I. COURSE DESCRIPTION: For students not planning to major in the physical sciences, engineering, mathematics, or computer science. Topics include systems of linear equations and matrices, matrix algebra and applications, linear programming and the mathematics of investments and loans. Satisfies General Education Requirement: (QR) (RE) Prerequisite(s): Math 119 or 130 or 125 or 141 or 147. Students who receive a grade of C or better in Math 123 may not subsequently receive credit for Math 119.

II. VALUE PROPOSITION: This course will enable students to solve real world application problems that arise in business, economics, and every-day situations such as investing and loans, in order to improve their decision-making and quantitative reasoning skills.

III. COURSE OBJECTIVES: In this course students will learn how to:

- Solve systems of linear equations using a variety of methods
- Define and use matrix operations and apply to solve problems
- Find the largest or smallest possible value of some quantity under certain constraints (optimization using linear programming)
- Use the simplex method to solve linear programming problems
- Use the mathematics of investments and loans to make good financial decisions
- Translate a real-world problem into a mathematical problem that can be solved using a variety of methods

This course is not required for any mathematics degree and therefore does not support the degree-level learning objectives for the Mathematics Department.
IV. **STUDENT LEARNING OUTCOMES:** At the completion of this course, students will be able to:

- Solve a system of linear equations using the following methods: graphing, algebra (elimination), matrix row reduction, and matrix inversion (using a matrix equation).
- Use a sequence of row operations to transform a matrix into reduced row echelon form.
- Express the solution to a system of linear equations in terms of a single solution, an inconsistent system, or a dependent system in parameterized form.
- Translate a real-world problem into a system of linear equations and solve.
- Carry out the following matrix operations by hand: addition, subtraction, multiplication by a scalar, multiplication of matrices, transpose, and inverse.
- Apply appropriate matrix operations to solve application problems.
- Find the best strategies and expected value of a two-person zero-sum game using matrix operations (game theory).
- Solve general linear programming problems (standard max, mixed constraints and standard min problems) by graphing and the simplex method (phase I and II).
- Translate a real-world problem into a linear programming problem and solve.
- Translate a two-person zero-sum game into a payoff matrix or linear programming problem and solve.
- Solve simple and compound interest problems by finding the future value, present value, interest rate, or time period.
- Find the future value, payment amount, interest rate, number of payments, time period, or present value of a sinking fund/ordinary annuity and installment loan.
- Solve a real-world financial problem by choosing the correct method or combination of methods.
- Use the TI-83/84 plus calculator to perform matrix row reductions, solve matrix equations, and apply the simplex method (using the PIVOTA or similar program).
- Use the TI-83/84 plus calculator to answer financial questions using the TVM Solver function.

V. **LEARNING ENVIRONMENT:** [This section includes information about the class environment (methods of instruction, role of the student, role of the faculty member), class collaboration, peer-to-peer teaching, demonstration, tools, projects, themes, activities or performance tasks, labs, lectures, etc.]


VII. **TECHNOLOGICAL RESOURCES:**

- WebAssign: WebAssign is an online homework system that is required for the course. Students should access WebAssign through their Online@UT (Blackboard) course site for Math 123. The semester begins with a 14 day free trial period. An Enhanced WebAssign Access Code (may be reused if repeating the course with current edition of
text) can be purchased either in the bookstore, online through WebAssign after the course begins, or through the website http://www.cengagebrain.com/micro/utkmath

- Calculator: A TI-83/84+ model graphing calculator is needed for the PIVOT program (download at the Math Tutorial Center). Use of cell phone calculators and calculators with advanced alphanumeric capabilities such as the TI-89 or NSpire CAS are prohibited. Devices with Internet capability are prohibited.

VIII. COURSE REQUIREMENTS, ASSESSMENT AND EVALUATION METHODS:
Grades will be determined using the grading scale below. Your letter grade is a measure of your mastery of course material and your fulfillment of course objectives. You should keep all of your graded work until final grades are posted. Your letter grade will be computed by your course average as given below:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>4 midterm exams</td>
<td>60%</td>
</tr>
<tr>
<td>WebAssign homework average</td>
<td>10%</td>
</tr>
<tr>
<td>Other*</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam (cumulative)</td>
<td>20%</td>
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<tr>
<td>Course Average</td>
<td>100%</td>
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<table>
<thead>
<tr>
<th>Letter grade</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>F</th>
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</thead>
<tbody>
<tr>
<td>Course average required</td>
<td>90</td>
<td>87</td>
<td>83</td>
<td>80</td>
<td>77</td>
<td>73</td>
<td>70</td>
<td>67</td>
<td>63</td>
<td>60</td>
<td>57</td>
<td>0</td>
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Attendance and Makeup policy: [*determined by individual instructors]

Classroom Etiquette: Please be considerate of the instructor and those around you. Come to class on time and stay the entire period. Turn off cell phones and electronic devices during class. Do not talk to classmates at inappropriate times. Refrain from reading newspapers or working on other coursework during class. For information on Classroom Behavior Expectations and consequences of non-compliance please see the following link: http://www.math.utk.edu/Courses/Expectations.pdf.

IX. HOW TO BE SUCCESSFUL IN THIS CLASS:
- Come to class every time, prepared to learn.
- Participate in class, take notes, and ask questions.
- Do all the homework at the time it is assigned. Read the text and study the example problems. A typical successful student spends 6 hours per week doing homework and studying for this class.
- Spend extra time studying for exams. Do all review problems and check the answers.
- Form a study/homework group that meets regularly with friends from class.
- Come to office hours or visit the Math Tutorial Center when you have questions or need some help. The Math Tutorial Center is in Ayres Hall G012 (also labeled B012, east end basement). It provides free tutoring. Hours of operation are posted at http://www.math.utk.edu/MTC/. Also check the library Commons http://commons.utk.edu/hours.html

Revised as of 8/6/13.
X. **COURSE FEEDBACK:** During the semester, you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

XI. **UNIVERSITY POLICIES:** All students are expected to abide by the University Honor Statement: *An essential feature of the University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.*

XII. **STUDENTS WITH DISABILITIES POLICY:** Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 2227 Dunford Hall to document their eligibility for services.

XIII. **COURSE CALENDAR AND ASSIGNMENTS:**

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic and Suggested Practice Problems</th>
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<tbody>
<tr>
<td>2.2</td>
<td>Using Matrices to Solve Systems of Equations: odd: 1 – 41 all: 51 – 64</td>
</tr>
<tr>
<td>2.3</td>
<td>Applications of Systems of Linear Equations: odd: 1 – 13, 17, 19, odd: 25 – 45 all: 47 – 56</td>
</tr>
<tr>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>Test 1</td>
<td>Sections: 2.1, 2.2, 2.3, 3.1, and 3.2</td>
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<tr>
<td>3.4</td>
<td>Game Theory: all odd</td>
</tr>
<tr>
<td>4.1</td>
<td>Graphing Linear Inequalities: odd: 1 – 25, 33 – 43 all: 45 – 58</td>
</tr>
<tr>
<td>4.2</td>
<td>Solving Linear Programming Problems Graphically: all odd</td>
</tr>
<tr>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>Test 2</td>
<td>Sections: 3.3, 3.4, 4.1, and 4.2</td>
</tr>
<tr>
<td>4.3</td>
<td>The Simplex Method: Solving Standard Maximization Problems Use PIVOT program for all Simplex (download at Math Tutorial Center, Ayres G012) all odd</td>
</tr>
</tbody>
</table>

*Revised as of 8/6/13.*
### 4.4
The Simplex Method: Solving General Linear Programming Problems: All odd focus on applications

### 4.5

#### Review

### Test 3
Sections: 4.3, 4.4, and 4.5

### 5.1
Simple Interest: all odd, focus on 13 – 44

### 5.2
Compound Interest: all odd, focus on 21 – 78

Last day to drop with a “W”

### 5.3

#### Review

### Test 4
Sections 5.1, 5.2, and 5.3

#### Review
Review for Final Exam

### Final Exam
Mandatory Comprehensive Final Exam: *Instructor insert date and time here from http://registrar.tennessee.edu/academic_calendar/

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**XIV. THE INSTRUCTOR RESERVES THE RIGHT TO REVISE, ALTER AND/OR AMEND THIS SYLLABUS, AS NECESSARY. STUDENTS WILL BE NOTIFIED IN WRITING AND/OR BY EMAIL OF ANY SUCH REVISIONS, ALTERATIONS AND/OR AMENDMENTS.**

**Helpful Online Student Resources:**

If you would like to enter the PIVOT program by hand into your calculator, go here to find the code: [http://www.math.utk.edu/~mtc/pivot-TI82-83.pdf](http://www.math.utk.edu/~mtc/pivot-TI82-83.pdf)

The textbook authors’ Web site, [www.finemath.org](http://www.finemath.org), has several useful resources in the student website listed under “Everything for Finite Math”, such as online topic tutorials, true/false quizzes, chapter summaries, chapter review exercises, and an online utilities for graphing and matrix operations.
*Notes to the instructor:* Instructors are not required to use this template version of the syllabus as long as all required information is included on their syllabus or they provide a link to this page.

Each instructor will need to complete: Section info and faculty info, V. (Learning Environment), VII. Grading policy (describe other, and may alter # of exams and placement), Attendance and Make-up policy, Final exam date and time. Calendar should include exam dates and other important deadlines.

Instructors may add to sections II., III. and IV. (Value statement, Course Objectives, Learning Outcomes), and VII. Technology Requirements (clickers, etc) and may replace section IX. How to be Successful.