Massasoit Community College

Instructor:
Office:
Email:
Phone:
Office Hours:
Course: Topics in Math II
Course Number: MATH153-XX
Semester:
Classroom:

Day and Time:

Course Description: This course is provided for students who wish to know what mathematics is all about but who do not wish to be mathematicians. Possible topics are: number systems, mathematical systems, number theory, voting coalitions, geometry, mathematics of finance, topology, linear programming, game theory, and cryptography. A selection of three or more such topics are offered each semester. Prerequisite: D- or higher in MATH003 Preparation for College Math III or MATH012 Intermediate Algebra or a score of 72 or higher on mathematics placement testing results; or departmental approval.

Required Text and Materials:

- Angel, Abbot, and Runde, A Survey of Mathematics with Applications, 10th edition, Pearson Education, plus MyMathLab Student Access Kit. ISBN: 9780134112237. <u>Note</u>: this textbook comes packaged with MyMathLab, which is a requirement for this course. Homework for this course will be assigned through MyMathLab. If you do not purchase your textbook through the bookstore, please make sure that it comes with a MyMathLab access code.
- You will need a calculator for this course. A scientific calculator, such as the TI30X-IIS should be able to handle all of the calculations needed for the course. A graphing calculator, such as the TI-84 Plus should work as well. You may not use any other technologies such as a cell phone, iPod, tablet, laptop, etc. as a calculator on assessments.

Course Topics:

Chapter 4: Systems of Numeration

Chapter 5: Number Theory and the Real Number System

Chapter 8: Geometry

Chapter 14: Voting and Apportionment

Teaching Procedures: This course will be taught in a lecture/discussion format with ample opportunity for student questions. Generally, class will begin with a question and answer session on the most recent homework assignment. New material will then be presented in a lecture format and homework be assigned to reinforce the topics covered in class.

Instructional Objectives:

COURSE OUTCOMES	OUTCOMES ACTIVITIES
At the end of this course, students will be able to	
Demonstrate an understanding of additive, multiplicative, positional, and ciphered systems of numeration in order to gain an appreciation for numeration systems other that the Hindu-Arabic system.	 Convert back and forth between an additive system, such as the Egyptian or Roman numeration system, and the Hindu-Arabic system of numeration. (CT,QS,R) Convert back and forth between a multiplicative system, such as the traditional Chinese numeration system, and the Hindu-Arabic system of numeration. (CT,QS,R) Convert back and forth between a positional system, such as the Babylonian or Mayan numeration system, and the Hindu-Arabic system of numeration. (CT,QS,R) Convert back and forth between a ciphered system, such as the classical Greek numeration system, and the Hindu-Arabic system of numeration. (CT,QS,R) Add and subtract in some or all of the numeration systems mentioned above. (CT,QS,R)
Perform conversions within base ten and between base ten and other bases and perform computations in other bases in order to better understand the Hindu-Arabic system of numeration.	 Convert among standard form, expanded form, and written form. (CT,QS,R,W) Multiply using some or all of the following methods: (CT,QS,R) Successive duplication, Mediation and duplication, Lattice method, Napier's rods. Convert between base ten and other bases, Add, subtract, multiply, and divide in bases other than ten.
Determine which properties of a mathematical system are satisfied in a given system in order to better understand these properties as they apply to the Hindu-Arabic numeration system	 Identify the set of elements and the binary operations of a given mathematical system. (R,W,CT,QS) Perform calculations using a binary operation defined by a table. (CT,QS)

Perform calculations, solve problems, and analyze properties of modulo systems in order to better understanding of some of the basic results in number theory in order to gain an appreciation of number and numeracy.Image: Cr_QS_R Perform calculations of sequences is an appreciation of number and numeracy.Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1. Determine if a given number is prime or composite. (CT_QS)Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1. Apply the rules of divisibility. (QS_CT)R)Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1. Apply the rules of divisibility. (QS_CT)R)Demonstrate an understanding of sequences an numeracy.1. Apply the rules of divisibility. (QS_CT)R)Demonstrate an understanding of sequences an appreciation of number and numeracy.1. Apply the rules of divisibility. (QS_CT)R)Demonstrate an understanding of sequences and numeracy.1. Apply the rules of divisibility. (QS_CT)R)Determine if a given number is prime or composite. (CT,QS)2. Find the greatest common multiple of two numbers. (CT,QS)Determine if a number is abundant, deficient, or perfect. (QS_CT)2. Determine if a given sequence is arithmetic, geometic, Fibonacci, or neither. (CT,QS,R)W)Demonstrate an understanding of sequences and numeracy.1. Determine if a given sequence is arithmetic, geometic, Fibonacci, or neither. (CT,QS,R)W)Demonstrate an understanding of sequences and numeracy.1. Determine if a given sequence is arithmetic, geometic, Fibonacci, or neither. (CT,QS,R)W)<	Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1.Determine if a gi group or an abeli group or an abeli group or an abeli group or an abeli an operations.Perform calculations, solve problems, and analyze properties of modulo systems in order to better understand finite mathematical systems.1.Determine if two m. (CT,QS)Demonstrate an understanding of some of the basic results in number theory in order to gain an appreciation of number and numeracy.1.Addy subtract, an a.Demonstrate an understanding of some of the basic results in number theory in order to gain an appreciation of number and numeracy.1.Apply the rules o 2.Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1.Determine if a gi composite numb 5.Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1.Determine if a numbers, (CT,QS, 8.Demonstrate an understanding of sequences in order to gain an appreciation of number and numeracy.1.Determine if a gi geometric, Fibon 3.Determine if a gain geometric, Fibon 3.For an arithmetic common differer a.1.Determine if a gi geometric, Fibon 3.Determine if a gain geometric, Fibon 3.For an arithmetic common differer a.1.Determine if a gi geometric, Fibon 3.Solve application of number and numeracy.1.Determine if a gi geometric, Fibon 3.For an arithmetic common differer a.The next seve b.The general t c. <th>3 Determine whether or not the following</th>	3 Determine whether or not the following
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	c. The sum of th 4. For a geometric s common ratio are	b. The general term,
c. The sum of the first <i>n</i> terms. (CT.QS.R)	4. For a geometric s	c. The sum of the first <i>n</i> terms. (CT.QS.R)
4. For a geometric sequence whose first term and	common ratio an	4. For a geometric sequence whose first term and
common ratio are known, find		common ratio are known, find
	a. The next sev	a. The next several terms.

		b. The general term,
		c. The sum of the first <i>n</i> terms. (CT.QS.R)
	5.	For a Fibonacci sequence whose first two terms
	_	are known,
		a. Find the next several terms,
		b. Find the ratios of successive terms and
		compare this sequence of ratios with the
		'golden ratio.' (CT,QS,R,W)
Demonstrate an understanding of various	1.	Solve election problems using the plurality
voting methods and various apportionment		method, the Borda count method, the plurality
methods in order to gain an appreciation of		with elimination method, the pairwise
these methods as seen in real life		comparison method, the sequential pairwise
		comparison method, and/or the approval voting
applications.		method. (CT,QS,R,W)
	2.	Determine if a given voting method violates the
		majority criterion, the Condorcet criterion, the
		monotonicity criterion, and/or the independence
		of irrelevant alternatives method. (CT,QS,R,W)
	3.	Explain Arrow's Impossibility Theorem. (CT,W)
	4.	Solve apportionment problems using the
		Hamilton method, the Jefferson method, and the
		Webster method. (CT,QS,TS,R,W)
	5.	Explain the quota rule, the Alabama paradox, the
		population paradox, and the new states paradox.
		(CT,W)
	6.	Verify that a specified paradox occurs for a given
	_	apportionment scenario. (CT,QS,TS,R,W)
	7.	Explain the Balinski and Young Impossibility
		Theorem. (CT,W)
Demonstrate an understanding of basic	1.	Correctly identify lines, rays, nait-lines, and line
definitions and properties of Euclidean	2	Segments. (C1,QS,K)
geometry and measurement formulas in order	Ζ.	obtuce angles, and straight angles, (CT OS P)
to solve related problems.	2	Correctly identify triangles as obtuse right or
	5.	obtuse, and as scalene, isoscales, or equilatoral
		$(CT \cap SP)$
	л	Correctly identify a given quadrilateral as a
	4.	tranezoid parallelogram rhombus rectangle or
		square (CT OS R)
	5	Correctly identify a polygon by the number of its
	5.	sides. (CT.OS)
	6.	Solve problems involving vertical angles.
	0.	complementary angles, and supplementary
		angles. (CT.QS.R)
	7.	Solve problems involving parallel lines cut by a
		transversal. (CT,QS,R)

	8. Solve problems involving the sum of the angles in
	a polygon. (CT,QS,R)
	9. Solve problems involving similar triangles and
	congruent triangles. (CT,QS,R)
	10. Solve problems involving right triangles and the
	Pythagorean Theorem. (CT,QS,R)
	11. Use measurement formulas to find
	a. Perimeter of polygons,
	b. Area of triangles and quadrilaterals,
	c. Circumference and area of circles,
	d. Volume of rectangular solids,
	pyramids, cylinders, cones, and
	spheres,
	e. Surface area of three-dimensional
	objects. (CT,QS,R)
Use simple and compound interest formulas	1. Calculate simple interest and maturity value.
in order to solve applications problems	(CT,QS,TS,R)
involving interest rates	2. Calculate compound interest and maturity value.
involving interest rates.	(CT,QS,TS,R)
	3. Calculate present value. (CT,QS,TS,R)
	4. Understand and compute effective annual yield.
	(QS.CT.TS.R)
	5. Find the value of an annuity. (QS.CT.TS.R)
Use formulas involved in installment buying in	1. Determine the amount financed, the installment
order to make informed decisions in real life	price, and the finance charge for a fixed loan.
of del to make informed decisions in real-life	(CT_OS_TS_R_W)
situations involving buying on credit.	2 Determine the APR (CT OS TS R W)
	3 Compute unearned interest and the payoff
	amount for a loan naid off early (CT OS TS R W)
	4 Find the interest the balance due and the
	minimum monthly payment for credit card loans
	$(CT \cap S TS R W)$
	5 Calculate interest on credit cards using the unnaid
	balance method, the previous balance method
	and/or the average daily balance method
	(OS CT TS P W)
Evaming the cost of home ownership in order	1 Compare and contract fixed rate mortgages and
	1. Compare and contrast fixed-fate mortgages and
to make decisions as an educated consumer.	Civen information on income and monthly
	2. Given information on income and monthly
	payments due, determine the maximum
	mortgage amount a given nome buyer is qualified
	to borrow. (C1,QS,TS,R)
	3. Compute interest costs for a fixed-rate mortgage.
	4. Compute the down payment. (C1,QS,TS,R)
	5. Prepare a partial loan amortization schedule for a
	fixed-rate mortgage. (CT,QS,TS,R,W)

	6.	Compute closing costs. (CT,QS,TS,R)
OPTIONAL: Demonstrate an understanding of	1.	Compare and contrast stocks, bonds, and mutual
investing in stocks, bonds, and mutual funds in		funds as investments. (CT,R,W)
order to make decisions as an educated	2.	Get information from stock tables. (CT,R)
consumer	3.	Calculate the basic cost for a given number of
consumer.		shares of a specific stock using stock tables.
		(CT,QS,R)
	4.	Calculate broker fees. (CT,QS,R)
	5.	For a given investment scenario, find the total
		purchase price, the total dividend amount, the
		capital gain or loss, the total return, and the
		percentage return. (CT,QS,TS,R,W)
	6.	Find the total return earned by a given bond
		investment. (CT,QS,TS,R)
	7.	Find the effective rate of return for a given
		mutual fund scenario. (CT,QS,TS,R)
Demonstrate an understanding of the basic	1.	In a given network determine which vertices are
definitions and properties of network theory,	_	even and which are odd. (CT,QS)
topology, hyperbolic geometry, elliptic	2.	Determine if a given network is traversable or
geometry, and fractals in order to develop an		not. (CT,QS)
appreciation for the nature of non-Euclidean	3.	Find a path that traces a traversable network.
geometry		(CT,QS,W)
Sconcery.	4.	Solve related network problems. (CT,QS,R,W)
	5. C	Identify the genus of an object. (C1,QS)
	б.	Determine if two objects are topologically
	7	Equivalent. (CT.QS)
	1.	For hyperbolic and elliptic geometry
		a. Identity at least one mathematician responsible for its development (W)
		h Identify the surface required for this type
		of geometry (CT W)
		c. Explain how Fuclid's parallel postulate is
		changed. (CT.W)
		d. Explain why the sum of the measures of
		the angles in a triangle is not 180°. (CT.W)
	8.	Describe what a fractal is. (CT,W)
	9.	Use iteration techniques to demonstrate the
		construction of a fractal. (CT,QS,R,W)
Use linear programming methods in order to	1.	Solve a linear programming problem by
solve maximum and minimum problems.		a. Writing the appropriate inequalities subject
p		to the given restrictions or constraints and
		the objective equation. (CT,QS,R)
		b. Graphing the inequalities to find the region of
		feasible solutions. (CT,QS,TS)
		c. Determine the corner points of the feasible
		region. (CT,QS)

	d lies the chiestive equation to determine
	d. Ose the objective equation to determine
	which of these points gives a maximum or
	minimum value. (CT,QS,TS)
	2. Solve related applications problems.
	(CT,QS,TS,R,W)
Demonstrate an understanding of the basic	1. Construct the game matrix for a given two-person
definitions and rules of game theory in order	game. (CT,R,W)
to gain an appreciation of the applications of	2. Determine whether or not a game matrix
game theory in husiness, economics, and the	represents a strictly determined game. (CT,QS)
game theory in busiless, economics, and the	3. Given the matrix for a strictly determined game,
sciences.	identify the saddle point, find the optimal pure
	strategy for each player, and the value of the
	game. (CT.OS.R.W)
	A Given the matrix for a game that is not strictly
	determined find the optimal mixed strategy and
	the value of the same for the row player
	(cr. oc. p. w)
	(CT,QS,R,W)
	5. Solve related application problems. (R,QS,CT,W)
Strengthen Core Competencies** in order to	Referenced above
increase success in this and other courses and	
in the workplace.	

**Indicate the Core Competencies that apply to the outcomes activities and assessment tools: Critical Thinking (CT); Technology Skills (TS); Oral Communications (OC); Quantitative Skills (QS); Reading (R); Writing (W).

Basis for Student Grading: Grades for this course will be assigned as follows:

Grade	Average
А	93%-100%
A-	90%-92%
B+	87%-89%
В	83%-86%
B-	80%-82%
C+	77%-79%

Grade	Average
С	73%-76%
C-	70%-72%
D+	67%-69%
D	63%-66%
D-	60%-62%
F	0-59%

The grade you earn is the grade you will receive in this course. Grades are not negotiable. You will not be allowed to make up work, substitute alternative assignments, or submit extra assignments in order to improve your grade during the semester or after the semester ends.

Grades of incomplete are given only in situations when extenuating circumstances prevent a student from taking the final exam or fulfilling a specific requirement in the course. The grade of "I" cannot be used to give students additional time to complete course assignments in order to raise their grade.

Basis for Evaluating Student Performance: The grade for this course will be weighted based on the following categories:

- *Homework (10%)*: Homework will be assigned in MyStatLab at the end of each section. It is due by the next class period, and loses 10% of its available credit each day that it is late.
- *Exams (60%)*: There will be four in-class exams given throughout the semester, approximately every 3 weeks. Exams must be taken during the regular class time and no make-up exams will be given. The lowest exam grade will be dropped. Your exam average will account for 60% of your final grade.
- *Final Exam (30%)*: The course will culminate in a cumulative final exam. It will be worth 30% of your final grade.

There is no extra credit available for this course.

Tentative Test Schedule/Assignment(s) Schedule:

Assignment:	Tentative Date:
Test 1	
Test 2	
Test 3	
Test 4	
Final Exam	

Attendance: Attendance for this course is mandatory. After the third absence, students will lose two points per absence thereafter from their final average. I will take attendance at the beginning of every class, and students not present at that time will be marked absent for the class, even if they show up late. If you must miss a regular class, you are still responsible for the material that was presented in class. The average student needs to attend all class meetings in order to be successful in this course.

Accommodations Statement: Massasoit's Disability Services office provides accommodations to students who qualify for services based on a documented disability. Students interested in accessing classroom or testing accommodations must contact Disability Services directly. In an effort to avoid any lapse in services, new and returning students are encouraged to contact Disability Services at the beginning of each semester to receive an Accommodation Letter for the current semester. Students on all campuses can contact Disability Services at 508-588-9100 X 2132 or by e-mail at DisabilityServices@massasoit.edu for further information or questions.

Title IX Statement: Massasoit Community College is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, stalking, or retaliation, we encourage you to report it to *Yolanda Dennis, Chief Diversity Officer and Title IX Coordinator, Office of Diversity and Inclusion, at 508-588-9100, x1309 or ODI@massasoit.edu*. While you may talk to a faculty member, understand that as a "responsible employee" of the College, the faculty member must report what you share to the College's

Title IX Coordinator. On and off campus resources and interim measures are available to assist you. Information about both of these policies can be found at www.massasoit.edu/title-ix and <a href="http://www.massasoit.edu/title-ix"/www.massasoit.edu/title-ix"/

Academic Integrity: Academic dishonesty will not be tolerated. Please see the following URL for more information on the college's policies on academic integrity:

http://www.massasoit.edu/academics/policies/academic-honesty/index