

**GERMANNA COMMUNITY COLLEGE  
FREDERICKSBURG AREA CAMPUS**

Mrs. Delois R. McCormick

**COURSE OUTLINE  
MTH 151-204  
Mathematics for the Liberal Arts I**

Fall 2009

- I. COURSE DESCRIPTION: MTH 151 presents topics in sets, logic, numeration systems, geometric systems, and elementary computer concepts. Prerequisites: a placement recommendation for MTH 151 and Algebra I, Algebra II and Geometry or equivalent.
- II. TEXTBOOK: Blitzer, Robert. Thinking Mathematically, 4<sup>th</sup> Edition, Prentice Hall: 2008.
- III. TOPICAL OUTLINE:
- A. Set Theory (Chapter 2)
  - B. Logic (Chapter 3)
  - C. Number Representation and Calculation (Chapter 4)
  - D. Number Theory and the Real Number System (Chapter 5)
  - E. Algebra: Equations and Inequalities (Chapter 6)
  - F. Geometry (Chapter 10)
- IV. OBJECTIVES: Upon completion of MTH 151 the student will be able to:
- A. Set Theory (Chapter 2):
    1. Designate a set by word description, listing or set builder notation.
    2. Define and recognize the empty set.
    3. Find the cardinal number of a set.
    3. Determine whether a set is finite or infinite.
    4. Determine if two sets are equal.
    5. Determine if two sets are equivalent.
    6. Use the symbols  $\in$  and  $\notin$  appropriately.
    7. Apply set notation to sets of natural numbers.
    8. Determine the number of subsets and proper subsets of a given set.
    9. Use the symbols  $\subset$ ,  $\subseteq$ , and  $\not\subset$  appropriately.
    10. Use Venn diagrams to illustrate relationships among sets.
    11. Find the complement of a set and the intersection, union, or difference of two sets.
    12. Use the formula for  $n(A \cup B)$ .
    13. Understand the meaning of "and" and "or."
    14. Perform set operations with 2 or 3 sets.
    15. Use Venn diagrams with 2 or 3 sets.
    16. Use Venn diagrams to prove the equality of sets.
    17. Solve survey problems with a Venn diagram.

- B. Logic (Chapter 3):
1. Identify English sentences that are mathematical statements.
  2. Express simple and compound statements with symbols.
  3. Form the negation of a simple, compound or quantified statement.
  4. Use the dominance of connectives.
  5. Construct truth tables for negation, conjunction, disjunction, conditional, and biconditional.
  6. Determine the truth value of a specific case for the above cases.
  7. Apply DeMorgan's Laws.
  8. Recognize a tautology.
  9. Given a conditional statement be able to construct its converse, inverse and contrapositive.
  10. Use truth tables to show that two statements are equivalent.
  11. Use Euler diagrams to analyze arguments.
  12. Test the validity of an argument with a truth table.
  13. Recognize and use argument forms to determine the validity of an argument (modus ponens, modus tollens, disjunctive syllogism, reasoning by transitivity, fallacy of the converse, and fallacy of the inverse).
- C. Number Representation and Calculation (Chapter 4):
1. Evaluate an exponential expression.
  2. Write a Hindu-Arabic numeral in expanded form and expanded form as a Hindu-Arabic numeral.
  3. Understand and use the Babylonian and Mayan numeration systems.
  4. Convert from base ten to another base and from another base into base ten.
  5. Perform operations in bases other than base ten.
  6. Understand and use the Egyptian, traditional Chinese, Roman, and Ionic Greek numeration systems.
- D. Number Theory Chapter 5):
1. Determine if one number is divisible by another.
  2. Identify prime and composite numbers.
  3. Write the prime factorization of a composite number.
  4. Find the greatest common divisor and the least common multiple of two or more numbers.
  5. Solve problems using the greatest common divisor and least common multiple.
  6. Define and graph the integers.
  7. Use the symbols  $<$  and  $>$ .
  8. Find the absolute value of an integer.
  9. Perform operations on integers.
  10. Apply the Order of Operations in simplifying a expression.

11. Define rational numbers.
  12. Reduce rational numbers.
  13. Convert between improper fractions and mixed numbers.
  14. Convert between fractional and decimal form.
  15. Perform operations on rational numbers.
  16. Solve application problems with rational numbers.
  17. Define irrational numbers.
  18. Simplify square roots in radical form.
  19. Perform operations with square roots.
  20. Rationalize the denominator.
  21. Recognize properties of real numbers: closure, commutative, associative, identity, inverse, and distributive.
  22. Use the properties of exponents to simplify exponential expressions.
  23. Convert between decimal and scientific notation.
  24. Solve application problems using scientific notation.
  25. Write the terms of an arithmetic or geometric sequence.
  26. Use the formulas for the general term of an arithmetic or geometric sequence.
- E. Algebraic Expressions and Formulas (Chapter 6):
1. Evaluate algebraic expressions.
  2. Use mathematical models.
  3. Simplify algebraic expressions.
  4. Solve linear equations.
  5. Solve formulas for specific variables.
  6. Identify equations with no solutions or infinitely many solutions.
  7. Solve problems with linear equations.
  8. Solve proportions.
  9. Solve proportion application problems.
  10. Solve direct and inverse variation problems.
  11. Multiply to binomials using FOIL.
  12. Factor trinomials.
  13. Solve quadratic equations by factoring or the quadratic formula.
  14. Solve quadratic application problems.
- F. Geometry (Chapter 10):
1. Understand points, lines, and planes as the basis of geometry.
  2. Solve problems involving angle measures.
  3. Solve problems involving angle relationships in triangles.
  4. Solve problems using the Pythagorean Theorem.
  5. Classify a polygon according to the number of sides.
  6. Recognize the characteristics of certain quadrilaterals.
  7. Solve problems involving perimeter and circumference.
  8. Understand tessellations and their angle requirements.
  9. Solve problems involving area.

10. Calculate the volume of a box, cylinder, sphere, cone, and pyramid.
11. Calculate the surface area of a cube, box, and cylinder.
12. Discuss the differences between Euclidean and non-Euclidean geometries.
13. Classify objects topologically by genus.
14. Apply Euler's method for determining if a path is traversable.

V. REQUIREMENTS:

- A. **Schedule:** Students must maintain the schedule that is outlined on the assignment sheet. There are specific due dates for all assignments. Work is assigned on a weekly basis as listed in the schedule. ***Work will not be accepted late except as outlined in this course outline or as authorized by the instructor.*** Work turned in without documentation and/or authorization will be counted as a zero. Written homework will be collected on exam days.
- B. **Materials:** Students must purchase and bring to class:
  1. Textbook
  2. Paper/Notebook
  3. Scientific calculator
- C. **Attendance:** ***Students who do not attend class by the end of the second week of classes will be administratively withdrawn from the course.*** Otherwise, it is the student's responsibility to withdraw from class. Those who withdraw by the last date to withdraw without academic penalty will receive a "W" in lieu of an "F." (See important dates in this outline.) The maximum number of absences permitted in a class that meets twice a week is four. Those who miss more than four classes in a semester risk failure unless extenuating circumstances can be proven with appropriate documentation.
- D. **Readings:** Students must read each section of the text relative to the assigned problems.
- E. **Lectures:** ***Mrs. McCormick's lecture notes are located under the LECTURES button on the course menu.*** Lecture notes will be distributed in class. Those who are absent or who misplace the notes should print copies there.
- F. **Email:** ***Students should check their GCC email at least three times a week for updates and announcements. Students must contact the instructor through the GCC email system unless the system is down. In that case another email system may be used, but the student must put his or her name and course name in the subject line.*** Generally the instructor will respond to email and phone messages within 48 hours, excluding some weekends and holidays. ***Email is the preferred means of contact.***

- G. **Announcements:** *Students should sign onto the Blackboard at least three times a week to work on quizzes and to check for updates and announcements.*
- H. **Written Homework:** The student must complete the written homework as listed on the assignment sheet. ***All work must be shown to receive credit on the written homework.*** The student may use the written homework on the exam. The homework will be collected on a daily basis and will be graded within a week of the due date. Five to ten problems will be selected at random and graded for correctness for 50% of each homework grade; the remaining 50% of each homework grade will come from the student making an honest attempt at all of the problems. The following are required to receive full credit for the homework assignment:
1. The student must put his or her name at the top of the page along with the course and section number and the section of the text that the homework covers.
  2. Each homework problem should be copied.
  3. All work must be shown. I need to see your thought processes for arriving at an answer. The thought processes are more important than the final answer.
  4. Circle or box in the final answer. Include units if they are appropriate. Be sure to answer the question completely.
  5. You should mark the problems you have questions on with an asterisk and ask questions on them in class before the homework is collected.
  6. Homework will not be accepted late. You have two passes that you may use in place of homework. After that any homework not submitted on time will receive a zero.
- I. **Labs:** The student must complete the labs as listed on the assignment sheet. Frequently the labs will be completed in groups. Each student should maintain his or her own copy of the lab and should make sure his or her name is on the copy of the lab that is submitted by the group. The labs may be submitted up to **a week** late with a ten point reduction in the grade. Any labs submitted more than a week late will receive a zero. Labs submitted on time will be graded within a week of the due date.
- J. **Online Quizzes:** The student must take several online quizzes up to 3 times until the due date. No make-up quizzes will be given. All quizzes must be completed by the due date listed on the assignment sheet. If a student experiences technical difficulties when taking an online quiz, the instructor must be notified by e-mail or phone within 24 hours of the due date to make alternate arrangements for taking the quiz. Make sure you submit the quiz when you have completed it. ***Please print a copy of your quiz after submitting it so that***

***you have a back-up copy in case an error is made during the electronic transmission of your grade. In the event you find that your quizzes are being “lost” and not recorded on Blackboard, you should make a copy of the score sheet by pressing the control key and the Print Screen key. Then open WORD and select “paste” to paste the sheet on a WORD page. Attach the WORD page to an email and send it to the instructor so that the quiz score can be recorded.***

- K. **Exams:** The student must take **three** exams. The exams are paper and pencil exams and will be **open notes and homework** but **not open book**. **Students who miss an exam must contact the instructor by phone or email within 24 hours of the due date for the exam to schedule a make-up exam. Documentation will be required.** Any missed exam must be made up within a week of the original due date or it will be recorded as a zero. Exams taken on the scheduled date will be graded within a week.
- L. **Academic Honesty:** The student is expected to act in accordance with academic honesty in this class. Those caught cheating on homework, a quiz, test or exam or plagiarizing (copying from another's work) will receive a zero on that quiz, test, exam, or assignment. The cheating incident will be reported to the Dean of Student Development Services who will place the information in the student's file. See the Student Handbook at the end of the current catalog for the complete college policy on academic honesty.
- M. **Disabilities:** If a student has a disability, it is the responsibility of the student to contact the special needs counselor to obtain the appropriate paperwork to receive accommodations. The student should then arrange to ***meet with the instructor during office hours to discuss the appropriate accommodations for the class.***

## VI. EVALUATION:

- A. Each student's semester grade will be based on:
1. Labs—15%
  2. Homework-15%
  3. Quizzes—20%
  4. Exams—50%
- B. The grades will be awarded on the basis of:
1. 90%-100%      A
  2. 80%-89%      B
  3. 70%-79%      C
  4. 60%-69%      D
  5. Below 60%      F

VII. OFFICE INFORMATION:

- A. Room: 206 in Phase II of FAC  
 B. Phone: (540) 891-3037  
 C. Office Hours:                      Online Office Chat:  
 Monday, Tuesday, & Thursday              Tuesday  
 8:30am-12:30pm                              8-9pm

D. E-mail address: [dmccormick@germanna.edu](mailto:dmccormick@germanna.edu) Note: All communication between the student and the instructor must be made via GCC email accounts. Students may not communicate with the instructor via other email systems. Mail sent by other systems will not be opened. The only exception is when the GCC e-mail is down; in that case you may use your personal e-mail account **as long as you put your name and the course name in the subject line.**

VIII. IMPORTANT DATES:

- A. Classes begin: August 20  
 B. Last day to add a class or change from audit to credit: August 26  
 C. Last day to drop with refund: September 3  
 D. Holiday (College closed): September 7  
 E. College Learning Day/Fall Break (No classes): October 1-3  
 F. Last day to withdraw without grade penalty: October 22  
 G. Classes end: December 12  
 H. Final examination: Thursday, December 17  
 12:30-3pm

**MTH 151-204  
 Tentative Assignment Sheet  
 Fall 2009**

<b>Date</b>	<b>Sections</b>	<b>Assignment</b>	<b>Due Date</b>
<b>8-20</b>	<b>2.1</b>	<b>pp. 55-56 #1-99(odd)</b>	<b>8-25</b>
		<b>Student Information Lab</b>	
<b>8-25</b>	<b>2.2 &amp; 2.3</b>	<b>pp. 65-66 #1-49(odd) pp. 76-77 #1-95(eoo)</b>	<b>8-27</b> <b>“eoo” means every other odd</b>
<b>8-27</b>	<b>2.4 &amp; 2.5</b>	<b>pp. 86-87 #1-61(odd) pp. 97-98 #1-31(odd)</b>	<b>9-1</b>
		<b>Quiz on 2.1-2.3</b>	<b>9-3</b>

9-1	2.5 & 3.1	pp. 97-98 #33-47(odd) p. 113 #1-39(odd)	9-3
		Statements Lab	9-1
9-3	3.2 & 3.3	pp. 125-126 #1-89(eoo) pp. 139-140 #1-23(odd)	9-8
		Quiz on 2.4 & 2.5	9-10
9-8	3.3 & 3.4	pp. 139-140 #25-61(eoo) pp. 149-150 #1-73(eoo)	9-10
		Quiz on 3.1 & 3.2	9-15
9-10	3.5 & 3.6	pp. 163-165 #1-75(eoo) pp. 175-176 #1-13(eoo)	9-15
		Negation Lab	9-10
9-15	3.6 & 3.7	pp. 175-176 #17-39(eoo) pp. 186-188 #1-39(odd)	9-17
		Quiz on 3.3-3.5	9-22
9-17	Review	pp. 104-105 #1-22(all) pp. 192-193 #1-29(all)	9-22
		Logic Puzzles Lab	9-29
9-22	Review	Go over questions for Exam 1	
9-24		Exam on Chapters 2 & 3	9-24
9-29	4.1 & 4.2	pp. 201-202 #1-49(odd) p. 208 #1-17(odd)	10-6
10-6	4.2 & 4.3	p. 208 #19-39(odd) p. 214 # 1-37(eoo)	10-8
10-8	4.4 & 5.1	p. 221 #1-55(odd) p. 235 #1-67(eoo)	10-13
		Quiz on 4.1 & 4.2	10-15
10-13	5.2 & 5.3	pp. 247-248 #1-117(eoo) pp. 260-261 #1-99(eoo),125-133(odd)	10-15
		Quiz on 4.3 & 4.4	10-20
10-15	5.4	p. 269 #1-65(odd)	10-20
		Quiz on 5.1-5.3	10-22
10-20	5.5 & 5.6	p. 276 #1-43(odd) pp. 285-286 #1-65(eoo)	10-22
10-22	5.6 & 5.7	pp. 285-286 #67-89, 99-109(odd)	10-27

		<b>pp. 294-295 #1-97(eoo)</b>	
<b>10-27</b>	<b>Review</b>	<b>p. 225 #1-24(all) p. 302 #1-28(all)</b>	<b>10-29</b>
		<b>Fibonacci Lab</b>	<b>10-27</b>
		<b>Quiz on 5.4-5.7</b>	<b>11-3</b>
<b>10-29</b>	<b>Review</b>	<b>Go over questions for Exam 2</b>	
<b>11-3</b>		<b>Exam on Chapters 4 &amp; 5</b>	<b>11-3</b>
<b>11-5</b>	<b>6.1 &amp; 6.2</b>	<b>pp. 309-310 #1-71(eoo) pp. 321-322 #1-75(eoo)</b>	<b>11-10</b>
<b>11-10</b>	<b>6.3 &amp; 6.4</b>	<b>pp. 329-330 #1-23(odd) pp. 338-339 #1-15(odd), 23-33(odd)</b>	<b>11-12</b>
<b>11-12</b>	<b>6.5 &amp; 6.6</b>	<b>p. 347 #1-65(eoo), 85, 87, &amp; 89 pp. 360-366 #1-69(eoo)</b>	<b>11-17</b>
		<b>Quiz on 6.1-6.3</b>	<b>11-19</b>
<b>11-17</b>	<b>10.1 &amp; 10.2</b>	<b>pp. 544-545 #1-35(odd) pp. 552-554 #1-21(eoo)</b>	<b>11-19</b>
		<b>Quiz on 6.4-6.6</b>	<b>12-1</b>
<b>11-19</b>	<b>10.2 &amp; 10.3</b>	<b>pp. 552-554 #25-43(eoo) pp. 561-562 #1-35(odd)</b>	<b>12-1</b>
		<b>Tessellation Lab</b>	<b>12-3</b>
<b>12-1</b>	<b>10.4</b>	<b>pp. 571-571 #1-37(odd)</b>	<b>12-3</b>
		<b>Quiz on 10.1-10.3</b>	<b>12-8</b>
<b>12-3</b>	<b>10.5</b>	<b>pp. 579-580 #1-27(odd)</b>	<b>12-8</b>