CCBC, Spring 2015 **School of Mathematics and Science**
Intermediate/College Algebra, MATH 083/163, E8X **Math Department**

MATH 083 – Intermediate Algebra covers rational expressions and equations, radicals, quadratic equations, complex numbers, functions and relations, and exponential and logarithmic functions. NOTE: Courses offered every fall and spring semester.

MATH 163 – College Algebra explores the nature and scope of college mathematics through the study of functions. Topics include the study of polynomial, rational, radical, piecewise defined, and absolute value functions and their graphs and applications as well as modeling with these functions. Additional topics include complex numbers, the binomial theorem, inverse functions, operations with functions, exponential and logarithmic functions and their graphs and applications.
**This syllabus may be changed with notification to the class.
Pre-requisites: MATH 082 or a satisfactory score on the math placement test and RDNG 052

I. Basic Course Information
   A. D. Truszkowski
   B. Office number:MASH 410e
      Phone number:443-840-1528 (office)
      Email address:dtruszkowski@ccbcmd.edu/ dtruszkowski@hotmail.com
   C. Instructor's office hours: M/W 10:15-11:15
   D. Mathematics Department Phone Number (Essex): 443-840-1837
   E. Class meeting : M/W 11:15-2:15pm ADMIN 209
   F. Statement of Student Out of Class Work Expectations:
      This is a six-credit/billable hour course offered over 14 weeks. You are expected to complete **at least 12 hours** of work **per week** outside of class including reading, course preparation, homework, studying, etc.
      i. we are using a pilot ALEKS system this semester.
      ii. Calculator: a scientific or graphing calculator is recommended and may be used in class for homework, quizzes, and exams. A recommended calculator is the TI-83 or TI-84. Calculators with advanced capabilities such as a TI-89 or TI-92 and any other calculator with computer algebraic capabilities are not permitted for use. You MUST always show all algebraic work on all assignments!

II. Course Goals Overall
   A. Course objectives as listed on the official Common Course Outline
      Math 083:
      Upon completion of this course students will be able to:

1. simplify and perform algebraic operations on quadratic expressions, including factoring;
2. simplify and perform algebraic operations on rational expressions;
3. simplify and perform algebraic operations on radical expressions and variable expressions with rational exponents;
4. identify and perform operations on complex numbers;
5. recognize and evaluate exponential and logarithmic expressions;
6. solve quadratic equations and applications;
7. solve rational equations, including proportion and variation applications;
8. solve radical equations;
9. identify functions and use function notation;
10. perform algebraic operations on functions;
11. graph and recognize the graphs of quadratic, exponential, and logarithmic functions; and
12. determine the domain and range of functions.

Math 163:

Upon completion of this course students will be able to:

1. Produce and compare graphs of absolute value and piecewise-defined functions;
2. **S**olve inequalities in one and two variables;
3. Solve absolute value inequalities in one variable;
4. Identify domain and range of functions;
5. Produce and compare graphs of functions, using translations, symmetry, end behavior, and asymptotes;
6. Combine two or more functions using addition, subtraction, multiplication, division, or functional composition;
7. Identify the inverse of a given function;
8. Identify the function, given information about the function;
9. Model numerical data using quadratic functions to further analyze data and predict values;
10. Perform operations with functions;
11. Produce and compare graphs of exponential and logarithmic functions;
12. Solve problems using exponential and logarithmic functions;
13. Produce and compare graphs of polynomial functions;
14. Identify the zeros of polynomial functions; apply the Fundamental Theorem of Algebra;
15. Identify the equation of a polynomial using the Theory of Equations and given sufficient information about its zeroes;
16. Apply the Binomial Theorem to determine the coefficients of a polynomial;

17. Solve rational equations;
18. Produce graphs of rational functions;
19. Construct a solution to real world problems using problem methods individually and in groups;
20. Examine the mathematical contributions made by people from diverse cultures throughout history.
21. Articulate a solution to mathematical problems; and
22. Apply appropriate technology to the solution of mathematical problems.

B. Major Topics as listed on the official Common Course Outline

I. Factoring (1 week)

1. Factor out the GCF
2. Factor a trinomial
3. Special factors
4. Factor completely
5. Factor perfect cubes
6. Factor by grouping

II. Linear Functions (0.5 weeks)

1. Slope
2. Graphing lines
3. Horizontal & vertical lines
4. Parallel & perpendicular lines
5. Linear regression
6. Solving linear equations
7. olving linear inequalities

III. Functions (2.5 weeks)

1. Determine a function
2. Evaluate functions
3. Vertical line test
4. Identify domain, range
5. Interval notation
6. Graphs of functions
7. Intercepts
8. Increasing, decreasing
9. Odd & even functions
10. Symmetry
11. Transformation of graphs
12. Horizontal, vertical shifts
13. Transformation of graphs
14. Stretch, shrink, reflect

15. Absolute value function
16. Inequalities
17. Piecewise functions
18. Operations on functions
19. Composition
20. Inverse functions
21. One-to-one functions
22. Horizontal line test
23. Domain & range of inverses
24. Solving absolute value equations & inequalities

IV. Radicals (1.5 weeks)

1. Expressions with rational exponents
2. Simplify radical expressions
3. Add and subtract radical expressions
4. Multiply and divide radical expressions
5. Solve radical equations

V. Complex Numbers (0.5 weeks)

1. Simplify complex numbers
2. Add and subtract complex numbers
3. Multiply and divide complex numbers

VI. Radicals (1.5 weeks)

1. Taking square roots
2. Completing the square
3. Standard form
4. Extrema – minimum and maximum
5. Applications and models
6. Solving quadratics
7. Factoring
8. Zero Product Property
9. Quadratic Formula
10. Discriminant
11. Graphing
12. Quadratic inequalities
13. Quadratic type equations

VII. Polynomial Functions (1.5 weeks)

1. End behavior
2. Zeros/x-intercepts
3. Leading coefficient
4. Long division & Synthetic division
5. Remainder Theorem

6. Factor Theorem
7. Conjugate Zeros Theorem
8. Multiplicity
9. Fundamental Theorem of Algebra
10. Complex zeros
11. Rational Zeros Theorem
12. Solving polynomial equations and inequalities

VIII. Rational Functions (2 weeks)

1. Simplify rational expressions
2. Multiply and divide rational expressions
3. Add and subtract rational expressions
4. Graphing rational functions
5. Horizontal, vertical, and oblique asymptotes
6. Solving rational equations and inequalities

IX. Exponential and Logarithmic Functions (1.5 weeks)

1. Exponential functions
2. Growth and decay applications
3. Natural number e
4. Logarithmic functions
5. Change-of-base formula
6. Common and natural logarithms
7. Graphing logarithmic functions
8. Solving exponential and logarithmic equations

X. Miscellaneous (0.5 weeks)

1. Binomial Theorem

Total (13.5 weeks)

0.5 weeks for Math 083 Final Exam given on last day of class.
Other exams/quizzes should be included in above time

C. Rationale for Math 083: The applications of intermediate algebra impact every area of human endeavor. It is an indispensable prerequisite for advancement in or to careers in natural sciences, social sciences and various technical professions. This course is designed to give the basic algebraic knowledge necessary for college level math courses and for the math content so prevalent in other credit courses.

Rationale for Math 163: College Algebra is the first course in the Calculus track. The students will be introduced to the basics of linear and quadratic equations and inequalities, basic polynomial and rational functions, transcendental functions, systems of equations and basic matrix operations. This course is a prerequisite for

Pre-Calculus and will lay the ground work for the more intensive topics covered in that course.

III. Evaluation

A. For both classes

1. Requirements: A scientific or graphing calculator is recommended and may be used in class for homework, quizzes, and exams. The TI-89, TI-92, and any other calculator with computer algebraic capabilities are not permitted in Math 163. I will be using a TI-84 Plus silver edition for some lectures. You MUST always show all algebraic work on all assignments!

Math 083 requirements:

25. Grading policy for Math 083

Tests, quizzes, homework, etc	**70%**	ALEKS online work 100 pts 8 quizzes 25 pts each (2 lowest grade dropped) 3 tests 150 pts each
Final Exam	**30%**	The comprehensive final exam 300 pts is scheduled for **5/11 during our regularly scheduled class period**

A final course grade for Math 083 will be assigned using the following criteria:

Final Average	Final Grade
At least 90%	A
At least 80% and less than 90%	B
At least 70% and less than 80%	C

Math 163 requirements:

2. Instructor's Grading Policy for Math 163:

Tests, quizzes, homework, etc	**80%**	ALEKS online work 100 pts 8 quizzes 25 pts each (lowest grade dropped.) 1 project 50 pts 3 tests 150 pts each
	20%	The comprehensive final exam 250 pts is scheduled for **FRIDAY 5/20 from 11:00-1:00**

A final course grade for Math 163 will be assigned using the following criteria:

Final Average	Final Grade
At least 90%	A
At least 80% and less than 90%	B
At least 70% and less than 80%	C
At least 60% and less than 70%	D
Less than 60%	F

* NOTE: Successfully completing MATH 083 is a requirement to earn credit for MATH 163. Any student that receives an F grade in MATH 083 will automatically receive an F grade in MATH 163.

B. Math Department Attendance policy:
   i. You are expected to attend ALL scheduled classes.
   ii. Attendance is critical to student success in college.
   iii. Satisfactory attendance is defined to be at most 6 hours of unexcused absences.
   iv. Documentation of the reason for your absence(s) may be required.
   v. The instructor may count each unexcused tardy arrival as an absence and each unexcused early departure as an absence.

C. Math Department Audit policy: Students may change from credit to audit only during the published 50% refund period, as indicated in the CCBC academic calendar. Students who audit are required to attend class, participate in course activities, and complete assignments (except for tests and the final exam) in accordance with instructor guidelines and due dates. For students who do not meet these requirements, the instructor may change their grade from AU to W. If you decide to audit or withdraw, you MUST audit or withdraw from BOTH Math 083 and Math 163.

D.

IV. Course Procedures

A. NO make-up tests will be given except under unusual circumstances. If you miss a test due to illness or other emergency, you must notify me before the scheduled test, and documentation may be required. Any make-up test must be taken before the first class after which the actual test was given. If these conditions are not met, your score on the test will be zero.
It is imperative that you do not fall behind in this course. Attendance is mandatory for every class

B. College wide syllabus policies: "For college wide syllabus policies such as the Code of Conduct related to Academic Integrity and Classroom Behavior or the Audit/ Withdrawal policy, please go to the Syllabus Tab on the MyCCBC page."

C. Contact information for course-related concerns: Students should first attempt to take concerns to the faculty member. If students are unable to resolve course-related concerns with the instructor, they should contact the Math Department Coordinator at the Essex campus, Sylvia Sorkin, at 443-840-2661 or at ssorkin@ccbcmd.edu.

D. Course calendar/schedule:
Spring 2015 Academic Calendar and final exam schedule:
http://www.ccbcmd.edu/registration/academic_calendars.html

Week	**Section 163**	**Section 083**
		Factoring: Factor the Greatest Common Factor; Factor a Trinomial; Factor Perfect Cubes; Factor by Grouping; Solve by Factoring (sections 6-1 to 6-6) Math 083 test 1
	1.1: Solving Linear Equations	
	1.2: Modeling with Equations	
	1.6: Solve Linear Inequalities; Interval and Set Builder Notation; Solve Compound Inequalities	
	1.7: Absolute Value Equations; Absolute Value Inequalities	
	2.2: x-and y-intercepts and Graphs	

	2.4: Slope; Graphing Lines; Horizontal &Vertical Lines; Parallel and Perpendicular Lines	
	Pg. 171-180: Regression Models	
	3.1: Determine a Function; Evaluate Functions; Specify Domain, Range; Piecewise Functions; Calculate Difference Quotient	Introduction to Functions (8-1)
	3.6: Algebra of Functions; Composition	Algebra of Functions (8-3)
	3.2: Graphs of Functions; Vertical Line Test; Absolute Value Function	
	3.3: Increasing, Decreasing, Constant Math 163 Test 1	Graphs of Functions (8-2)
	3.4: Average Rate of Change	
	3.5: Transformation of Graphs; Horizontal, Vertical Shifts, Stretching, Shrinking, Reflecting, Odd & Even Functions; Symmetry	
	3.7: Inverse Functions; One-to-One functions; Horizontal Line Test; Domain& Range of Inverse	
		Radicals: Expressions with Rational Exponents; Simplify Radical Expressions; Add& Subtract Radical Expressions; Multiply and Divide Radical Expressions (10-1 to 10-5)
	1.4: Simplify complex Numbers; Multiply and Divide complex Numbers	
	1.3: Zero Product Property; Completing the Square; Quadratic Formula; Discriminant; Quadratic Applications and	Quadratic Equations and Functions (11.1,11.2)

	Models	
	1.5: Solve Radical Equations: Use Factoring; Solve Quadratic Type	Radical Equations (10-6) Math 083 test 2
	1.6: Quadratic Inequalities; Critical Points	
	4.1: Graph a Quadratic Function; Vertex Form; Minimum and Maximum; Quadratic Applications and Models	Quadratic Functions and Graphs (11.3)
	4.2: End Behavior; Zeros (x-intercepts); Leading Coefficient; Multiplicity; Graph Polynomials	
	4.3: Synthetic Division; Long Division; Remainder Theorem; Factor Theorem	
	4.4: Rational Zeros Theorem	
	4.5: Fundamental Theorem of Algebra; Complex Zeros; Conjugate Zeros Theorem Math 163 test 2	Complex Numbers (10-7)
		Rational Expressions: Find the Domain; Simplify Rational Expressions; Multiply and Divide Rational Expressions; Add and Subtract Rational Expressions; Solving Rational Equations (7-1 to 7-4 & 7-6 &7-7)
	4.6: Rational Functions Graphs; Graphing Rational Functions; Horizontal, Vertical and Slant Asymptotes	
	1.6 Solving Rational Inequalities	
	5.1: Exponential Functions; Compound interest	Exponential Functions (12-1)
	5.2: Natural Number e; compound Continuously	
	5.3: Logarithmic Functions; Change-of-Base Formula; Common and Natural Logarithms; Graphing Logarithmic Functions	Logarithmic Functions (12-2)

	5.5: Solving Exponential and Logarithmic Equations	Exponential and Logarithmic Equations (12-4, 12-5)
		Variations (7-8) Math 083 test 3
	13.6: Binomial Theorem; Find a specific Term Math 163 test 3	
	Review	Review
		FINAL EXAM **1. The Final exam for 083 5/11 during our regularly scheduled class time.** **2.The Math 163 Final review session is 5/11** **3.The Math 163 Final exam is on 5/20 from 11:00-1:00**

Math 083 ***Points Earned***	***Total Possible points***	***Math 163*** ***Points Earned***	***Total Possible points***