Linear Algebra (SDSU Math 254 Introduction to Linear Algebra)

Open to any grade level for students who have received a "3" or higher on the Advanced Placement (AP) Calculus BC Exam or a "C" or higher in Calculus C. Students should take Calculus D before or concurrently with Linear Algebra. (5 Credits)

- *Students earn college credits for this course through either San Diego State University or MiraCosta College. The class is taught at TPHS as part of the regular school day. It is recommended that students do not earn high school credits for this class. Details will be explained in class or see www.abbymath.com/SDSU.*

General Information

Description

In **Linear Algebra**, students will learn concepts such as

- Systems of Linear Equations and Matrices
- Determinants
- Euclidean and General Vector Spaces
- Inner Product Spaces
- Eigenvalues and Eigenvectors
- Linear Transformations

Expectations and Goals

Students must have a "3" or higher on the Advanced Placement (AP) Calculus BC Exam or a "C" or higher in Calculus C.

Indicators of potential success in Linear Algebra include test scores near or above the following values:

- Advanced Placement Calculus BC Exam: 4 or 5

- Students who score a "3" on the above are eligible for Linear Algebra, however they may find more success in Calculus C followed by Calculus D. (Students are eligible for Calculus C if they score a "3" or higher for the AB sub-score of the AP Calculus BC Exam).

Student entering Linear Algebra should be able to solve problems such as

- Systems of equations
- Parametric equations (including lines and planes in space)
- Vectors and operations with vectors
- Solving problems in two, three, and four dimensions
- Algebraic properties, axioms, and identities

Students entering **Linear Algebra** should also be able to solve problems such as

Vector Problem: For $\mathbf{u}$ = <1, 2, 3> and $\mathbf{v}$ = <-2, 7, 0> find $proj_{\mathbf{u}}\mathbf{v}$, the projection of $\mathbf{v}$ onto $\mathbf{u}$.	Plane Problem: Find the equation of the plane containing the points (1, 2, 3), (-2, 7, 0), and (5, -1, -1).
Parametric Equations and Systems Problem: Determine if the lines $L1$ and $L2$ are parallel, skew, or intersecting. If intersecting, find the point of intersection. $L1$: $x = 5t = 7$, $y = \square t = 2$, $\quad z = 6t = 13$ $L2$: $x = 3s = 6$, $y = 2s = 2$, $\quad z = \square 2s = 3$	Properties Problem: Name each property illustrated: (a) $\mathbf{u} + \mathbf{v} = \mathbf{v} + \mathbf{u}$ $\quad\quad$ (b) $\mathbf{u} + (-\mathbf{u}) = \mathbf{0}$ (c) $k(\mathbf{u} + \mathbf{v}) = k\mathbf{u} + k\mathbf{v}$ (d) If $\mathbf{u} = \mathbf{v}$ and $\mathbf{v} = \mathbf{w}$, then $\mathbf{u} = \mathbf{w}$.

Students entering Linear Algebra are expected to do the following:
- Keep up with daily assignments without a daily check from the teacher.
- Work independently and with classmates to solve problems and understand concepts.
- Read mathematical arguments, proofs, and examples.
- Prepare projects outside of class and give presentations in front of peers.
- Solve complex problems without the use of a calculator or note sheet.
- Develop proofs and write out mathematical arguments for solving problems.

Estimated Homework
Students will be expected to spend an average of approximately 2 hours outside of class on homework, reading, and review for each class period. This is a general guideline for planning and scheduling purposes. A student's individual ability level and competency may affect the actual preparation times needed.

There may also be projects such as
- Presentations to the class
- Computer activities with the program *Mathematica*

This Class Is Best For…
Linear Algebra is a rigorous college course. Students are expected to spend significant amounts of time completing and understanding assignments, preparing projects, studying for exams, and reviewing material each week. As in most college courses, students in Linear Algebra have only a few opportunities to demonstrate understanding on tests and projects, therefore each assessment will have a significant impact on a student's grade.

Note that students who do not need the additional units for high school graduation are strongly encouraged to have the Linear Algebra course NOT appear on their high school transcripts. This makes it much more likely for colleges to accept the transfer units. More details are given in class.

Course Materials

Required Materials
Text book: *Elementary Linear Algebra*, 8th Edition, John Wiley & Sons 2000, Anton.

Internet resources
- AbbyMath.com