**TEXAS COLLEGE**
**Division of Natural and Computational Sciences**
**Department of Mathematics**
**Course Syllabus for Spring 2022**
**MATH 3315-01 Linear Algebra**

## COLLEGE MISSION

*Texas College is a Historically Black College founded in 1894, by a group of CME ministers. Our mission continues to embody the principles of the Christian Methodist Episcopal Church. The College shall prepare students with competencies in critical and creative thinking related to the knowledge, skills, and abilities as defined in areas of study. Additionally, the College shall provide an environment to inspire intellectual, spiritual, ethical, moral, and social development, which empowers graduates to engage in life-long learning, leadership, and service.*

Course Description
Vectors in R and C, linear equations, matrices, vector spaces, subspecies, basic dimension, and linear operations.

Course Overview
The Course provides substantial support both for teaching and for using technology.  It provides a modern elementary introduction to linear algebra and a broad selection of interesting applications.  It helps students master the basic concepts and skills they will use in their careers.

Supplemental Text(s):  <u>A History of Mathematics, An Introduction</u>, 3rd Edition; Pearson, Addison-Wesley; Katz, Victor; Boston, Massachusetts.

"Linear Algebra", 4th Edition; Addison-Wesley, 501 Boylston Street, Suite 900, Boston, MA  02116; David C. Lay.

 "Elementary Linear Algebra", 3rd Edition; PWS-KENT, 20 Park Plazza, Boston, Massachusetts 02116; Stewart Venit and Way Bishop

"Elementary Linear Algebra," 4th Edition; Macmillan, 866 Third Avenue, New York, New York 10022; Bernard Kolman.

TExES/Texas Examinations of Educator Standards, Preparation Manuals: 191 Generalist EC-6, 115 Mathematics 4-8, and 143 Mathematics/Physics 8-12.

**Generalist EC-6**
**Domain II: Mathematics**

**Competency 013:** Mathematics Instruction: The teacher understands how students learn mathematics skills and uses that knowledge to plan, organize and implement instruction and assess learning.

**Competency 015:** Patterns and Algebra: The teacher understands concepts related to patterns, relations, functions and algebraic reasoning.

**Competency 018:** Mathematical Processes: The teacher understands mathematical processes and knows how to reason mathematically, solve mathematical problems, and make mathematical connections within and outside of mathematics.

**Mathematics Standard II:** Patterns and Algebra: The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) to prepare students to use mathematics.

**Mathematics Standard V:** Mathematical Processes: The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.

**Mathematics Standard VI:** Mathematical Perspectives: The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics and the evolving nature of mathematics and mathematical knowledge.

**Mathematics Standard VII:** Mathematical Learning and Instruction: The mathematics teacher understands how children learn and develop mathematical skills, procedures and concepts, knows typical errors students make, and uses this knowledge to plan, organize and implement instruction; to meet curriculum goals, and to teach all students to understand and use mathematics.

**Mathematics Standard VIII:** Mathematical Assessment: The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

**Mathematics Standard IX:** Professional Development: The mathematics teachers understand mathematics teaching as a profession, knows the value and rewards of being a reflective practitioner and realizes the importance of making a lifelong commitment to professional growth and development.

**Mathematics 4-8**
**Domain II: Patterns and Algebra**
**Competency 004:** The teacher understands and uses mathematical reasoning to identify, extend and analyze patterns and understands the relationships among variables, expressions, equations, inequalities, relations, and functions.

**Competency 005:** The teacher understands and uses linear functions to model and solve problems.
**Domain V: Mathematical Processes and Perspectives**
**Competency 015:** The teacher understands mathematical reasoning and problem solving.

**Competency 016:** The teacher understands mathematical connections within and outside of mathematics and how to communicate mathematical ideas and concepts.
**Domain VI: Mathematical Learning, Instruction and Assessment**
**Competency 017:** The teacher understands how children learn and develop mathematical skills, procedures and concepts.

**Competency 018:** The teacher understands mathematical reasoning and problem solving.

**Competency 019:** The teacher understands mathematical connections both within and outside of mathematics and how to communicate mathematical ideas and concepts.

**Mathematics Standard II:** Patterns and Algebra: The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

**Mathematics Standard V:** Mathematics Processes: The mathematics understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.

**Mathematics Standard VI:** Mathematical Perspectives: The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics and the evolving nature of mathematics and mathematical knowledge.

**Mathematics Standard VII:** Mathematical Learning and Instruction: The mathematics teacher understands how children learn and develop mathematical skills, procedures and concepts, knows typical errors students make, and uses this knowledge to plan, organize and implement instruction; to meet curriculum goals, and to teach all students to understand and use mathematics.

**Mathematics Standard VIII:** Mathematical Assessment: The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

**Mathematics 7-12**
**Domain II: Patterns and Algebra**
**Competency 004:** The teacher uses patterns to model and solve problems and formulate conjectures.
**Competency 005:** The teacher understands attributes of functions, relations, and heir graphs.
**Domain V: Mathematical Processes and Perspectives**
**Competency 018:** The teacher understands mathematical reasoning and problem solving.
**Competency 019:** The teacher understands mathematical connections both within and outside of mathematics and how to communicate mathematical ideas and concepts.
**Domain VI: Mathematical Learning, Instruction and Assessment**
**Competency 020:** The teacher understands how children lean mathematics and plans, organizes, and implements instruction using knowledge of students, subject matter, and statewide curriculum (Texas Essential Knowledge and Skills [TEKS]).
**Competency 021:** The teacher understands and uses a variety of formal and informal assessment techniques to monitor and guide mathematics instruction and to evaluate student progress.
**Mathematics Standard II:** Patterns and Algebra: The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis, and technology appropriate to teach the statewide curriculum (TEKS) to prepare students to use mathematics.
**Mathematics Standard V:** Mathematical Processes: The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics and to communicate mathematically.
**Mathematics Standard VI:** Mathematics Perspectives: The mathematics teacher understands the historical development of mathematical ideas, the relationship between society and mathematics, the structure of mathematics and the evolving nature of mathematics and mathematical knowledge.
**Mathematics Standard VII:** Mathematical Learning and Instruction: The mathematics teacher understands how children learn an develop mathematics skills, procedures and concepts; knows typical errors students make; and uses this knowledge to plan, organize and implement instruction to meet curriculum goals and to teach all students to understand and use mathematics.
**Mathematics Standard VIII:** Mathematical Assessment: The mathematics teacher understands assessment and uses a variety of formal and informal assessment techniques appropriate to the

learner on an ongoing basis to monitor and guide instruction and to evaluate and report student progress.

Study equations of Lines, Systems of Linear Equations, Matrices, Vectors, and Application of Linear Algebra.

Apply basic concepts of this course to the passing of TExES, GRE, etc., and Graduate Study.

<u>Course Delivery Method and Activities</u>
Teaching methods that will be utilized in this class are media presentations, lectures, open discussions, group exercises, students' questions-answers and contributions and class participation, as well as some research.

<u>Course Outline Chart</u>

Tentative Schedule:
(Dates may vary)

| Week of | |
|---------|---|
| January | |
| 19-27 | Diagnostic Test taking |
| 28 | Review College Algebra |
| February | |
| 1-8 | Solution of Equations |
| 9 | **Test** |
| 10-12 | Lines, Slopes, Equations of Lines, and Graphs |
| 15-17 | Systems of Linear Equations<br>Graphing and operations with Substitution Methods |
| 18-22 | Systems of Linear Equations<br>Matrices |
| 23 | **Test** |
| 25 | Mid-Term Review |
| 29 – Mar. 4 | Mid-Term Examinations |
| March | |
| 7-18 | Determinants |
| 28-31 | Cramer's Rule |
| April | |
| 5 | **Test** |
| 6-13 | Vectors |
| 14-25 | Vector Spaces and Subspaces |
| 26 | Test |
| 27-29 | **Final Exams Review** |
| May | |
| 2-6 | Spring 2016 Final Examinations |

<u>Evaluation</u>
The final semester grade is determined by the average of Class Attendance, Participation, Notebook Assignments, Chapter Tests, Reports, Mid-Term Examination and Final Examination.

<u>Exams/Grading Chart</u>

| Grading scheme will be as follows: |
|---|
| 90 ----- 100  ----- A |
| 80 -----  89 ----- B |

| | |
|---|---|
| 70 ----- 79 ----- C | |
| 60 ----- 69 ----- D | |
| Below --- 60 ----- F | |

Required materials for this course

| | | | |
|---|---|---|---|
| Notebook (Binder) | A Pair of Compasses | Library Research Reports | Others |
| Notebook Paper | the Greek Alphabet | Textbook | Hole Punch |
| Pen | Typing Paper | Textbook References | |
| Pencil | Poster Boards | Calculator | |
| Graph Paper | Binder | Computer | |
| Metric Ruler | Markers | Periodicals | |
| English Measurement Ruler | Research Projects | A Pair of Scissors | |

Roles and Responsibilities:

If a student is, absent because he or she was representing the College, on a day of an examination, he or she may be permitted to take the examination with a documented excuse from the respective sponsor.

Make-up exams will generally be discouraged except under emergency circumstances, in which case the instructor should be informed about the emergency.

A failure grade of "F" will be given to a student who does not take the Final Examination.