

**SYLLABUS**  
**MAT 115**  
**MATHEMATICAL MODELS**

**Faculty Information**

**Instructor:** Jackie Caldwell, M.A. Ed.  
**Email Address:** jcaldwell@abtech.edu  
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**Phone:** 254-1921 ext. 326  
**Office Hours:** MWF: 10:00-10:50; T, Th: 9:00-9:50

**Course Information**

**Course Title:** Mathematical Models  
**Course Number:** MAT 115 – D1  
**Credit Hours:** 3  
**Contact Hours:** 4  
**Class Location:** ELM 346  
**Class Meeting Time:** M, T, W, Th 8:00-8:50

**Course Description:** This course develops the ability to utilize mathematical skills and technology to solve problems at a level found in non-mathematics-intensive programs. Topics include applications to percent, ratio and proportion, formulas, statistics, functional notation, linear functions and their groups, probability, sampling techniques, scatter plots, and modeling. Upon completion, students should be able to solve practical problems, reason and communicate with mathematics, and work confidently, collaboratively, and independently.

**Prerequisite:** Mat 070 or placement

**Textbook:** Timmons, Johnson, McCook, *Fundamentals of Algebraic Modeling*, Fourth Edition.

**Course Goal:** Upon completion, students should be able to solve practical problems, reason and communicate with mathematics, and work confidently, collaboratively, and independently.

**Course Specific Competencies:** Upon successful completion of the course, the student will be able to:

- Define and discuss a special kind of relationship between two quantities called a function.
- Define and discuss linear and non-linear functions.
- Define and discuss mathematical models in geometry, business, personal finance, and science and technology.
- Define and discuss problems and models that involve the interaction of two or more variables.
- Define and discuss the laws of probability and how they are used to assist in decision making.
- Define and discuss statistics as the area of mathematics that is involved with collecting, classifying, summarizing and presentation of data that has been collected.
- Work collaboratively and communicate mathematics effectively.

## **Reinforcement Experiences for General Education Cross-Curriculum Competencies**

The course encapsulates reinforcement experiences for the general education cross-curriculum competencies:

- Communicate effectively in speaking, writing, reading, and listening.
- Locate, evaluate, and use information to analyze problems and make logical decisions.
- Apply math skills and/or natural science knowledge appropriately to organize, analyze and make information useful.
- Develop the ability to succeed as a self-directed learner.

**Grading Policy:** You will have 6 chapter tests, labs and quizzes for each chapter, and a midterm and a final exam during the semester. Your chapter test average will account for 45% of your final grade, labs will account for 25% of your final grade and quizzes will account for 10% of your final grade. The midterm and final exams are mandatory and will each count 10% of your final grade. All tests will be closed book. **Makeup tests will not be given.** The average of your midterm and final exam will be substituted for the first test missed. Any other test missed will be counted as a zero. If no tests are missed during the semester the average of the midterm and final exam may be substituted for the lowest test grade. Labs and quizzes will be given during each chapter. **Makeup labs and quizzes will not be given.** (If you are absent the day of a lab/quiz, you will not be given a makeup lab/quiz.) I will drop one of your lowest lab grades and one of your lowest quiz grades. Labs are due at the end of class unless you have worked the entire class time and still have not completed your lab. If this is the case, you will have until the beginning of the next class to turn in your lab assignment. **Your lab must be turned in before class starts.** After this point there will be a 15 point deduction for each day your lab is late. (If you are tardy, there will be a 15 point deduction.) If for any reason it is necessary for you to withdraw from this class, you must complete the appropriate form and submit it to the Records and Registration Office by the deadline. If you quit attending class without completing the appropriate forms your grade will become an “F”. The grading scale: A(90-100), B(80-89), C(70-79), D(60-69), F(below 60)

**Final Exam Policy:** Final exams for all classes are given during the last 1-2 hours of the regular class schedule.

**Attendance Policy:** To receive course credit, a student should attend a minimum of 80 percent of the contact hours of the class. Upon accumulating absences exceeding 20 percent of the course contact hours, the student may be dropped from the class with a grade of “U” at the discretion of the instructor. A tardy is defined as arriving late for class, leaving early, or being away from class without permission during class hours. Three tardies may constitute one absence.

### **Email Policy:**

The ABTech student email is to be used for official school business. All electronic correspondence must take place through your AB Tech email account. The format for student emails is: [firstnamemiddleinitiallastname@students.abtech.edu](mailto:firstname.middleinitial.lastname@students.abtech.edu) All emails should start with the following information:

Class:

Class Section:

Student ID:

Official Student Roster Name:

**Inclement Weather Schedule:**

The College will close when weather conditions are such that driving is hazardous. The following procedure will be observed for inclement weather conditions:

1. Announcements concerning school operation will be made by 6:30 am on local radio and TV stations for day classes. A voice mail message will be recorded on the switchboard. If it appears that ice or snow may be cleared by mid-morning, the schedule below will be followed and all College personnel and students should report by 10am.
2. Closing or delaying the day programs does not automatically close evening classes. Announcements will be made on radio stations and the College switchboard no later than 3pm concerning the evening classes.
3. When weather conditions dictate early dismissal of the day or evening classes, the announcement will be made by telephone to each building on campus.
4. Commuters should exercise personal judgment concerning highway conditions regardless of College announcements, particularly those commuting from outlying areas.
5. Adjustments in the College calendar for days missed because of inclement weather will be made at the end of the semester.

Normal Class Time	Delayed Opening
8 a.m.	10-10:40 a.m.
8:30 a.m.	10:20-11 a.m.
9 a.m.	10:45-11:25 a.m.
9:30 a.m.	11:05-11:45 a.m.
10 a.m.	11:30am-12:10 p.m.
10:30 a.m.	11:50am-12:30 p.m.
11 a.m.	12:15-12:55 p.m.
11:30 a.m.	12:35-1:15 p.m.
12 p.m.	1-1:40 p.m.
12:30 p.m.	1:20-2 p.m.
1 p.m.	1:45-2:25 p.m.
1:30 p.m.	2:05-2:45 p.m.
2 p.m.	2:30-3:10 p.m.
2:30 p.m.	2:50-3:30 p.m.
3 p.m.	3:15-3:55 p.m.
3:30 p.m.	3:35-4:15 p.m.
4 p.m.	4 p.m.

## Important Dates:

Spring 2009

Classes begin	January 12 <sup>th</sup>
Martin King Jr. Day	January 19 <sup>th</sup>
Last Day to Drop for Partial Refund	January 22 <sup>nd</sup>
Professional Development (no classes 12 pm- 5 pm)	February 17 <sup>th</sup>
Last Day to Apply for Spring Graduation	February 27 <sup>th</sup>
Student Break	March 13 <sup>th</sup> *
Last Day to Withdraw from Class w/o Penalty	April 7 <sup>th</sup>
Spring Break	April 13 <sup>th</sup> -18 <sup>th</sup>
Activity Day – Earth Day	April 24 <sup>h</sup>
Last Day of Classes/Exams	May 12 <sup>th</sup> *
Spring Graduation	May 15 <sup>th</sup>

\*Up to three days may be made up at the end of the semester for inclement weather. All dates are subject to change.

## Activity Day Schedule:

This schedule will be used for most approved and announced student activities.

Normal Class Time                      Activity Day Schedule

8:00 am	8:00-8:40 am
8:30 am	8:20-9:00 am
9:00 am	8:45-9:25 am
9:30 am	9:05-9:45 am
10:00 am	9:30-10:10 am
10:30 am	9:50-10:30 am
11:00 am	10:15-10:55 am
11:30 am	10:35-11:00 am*

11:00 am-1:00 pm Free for activities !

12:00 noon	1:00-1:40 pm
12:30 pm	1:20-2:00 pm
1:00 pm	1:45-2:25 pm
1:30 pm	2:05-2:45 pm
2:00 pm	2:30-3:10 pm
2:30 pm	2:50-3:30pm
3:00 pm	3:15-3:55 pm
3:30 pm	3:35-4:15pm
4:00 pm	4:00 pm

\* 25 minute period

## Academic Dishonesty:

You may not deceive any official of the college by cheating on any assignment, exam, or paper. This includes plagiarism, which is the intentional theft or unacknowledged use of another's words or ideas. Plagiarism includes (but is not limited to) paraphrasing or summarizing another's words **or works** without proper acknowledgement, using direct quotes of material without proper acknowledgement, or purchasing or using a paper **or presentation** written **or produced** by another. The faculty at A-B Tech **may** also consider presenting as original work a paper written for one class to satisfy a requirement in another class to be academic dishonesty.

**Code of Classroom Conduct:** Asheville-Buncombe Technical Community College is an institution for adult learning. It is a partnership between instructors with the desire to teach and students with the desire to learn. In order to create an appropriate environment for teaching and learning to flourish, there must be respect for the instructor and fellow students. Listed below are guidelines for classroom behavior which the College has established to ensure that the learning environment is not compromised.

1. Attendance: You are expected to be in class the entire class time. Do not enter late or leave early. Rare exceptions may be excused, particularly under emergency circumstances, but you should be prepared to explain your tardiness to the instructor after class. Likewise, the need to leave early should be explained to the instructor before class.
2. Absences: Inform the instructor in advance, if you know you are going to miss a class. Also, take responsibility for getting missed assignments from other students. Do not expect that you will be allowed to make up work, such as unannounced quizzes or tests, after an absence. Instructors are not responsible for re-teaching the material you missed because of absence.
3. Conversation: Do not carry on side conversations in class.
4. Other Activities: You may not work on other activities while in class. This includes homework for other courses or other personal activities.
5. Internet: In classes where Internet access is provided, you may use the Internet for valid, academic purposes only. You may not use it for open access to other non-academic sites which are unrelated to the course.
6. Sleep: Do not sleep in class.
7. Attitude: You are expected to maintain a civil attitude in class. You may not use inappropriate or offensive commentary or body language to show your attitude regarding the course, the instructor, assignments, or fellow students. Keep in mind that all electronic interactions (email, chats, discussion forums etc) are extensions of the classroom and should be treated as such. Unacceptable language and behavior will be addressed as if you were sitting in the classroom. . Keep in mind that all electronic interactions (email, chats, discussion forums etc) are extensions of the classroom and should be treated as such. Unacceptable language and behavior will be addressed as if you were sitting in the classroom.
8. Profanity and Offensive Language: You may not use profanity or offensive language in class.
9. Cell phones and beepers: You may not receive or send telephone calls or pages during class. You are responsible for turning off cell phones and beepers upon entering class. **If you are using your cell phone, beeper, etc. during class, you will be asked to leave!**
10. Guests: You may not bring unregistered friends or children to class.
11. Food, Drink, Tobacco Products: You may not have food or drink in class. You may not use tobacco products in the buildings of A-B Tech.
12. Personal Business: You may need to transact personal business with the instructor, asking him or her to sign forms. Plan to do this before instruction begins or after class.

Typically, violations of the Code of Classroom Conduct will be dealt with as minor infractions. However, repetition of minor infractions or other more serious violations of the Code of Student Conduct may lead to removal from the classroom while the matter is resolved and referral to the Vice President for Student Services for disciplinary action.

## **NETIQUETTE STATEMENT:**

### **GENERAL:**

1. Understand that typed messages lack cues normally associated with face-to-face conversation. Without these supporting cues for context, satire or sarcasm can come across in unintended ways.
2. Use parenthetical explanation to explain meanings that might be misunderstood.
3. Do not criticize spelling or grammar but do check your own spelling, punctuation, and grammar.
4. Don't use all capital letters. In the online world, this is the equivalent of shouting and it is difficult to read.
5. All lowercase letters indicate mumbling.
6. Be brief and to the point.

### **SUBJECT LINES:**

1. Keep subject lines short.
2. Make subject lines informative by indicating the content of the message.
3. Make subject lines clear and unambiguous.

### **REPLYING:**

1. If you excessively reply to ongoing discussions and include the original message, your messages will be very long and hard to follow.
2. For simple messages, quoting the original message when replying will clarify your response.
3. Using carets to indicate lines of text that are quoted.

### **EMAIL:**

1. Unless you are explicitly given permission, don't publicly post email sent to you in private.
2. Recognize that instant delivery of email does not guarantee an instant response.
3. If you are sending information from another source, pay attention to whether the material is copyrighted and cite sources.
4. For important messages, compose a draft in a word processor so you can spell check it.
5. Be careful when addressing emails. One character out of place, or a ".com" suffix when the person's email really ends with ".edu", and your message won't be delivered.
6. If it is going to take considerable time to reply fully, try to acknowledge receipt of a message promptly and let the sender know that you will answer.

### **ATTACHMENTS:**

1. Do not send huge attachments.
2. When you're replying to a message that has an attachment, do not include the attachment again.
3. Avoid sending attached files that lack filename extensions (that's because some computers won't be able to open them).

### **FLAMING:**

1. Do not flame! Flaming refers to derogatory, abusive, threatening, sarcastic, rude, or otherwise mean-spirited messages directed at people.
2. If a message provokes a negative emotional response, put it away for a while, then reread it and see if you're misinterpreting it. If you don't understand a particular item, ask the sender for clarification before replying to an incorrect conclusion.
3. Messages are not secure. Remember, it's very easy for someone else to forward messages you thought were confidential.
4. Apologize. If there's been a misunderstanding or miscommunication, you can often nip a flame war in the bud by a brief apology.
5. Don't write anything that you won't want other people to be able to see for a long time (posts can be archived for years).

### **DISCUSSION:**

1. Lurk before you leap. Lurking is visiting without participating. While it's rude to make a habit of lurking, a little lurking can acquaint you with rules and procedures, help you get the "lay of the land," and prevent embarrassment.
2. Avoid posting non-informative messages on bulletin boards. Chat is more like a telephone, so saying "Me, too!" or "I don't know" is accepted. But on bulletin boards, people don't like to read postings that aren't substantive.

### **CHAT:**

1. Remember that chat rooms are "logged" (i.e., a record is kept of conversations).
2. Do not disrupt chat rooms by pasting large blocks of text into the input box (thus causing the screen to scroll faster than other users are able to type) or otherwise act in a manner that negatively affects other users' ability to engage in real time exchanges.
3. If you are having a conversation that is off the main topic, please move to another chat room.
4. If you are a fast typist, please pause occasionally to let slower typists contribute to the discussion.

\*Please note this Netiquette statement was inserted as a requirement of the Mathematics Department at AB-Tech. The author of Netiquette is Robert Bramucci from **California State University at Fullerton**

**Tobacco Free Campus:** Asheville-Buncombe Technical Community College is committed to providing students and employees with a safe and healthy environment.

*It is the policy of Asheville-Buncombe Technical Community College that tobacco use is not permitted on A-B Tech's campuses. A-B Tech is tobacco-free.*

**Other Information:** Tutoring in math and related courses is available in the Academic Learning Center, Laurel Building, Room 118. The hours are from 9am-6:30pm M-Th, and 9am-1:00pm on Friday.

**Calculator:** A calculator is *required* for this course. The TI-83 or TI-86 will be the calculator used by the instructor and would be preferred. A scientific calculator will be sufficient.

**Statement of Right to Make Changes:** I reserve the right to make changes in the syllabus. Any changes will be announced in class.

**Math 115**  
**Mathematical Models**  
**Course Outline**  
**Skill Building Exercises**

<b>Sections</b>	<b>Pg.</b>	<b>Assignment</b>
2.1 Rectangular Coordinate System	50	1-40
2.2 Graphing Linear Equations	55	1-40
2.3 Slope	66-67	1-40
2.4 Writing Equations of Lines	72-73	1-40
2.5 Linear Inequalities	76-77	1-30
Review		
<b>Test 1 – Chapter 2 – Graphing</b>		
3.1 Functions	92-95	1-30
3.2 Using Function Notation	100-102	1-30
3.3 Linear Functions	107-109	1-20
3.4 Direct and Inverse Variation	115-117	1-40
3.5 Nonlinear Functions	125-126	1-24
Review		
<b>Test 2 – Chapter 3 – Functions</b>		
4.1 Geometric Applications – Perimeter & Area	141-143	1-25
4.2 Geometric Applications – Right Triangles	147-149	1-27
4.3 Mathematical Models in Personal Finance	154-156	1-23
4.4 Mathematical Models in Banking & Finance	165-166	1-30
4.5 Mathematical Models in Consumer Credit	172-174	1-30
4.6 Mathematical Models in Business	179-181	1-29
4.7 Mathematical Models in Science & Technology	187-189	1-23
Review		
<b>Test 3 – Chapter 4 - Applications of Functions</b>		
5.1 Solving Systems by Graphing	205-206	1-25
5.2 Solving Systems Algebraically	212	1-36
5.3 Solving Systems with Cramer’s Rule	215-216	1-30
5.4 Applications of Linear Systems	220-222	1-30
5.5 Systems of Nonlinear Functions	225-226	1-22
Review		
<b>Test 4 – Chapter 5 – Systems of Equations</b>		
6.1 What Is Probability?	235-237	1-25
6.2 Theoretical Probability	243-245	1-52
6.3 Odds	247	1-29
6.4 Counting Principle and Tree Diagrams	251-252	1-32
6.5 Or and And Problems	257-258	1-25
6.6 Permutations and Combinations	263-264	1-30
6.7 Applied Probability Problems	265-267	1-24
Review		
<b>Test 5 – Chapter 6 – Probability Models</b>		
7.1 Introduction to Statistics	279-280	1-30
7.2 Descriptive Statistics	286-287	1-23
7.3 Organizing and Displaying Data	295-297	1-11
7.4 Variation	301-302	1-22
7.5 The Normal Curve	310-311	1-38
7.6 Scatter Diagrams and Linear Regression	317-319	1-16
Review		
<b>Test 6 – Chapter 7 – Modeling with Statistics</b>		

**Final Exam**

\*\* This schedule is tentative and is subject to change

## Lab Outline

- Lab 1: Ch. 1 – Review of algebra fundamental
- Lab 2: The rectangular coordinate system, graphing linear equations, slope
- Lab 3: Slope, writing equations of lines
- Lab 4: Writing linear equations, linear inequalities
- Lab 5: Functions
- Lab 6: Using function notation, linear functions
- Lab 7: Direct and inverse variation, nonlinear functions
- Lab 8: Geometric applications: perimeter and area, right triangles
- Lab 9: Mathematical models: personal finance, banking and finance
- Lab 10: Mathematical models: business, science and technology
- Lab 11: Solving systems: graphing, algebraically and Cramer's Rule
- Lab 12: Applications of linear systems, systems of nonlinear functions
- Lab 13: Intro to probability, theoretical probability, odds
- Lab 14: Counting problems and tree diagrams, Or and And problems, permutations and Combinations
- Lab 15: Applied probability problems
- Lab 16: Intro to statistics, descriptive statistics, organizing and displaying data
- Lab 17: Variation, normal curve, scatter diagrams and linear regression

\*\* This outline is tentative and is subject to change

## **MATHEMATICS DEPARTMENT STATEMENT:**

Dear Student,

Welcome to the Mathematics Department!

We look forward to working with you and providing you with the very best education in mathematics.

We are a seven-member team that boasts a combined experience of over one-hundred-fifty years in professional education. We are extremely proud of our services and our accomplishments, and we always strive to maintain the best of quality instruction and as well as adherence to high academic standards and goals. Because of this dedication, we enjoy an excellent academic reputation with the surrounding upper-division colleges and universities in the region. It is a high priority to maintain this reputation, and consequently the value of your degree.

In order to be successful in your Math class and to ensure that other students have the learning environment they deserve, we require that you adhere to the Code of Student Conduct located in your Student Handbook, and on your syllabus. A positive learning environment makes it much easier for any student to achieve their goals.

If it is necessary for you to discuss any personal issue with your instructor, it is imperative that you do so during their office hours or during an out of class appointment.

We are happy to meet with you to talk about any issue that is relevant to your participation in class, or your grade in the course. We have appropriate and time-proven suggestions that should help you.

As a student at AB-Tech, it is expected that you to keep up with the class, turn in assignments on time, and take responsibility for your education. The instructor will assist you in every way possible that does not compromise the integrity of the course itself. Our reputation depends on it.

Again, Welcome to AB-Tech and have a great semester!

R. Trent Codd, Jr.; Chairman; AA, BS, BSCS, MA, EASGC; 38 years of experience

Jerry L. Ashe; Instructor; AA, BS, MS; 22 years of experience

Jackie Caldwell; Instructor; BS, MA; 20 years of experience

Karma Crouch; Instructor; BS, MA Ed; 23 years of experience

Valerie Martin; Instructor; AA, BA, MS; 8 years of experience

Tammy Pagan; Instructor; AA, BS, MS; 20 years of experience

Robby Webb; Instructor; BA, MA; 23 years of experience

**SYLLABUS  
MAT 115 D1  
MATHEMATICAL MODELS  
SPRING 2009**

**Your Acknowledgement:**

I have been provided access to the course syllabus, understand what is expected of me, and agree with the provision set forth in the syllabus.

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Print Name

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Student I.D. Number

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Signature

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Date