**Northern Michigan University**
**Mathematics and Computer Science Department**
**College Algebra with Applications in the Sciences and Technologies (4 credits)**
**MA104-55 (50236) Web-based**
**May 16 – June 24**

**Instructor:** Dr. Carol Bell
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**Prerequisite:**
MA100 (passed with a C- or better) or satisfactory score on the Mathematics Placement Exam.

**General Introduction and Goals:**
This course is designed for students who need college algebra but do not intend to take calculus. The applications of algebra are stressed; mathematical topics are chosen primarily on the basis of their immediate applicability. Such applications are drawn mainly from the natural sciences and technologies. This course will prepare students to study Trigonometry, MA 106, and Calculus with Applications, MA 271. And although MA 103 is the recommended preparatory course for the study of statistics, MA 104 is as an alternative prerequisite for Statistics. To move to the precalculus track (MA115) from MA104, a student must achieve at least a B- in this course.

This course satisfies the Foundation of Natural Science/Mathematics requirement. Students who complete this course should be able to demonstrate a basic understanding of mathematical logic; use mathematics to solve scientific or mathematical problems in college classes; express relationships in the symbolic language of mathematics; and appreciate the role of mathematics in analyzing natural phenomena.

**Text and Other Course Information:**
- College Algebra and Trigonometry with Applications, 6th Edition, Levitan, Kolman, Shapiro, Bell. BVT Publishing (2011). ISBN 9781627516532 (Textbook +). Either the hard copy or online text may be purchased. Both come with online access to the course materials.
- Online course materials may be accessed at http://www.bvtlab.com. The course code is **6BB70C**. You will need this code along with the product key (located in the back of the book cover) when you set up your account to access the course materials. Note – if you are repeating the course, you must purchase a new product key.
- Either a non-CAS graphing calculator or access to an online graphing utility, such as the one provided at Desmos at https://www.desmos.com/calculator.

**Note – Temporary access to the course materials are available. Below are the eBook+ Access Instructions.**

- If you do not already have a BVTLab account then please visit http://www.bvtlab.com and enter K4015579 into the Product Key field.
- Click the "Redeem a Product Key" button and complete the account creation process.
- Upon completion of the account creation process you will be automatically logged on. You will then find that you have access to your online resources.
- Please visit http://bvtpublishing.freshdesk.com/support/solutions/folders/4000005239 to access the video help library for more information.

**Learning Outcomes:**

Upon successful completion of this course the student will be able to:

- Identify, graph, and analyze quadratic and polynomial functions.
- Identify, graph, and analyze rational functions.
- Identify, graph, and analyze exponential functions.
- Identify, graph, and analyze logarithmic functions.
- Describe and perform transformations of basic functions
- Determine the inverse of a function
- Perform operations with functions including composite functions
- Solve quadratic and polynomial equations.
- Solve rational equations.
- Solve radical equations
- Solve absolute value equations
- Solve exponential equations.
- Solve logarithmic equations.
- Solve systems of equations with two and three variables.
- Solve systems of non-linear equations
- Solve inequalities and systems of inequalities.
- Apply elementary trigonometry to solve problems involving right triangle relationships.
- Utilize law of sines and law of cosines to solve oblique triangles
- Select and apply appropriate mathematical models to describe real-world problems.

Evaluation of these learning outcomes will be done through assignments and exams.

**Content Outline:**

1. Review of Algebra
    - Polynomials and operations on polynomials
    - Solving linear and quadratic equations
    - Integral and rational exponents and radicals
    - Fractional expressions
    - The coordinate plane and graphing
2. Learning to Use the Calculator
    - To draw graphs and to solve equations and systems of equations
3. The Function Concept

   - Functional notation and graphs of functions
   - Expressing functional dependence algebraically
4. The Study of Special Functions
   - Linear, quadratic, polynomial, and rational functions
   - Functions involving radicals
5. Solving Equations
   - Algebraic and graphical methods
   - Solving literal equations
6. Exponents and Logarithms
   - Properties of the exponential and logarithmic functions
   - Solving exponential and logarithmic equations
   - Applications of the exponential and logarithmic functions
7. Systems of Equations
   - Linear systems: solving algebraically, graphically
   - Solving special non-linear systems
8. Other Topics
   - Introduction to probability
   - Introduction to right triangle trigonometry

**Assessment Format:** Specific information on each assessment is provided below.

- **Online Homework (10%):** Each chapter has several homework assignments covering one or two sections in the text. Refer to text examples as well as the online resources (step-by-step solutions and videos) to aid in working the homework problems. There are also practice tests, which are <u>required</u> and count as a homework assignment.
- **Written Homework (10%):** Each online homework assignment (not practice tests) consist of 20 questions. You must submit written work for problems 5, 10, 15, and 20. You may drop off your written work at the department office (Jamrich 2200) or submit it electronically. Please scan your work or take a photo, if submitted electronically. If you have more than one photo or document, please put them in a folder and submit a compressed (zipped) version of this folder to EduCat. Instructions for compressing a folder are below.
- **Tests (50%):** You will be required to take a comprehensive end-of-chapter test after completing each chapter or unit. <u>You must submit your written work for all tests. You may scan your test solutions or take photos and then upload a compressed folder containing your photos into EduCat.</u> Tests may only be taken one time and there is a time limit (2 hours) so be sure you have prepared yourself to take the test. Scores on tests consist of the computer graded portion (15 points) and your written work (35 points). Be sure your written work is complete before you submit it to be graded.

  **DO NOT EMAIL ME YOUR TEST SOLUTIONS OR WRITTEN WORK!** If you are submitting them electronically, put your documents/photos in a folder, compress (zip) the folder, and upload it to EduCat. See instructions below.

To compress (zip) a folder, do a right mouse click on the folder containing your documents, scroll down to Send to, and then select Compressed (zipped) folder. You can then upload this compressed folder to EduCat.

- **Final Exam (30%):** The final exam is cumulative and will be a written final. You will need to get a proctor or come to the Mathematics and Computer Science Department (Jamrich 2200) to take it during their scheduled office hours (M-F, 7:30-4:30). Allow two hours for the final exam. **You must earn at least 60/100 (raw score) on the final exam in order to receive a passing grade for the class.**

**Grading Scale (%):** Your course grade will be based on the percentages outlined under Assessment Format. Corresponding grades as a percentage of the total are listed below.

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|---|---|---|---|
| 100 – 95.0: A | 86.4 – 82.5: B | 76.4 – 72.5: C | 66.4 – 62.5: D |
| 94.9 – 89.5: A- | 82.4 – 79.5: B- | 72.4 – 69.5: C- | 62.4 – 59.5: D- |
| 89.4 – 86.5: B+ | 79.4 – 76.5: C+ | 69.4 – 66.5: D+ | 59.4 – 0: F |

**NMU's Non-Discrimination Statement:**
Northern Michigan University does not unlawfully discriminate on the basis of race, color, religion, sex, national origin, age, height, weight, marital status, familial status, handicap/disability, sexual orientation, or veteran status in employment or the provision of services, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities.

Anyone having civil rights inquiries may contact the Equal Opportunity Office, 502 Cohodas Hall, telephone number 906-227-2420.

**ADA Statement:**
If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Disability Services Office by: coming into the office at 2001 C. B. Hedgcock; calling 227-1700; or e-mailing disserv@nmu.edu. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.

**I am available to meet with you in my office. Just email me to set up an appointment.**