DR. M. HERMAN, ROWAN UNIVERSITY
STRUCTURES OF MATHEMATICS (3 sem. hrs.)
SYLLABUS FOR FALL 2008
Section 01201-2 (CRN 40245) T R 10:50 am – 12:05 pm SCI 128
Section 01201-4 (CRN 40247) T R 1:45 pm – 3:00 pm EDUC 3091A

INSTRUCTOR: Dr. M. Herman (herman@rowan.edu)
OFFICE: Robinson Hall, 2nd Floor, Mathematics Department, 256-4500 x 3539
OFFICE HOURS: by appointment (please email to set up an appointment so Dr. Herman can schedule meeting with you around meetings with other students/professors and can be prepared to meet with you), W 2:00 PM – 4:30 PM

COURSE MATERIALS:
*Textbook *Mathematics for Elementary Teachers: A Conceptual Approach* (7th Ed.) by Bennett and Nelson, McGrawHill Higher Education, 2007. ISBN 978-0-07-302284-0 or 0-07-302284-5.
*Activity manual *Mathematics for Elementary Teachers: An Activity Approach* (7th Ed.) by Bennett, Burton, and Nelson, McGrawHill Higher Education, 2007. ISBN 978-0-07-305370-7 or 0-07-305370-8.
**Manipulatives Kit* to accompany the activities in the above two books.

TECHNOLOGY: Any calculator will do, but the Rowan Mathematics Department recommends the Math Explorer Plus (Texas Instruments) for this course. Email will be used as a communication tool between Dr. Herman and students. Email from Dr. Herman will be sent to students' Rowan email accounts throughout the semester.

CATALOG DESCRIPTION: This course concerns the development of number systems and algebraic structures, including the natural numbers, the integers, rational numbers, real and complex numbers. Concrete examples of selected algebraic structures such as modular arithmetic and matrices are also included. Students will be required to reason mathematically, solve problems, and communicate mathematics effectively at different levels of formality, using a variety of representations of mathematical concepts and procedures.

TOPICS: We will use physical materials and models to explore fundamental properties of number systems, to describe real-world relationships, and to explore selected algebraic structures. We will also develop conjectures and intuitive proofs of number theoretic properties. This course is especially appropriate for those students preparing to be elementary or special education teachers.

GRADING SCHEME:
2 Midterm Exams, plus one Final Exam (Exams make up approximately 60% of the course grade.)
Reflective Writings / Homework / Quizzes / Class Participation / Groupwork / Projects (40% of course grade)
Cut-offs: A 93 A- 90 B+ 87 B 83 B- 80
C+ 77 C 73 C- 70 D+ 67 D 63 D- 60
Final semester grades will be reported online and will not be changed once finalized at the end of the semester.

STUDENTS WITH DISABILITIES AND SPECIAL NEEDS: Disabilities and special needs are documented at the Office of Disability Resources in the Academic Success Center in Savitz Hall (x4233 or x4234). Students who wish for special services must provide a Notification of Accommodation letter from the Office of Disability Resources to the instructor as soon as possible at the beginning of the semester. The instructor is not responsible for providing accommodations until she receives the notification letter.

ATTENDANCE: Students are expected to attend class regularly and will sign an attendance sheet on a daily basis. **The instructor is not responsible for covering material missed when a student is absent.** That is, rather than asking the instructor to re-teach material to a student who misses a class, the student should catch up on missed notes and assignments with a classmate. Absences and/or excessive lateness may result in a lowered final grade. **Any graded assignments turned in late as a result of an absence will result in a grade of zero (0) up to a maximal score of half the credit of the completed work.** As shown in the grading scheme above, exams constitute most of the course grade. Attendance at all exams is required. Absence on the day of a regularly scheduled test will automatically result in a grade of zero (0). Permission to be excused from an exam will be given only when documentation of a serious reason for the absence is provided**. No make-up exams or assignments will be administered.**

ACADEMY HONESTY: All work on exams must be your own. The penalty for a cheating offense will minimally be an automatic zero (0) on the related exam (or assignment), up to an automatic F in the course with a report to the Provost's Office. Procedures regarding dishonesty will follow Rowan University policies, as outlined in the Academic Honesty portion of the Student Information Guide available online.

WITHDRAWAL POLICY: Students will be updated on their overall course grade after each midterm exam and any time by request (typically on email). Dates and policies regarding withdrawal from the course will follow Rowan University protocol, including the three deadlines for withdrawal during the semester. Note that the university's policy on course withdrawals during the last four weeks of the semester is that a student may withdraw only if there are circumstances beyond his/her control which prevent him/her from completing the course requirements.

OBJECTIVES: Students will…

1. improve their estimation skills and use estimation as part of the problem-solving process.
2. understand the Standards 2000 perspective on problem solving.
3. justify their solutions, both orally and in writing.
4. improve in their abilities to do mental math.
5. improve in their ability to solve non-routine mathematics problems.
6. identify linear and nonlinear patterns, including those found in Pascal's triangle and the Fibonacci sequence.
7. use variables to generalize patterns and to solve problems.
8. use functional and recursive notation to describe patterns.
9. use problem-solving strategies such as guess and check, use a visual aid, look for a pattern, make a table, make an organized list, work backward, use algebra, solve a simpler problem.
10. use Polya's four-step problem-solving process.
11. understand the six characteristics of the base-ten place-value numeration system (has a base, is a place value system, is multiplicative, is additive, has a zero, is a unique representation system).
12. recognize that there are other number systems, analyze their characteristics, and contrast them with the base-ten place-value system.
13. write base-ten numbers in other bases.
14. use concrete materials (e.g., base-ten blocks, base-four blocks, digi-blocks) to illustrate quantities in other bases.
15. convert between a base-ten number and a number in another base.
16. add, subtract, multiply, and divide in other bases using manipulatives.
17. use properties that apply to an operation on a given set and name those properties (closure, identity, inverse).
18. use properties that apply to binary operations and name them (commutative, associative, distributive).
19. name and describe sets of numbers (natural, whole, integers, rational, irrational, real).
20. classify and create word problems by operation and sub-type of operation (e.g., combining sets addition, comparison subtraction, array multiplication, sharing division).
21. perform operations with integers using concrete materials (e.g., two-color counters).
22. use alternative algorithms and explain why they are valid (e.g., a left-to-right partial sums alternative algorithm to add, a cashier's algorithm to subtract, a partial-products method to multiply).
23. understand and find factors, prime factors, least common multiple, and greatest common factor of numbers.
24. understand and identify prime and composite numbers.
25. use and explain the divisibility rules for 2, 3, 5, 9.
26. recognize that perfect squares have an odd number of factors and explain why.
27. demonstrate addition, subtraction, multiplication, and division of rational numbers with concrete materials and diagrams (e.g., using area, discrete, and linear models).
28. compare, order, and demonstrate equivalence of rational numbers and percents using concrete materials and diagrams.
29. use algorithms when performing the four basic operations with rational numbers and connect the algorithms to the use of concrete materials.
30. use concrete materials and diagrams to solve percent problems.
31. compare, order, and demonstrate equivalence among different representations of rational numbers and percents.
32. understand when a proportion is appropriate for use in solving problems.
33. use various approaches to solving proportions.
34. recognize irrational numbers as nonterminating, nonrepeating decimals.
35. draw a graph to illustrate relationships between variables in a contextual situation and identify whether a given graph illustrates the relationship between variables in a contextual situation.
36. use concrete materials (e.g., algebra-tiles, alge-blocks) to solve equations.