COURSE SYLLABUS

MATH 1410 - Structure of Number Systems I

Instructor: 
Class Hours/Credit Hours: 3
Phone: 
Office: 
E-mail: All e-mail from the student should be from the e-learn system.
(Alternate e-mail:)
Classroom: 

Catalog Course Description: The study of relations, functions, numeration systems, and whole number systems.

Entry Level Standards: The beginning student is expected to have a mathematical competence in algebra to the degree that the student can: a) simplify algebraic expressions, b) solve linear equations, and c) graph linear functions. The student should have an ability to read on the college level and be able to reason logically.

Prerequisites: Two years of high school algebra and acceptable test scores; or DSPM 0850.
Corequisites: None

Textbook and Other Reference Materials:
- Manipulative Kit to accompany activities in the textbook.
- A calculator capable of performing fraction arithmetic is recommended. Instructors will use the Texas Instruments TI-84 graphing calculator and/or other Texas Instruments calculators appropriate for elementary and middle school. If you have a different calculator, you are responsible for learning the operation of your calculator. There will be some problems on which you will not be allowed to use a calculator.

Email Communication
Please note all communication with instructors about your course work should be through the eLearn Email system. For assistance on how to use the eLearn Email tool go to this url: http://river.chattanoogastate.edu/orientations/Student_PDFs/eLearn_eMail_aug09.pdf.

For all other communication the official email system used by the college is through Tiger Mail. This is accessible by clicking the blue paw icon from the top right hand side of your Tiger Web home page https://tigerweb.chattanoogastate.edu/cp/home/displaylogin.

PROGRAM STUDENT LEARNING OUTCOME:
PSLO1 Acquire additional competencies needed for transfer for a BA\BS degree.

COURSE STUDENT LEARNING OUTCOMES:
CSLO1. Student will show evidence of personal work ethic through class attendance and participation.
CSLO2. Student will use mathematics to solve problems and determine if the solutions are reasonable.
CSLO3. Student will use mathematics to model real world behaviors and apply mathematical concepts to the solution of real-life problems.
CSLO4. Student will make meaningful connections between mathematics and other disciplines.
CSLO5. Student will use technology for mathematical reasoning and problem solving.
CSLO6. Apply mathematical and/or statistical reasoning to analyze data and graphs.

I. Learning Indicators

Upon successful completion of the course a student should be able to:

• Solve problems using appropriate strategies including: making a drawing, guessing and checking, making a table, using a model, looking for a pattern, writing an algebraic equation, and working backwards.
• List the specific terms or figures in a geometric pattern and/or numeric pattern including Pascal’s Triangle, arithmetic sequences, geometric sequences, triangular numbers, Fibonacci numbers and others.
• Use finite difference and inductive reasoning to determine the next number in a given sequence.
• Distinguish between algebraic expressions and equations and use variable appropriately.
• Write algebraic expressions or equations for given situations.
• Solve equation/inequalities using a balance-scale model.
• Solve equation/inequalities algebraically.
• Use correct notation to describe elements in a set, including complements, subsets, equivalent sets, equal sets, disjoint sets, union of sets, intersection of sets, empty sets and universal sets.
• Determine the cardinal number of a set.
• Determine whether given sets can be placed in a one-to-one correspondence and place sets in a one-to-one correspondence.
• Use Venn diagrams to describe the relationship between sets.
• Perform basic operations on sets including intersection, union and complement.
• Use Venn diagrams and elementary set theory to solve problems.
• Distinguish between functions and relations.
• Determine the domain and range of a given function.
• Display relations and/or functions using a variety of formats including arrow diagrams, tables, formulas, ordered pairs, and graphs.
• Solve problems involving functions.
• Interpret given graphs.
• Given a set of premises, determine if the conclusion is valid using the laws of contraposition and detachment.
• Write out the converse, inverse and contrapositive for a given conditional statement.
• Identify and write integers using ancient numeration systems including Roman, Mayan, and Hindu-Arabic.
• Write base ten numbers in expanded form and determine the place value for each digit.
• Use models to illustrate positional numeration and place values. (Examples: Bundles of sticks or straw model).
• Convert between base-ten numerals and different base systems including base 2, 5, 3, 7, 12 and others.
• Compare numbers written in different bases.
• Identify and use appropriate properties for a given addition problem including closure, associative, identity, and commutative.
• Use a variety of models for whole numbers addition algorithms including left-to-right addition, base-ten blocks, partial sums, re-grouping, and scratch method.
• Solve problems using a conceptual understanding of the arithmetic operations and the properties of whole numbers, integers and rational numbers.
• Use a variety of subtraction algorithms including take-away, comparison, and missing addend to subtract numbers.
• Use compatible numbers method, equal differences, and add-up method to add and subtract mentally.
• Estimate sums and differences including rounding, compatible numbers and front-end estimation.
• Add, subtract, multiply, and divide non-base-ten numbers.
• Use a variety of models for multiplication algorithms, including repeated addition, arrays, and partial products.
• Identify and use appropriate number properties for multiplication, including identity, commutative, associative and distributive.
• Use mental calculation models for multiplying and dividing.
• Estimate product of given numbers using compatible numbers, rounding, and front-end estimation.
• Use models for division and division algorithms including partitive (sharing), measurement (subtractive), long division, and rectangular arrays.
• Estimate quotients using equal quotients, rounding, compatible numbers and front-end estimation.
• Evaluate exponential expressions.
• Use the laws of exponents.
• Simplify an expression using the order of operations, both with and without exponents.
• Use linear and rectangular models for factors and multiples.
• Test any natural number for divisibility by 2, 3, 4, 5, 6, 8, 9, and 10.
• Apply the definition of divisibility to develop the properties of divisibility.
• Determine if a number is prime or composite.
• Find the prime factorization of a given number using a factor tree and division.
• List all the factors of a number.
• Determine the greatest common factor and least common multiple using models including rods, listing and prime factors.
• Solve problems involving greatest common factor and least common multiple.
• Use models of integers to perform operations involving integers including credits and debits, number line, graphs, black and red chips.
• Use and identify the properties of integers.
• Use models for fractions including part-to-whole, division and ratio.
• Determine equality and inequality of fractions.
• Determine the correct inequality symbol to use between two numbers.
• Find common denominators.
• Find rational numbers between two given rational numbers.
• Convert between mixed and improper fractions.
• Add, subtract, multiply and divide fractions using a variety of methods, including fraction bars.
• Identify and use the number properties for fractions.
• Complete mental calculations involving fractions accurately using compatible
numbers method, equal differences, substitutions, equal quotients, and add-up
method.
• Estimate operations involving fractions appropriately using rounding and compatible
numbers.
• Represent decimal numbers using expanded notation, fractions, number lines,
decimal squares and traditional notation.
• Add, subtract, multiply and divide decimals using a variety of methods, including
decimal squares.
• Complete mental calculations involving decimal numbers accurately using
compatible numbers method, equal quotients, and add-up method.
• Estimate operations involving decimals appropriately using rounding, front-end
estimation and compatible numbers.
• Solve problems involving percents and proportions.
• Solve problems involving scientific notation.
• Represent rational and irrational numbers geometrically using a geoboard.
• Classify real numbers as being whole numbers, integers, rational numbers or
irrational numbers.
• Identify and use the number properties for real numbers.
• Approximate values for irrational numbers to a specified place.

II. UNIT/TIME/TOPIC BASIS:

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<tr>
<th>Unit</th>
<th>Time in class hours</th>
<th>Topic</th>
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</thead>
</table>
| 1    | 14                  | A. Ch. 1: Problem Solving  
B. Ch. 2: Sets, Functions, and Reasoning  
C. Test |
| 2    | 12                  | A. Ch. 3: Whole Numbers  
B. Ch. 4: Number Theory  
C. Test |
| 3    | 12                  | A. Ch. 5: Integers and Fractions  
B. Ch. 6: Decimals: Rational & Irrational  
C. Test |
| 4    | 4                   | A. Completion of all projects, if assigned.  
B. Review for Final  
C. Final Exam |

III. Required Assessments
A. Testing Procedures:
There will be a minimum of 3 fifty-minute tests. A comprehensive final exam will be
given.
Test 1: Ch. 1: Problem Solving & Ch. 2: Sets, Functions, and Reasoning (PSLO 1,  
CSLOs 2, 3, 4, 5, 6)
Test 2: Ch. 4: Whole Numbers & Ch. 15: Number Theory (PSLO 1, CSLOs 2, 3, 4, 5)
Test 3: Ch. 5: Integers and Fractions & Ch. 6: Decimals: Rational & Irrational (PSLO 1,  
CSLOs 2, 3, 4, 5)
Final Exam: Chapters 1-6 (PSLO 1, CSLOs 2, 3, 4, 5, 6)

B. Work Ethic Grade:
The student will receive a work ethic grade based on attendance and participation in any class activities.

C. Laboratory Expectations:
At the discretion of the instructor, projects may constitute a major grade for the course.

D. Other Evaluation Methods:
At the discretion of the instructor, an attendance grade, quizzes, homework and/or other coursework may be assigned.

E. Percentage of grade that will apply in A-D above:
Each fifty-minute test will constitute a major grade. Projects, attendance/participation, quizzes, homework and/or other assignments may constitute at least one major grade, when applicable (See B thru D). The final exam will count as at least one major grade. The course grade is the average of the major grades. Letter grades will be assigned in keeping with the standards of the college.

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
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<tr>
<td>B</td>
<td>80 – 89</td>
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<tr>
<td>C</td>
<td>70 – 79</td>
</tr>
<tr>
<td>D</td>
<td>65 – 69</td>
</tr>
<tr>
<td>F</td>
<td>Below 65</td>
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</tbody>
</table>

A. Participation/Attendance 10%
B. Projects/Special Assignments 15%
C. Homework/Quizzes 15%
D. Unit/Chapter Tests 45%
E. Cumulative Final Exam 15%

IV. COURSE DELIVERY FORMAT:
Traditional Format – This format requires students to meet full-time with an instructor in a classroom at least three hours weekly. There may be some online activities. Faculty need not hand out a copy of the syllabus and any other required course material, including their contact information.

V. COLLEGE POLICIES:
This class is governed by the policies and procedures stated in the current Chattanooga State Student Handbook. Additional or more specific guidelines may apply.

ADA Statement
Students who have educational, psychological, and/or physical disabilities may be eligible for accommodations that provide equal access to educational programs and activities at Chattanooga State. These students should notify the instructor immediately, and should contact Disabilities Support Services within the first two weeks of the semester in order to discuss individual needs. The student must provide documentation of the disability so that reasonable accommodations can be requested in a timely manner. All students are expected to fulfill essential course requirements in order to receive a passing grade in a class, with or without reasonable accommodations.

Disruptive Students
The term “classroom disruption” means – student behavior that a reasonable person would view as substantially or repeatedly interfering with the activities of a class. A
student who persists in disrupting a class will be directed by the faculty member to leave the classroom for the remainder of the class period. The student will be told the reason(s) for such action and given an opportunity to discuss the matter with the faculty member as soon as practical. The faculty member will promptly consult with the division dean and the college judicial officer. If a disruption is serious, and other reasonable measures have failed, the class may be adjourned, and the campus police summoned. Unauthorized use of any electronic device constitutes a disturbance. Also, if a student is concerned about the conduct of another student, he or she should please see the teacher, department head, or division dean.

**Affirmative Action**
Students who feel that he or she has not received equal access to educational programming should contact the college affirmative action officer.

**Academic Integrity/Academic Honesty**
In their academic activities, students are expected to maintain high standards of honesty and integrity. Academic dishonesty is prohibited. Such conduct includes, but is not limited to, an attempt by one or more students to use unauthorized information in the taking of an exam, to submit as one's own work, themes, reports, drawings, laboratory notes, computer programs, or other products prepared by another person, or to knowingly assist another student in obtaining or using unauthorized materials. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions, which may be imposed through the regular institutional procedures as a result of academic misconduct, the instructor has the authority to assign an "F" or zero for an activity or to assign an "F" for the course.

**Updating of Policies and Procedures**
The instructor reserves the right to modify this syllabus in writing during the course of the semester. Any change in course policies will be made in writing. Any change of a less substantive nature, such as a revision of a test date may be made orally in class at any time prior to the actual date.

**VI. INSTRUCTOR POLICIES:**