

# Physics 3301: Math Methods for Physics/Engineering, Fall 2019

## Professor Information:

**Name:** Dr. David Bixler  
**Office:** VIN 115  
**Phone:** 942-2242  
**Email:** David.Bixler@Angelo.edu  
**Office Hours:** MTW 8:00-11:00; RF 9:30-11:00

## Course Description:

An introduction to specific mathematical topics as applied to standard problems in physics/engineering.  
Prerequisite: Mathematics 2414 (Calculus II).

## Student Learning Outcomes:

Upon completion of Physics 3301, students will demonstrate the ability to solve quantitative problems and evaluate quantitative information in the study of physics and engineering.  
Students will have practiced and demonstrated a satisfactory level of mathematical reasoning and analytical thinking appropriate for studies in advanced physics and engineering.  
These outcomes will be assessed by three section exams and a comprehensive final exam.

## Required Materials:

"Mathematical Methods in the Physical Sciences" 3<sup>rd</sup> edition by Mary Boas.

## Classroom Procedures:

Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are responsible for understanding the Academic Honor Code, which is contained in both print and web versions of the Student Handbook.

Persons with disabilities which may warrant academic accommodations must contact the Student Life Office, Room 112 University Center, in order to request such accommodations prior to any accommodations being implemented. You are encouraged to make this request early in the semester so that appropriate arrangements can be made.

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

Homework will be assigned in Blackboard and will be due as noted in the assignment. All homework will be submitted through Blackboard.

Four mid-term tests will focus on problem-solving skills. The tests will be open for a limited time, and once you submit your test answers, it cannot be changed. Make-up tests will be available only under extremely special circumstances. The final exam will be comprehensive.

The course grade will be calculated as follows: Tests 40% (10% each), Homework and Quizzes 40%, Final Exam 20%.

## Physics 3301 Fall 2019 Schedule

Week	TOPICS	TEXT SECTIONS
August 26 – August 31	Matrices, Matrix operations, Inverse matrices, Special matrices, Determinants	Chapter 3 Sections: 1, 2, 3, 6, 9
September 3 – September 7	Vectors, Lines and Planes, Matrix operators, Complex matrices, Special matrices	Chapter 3 Sections 4, 5, 7, 9, 10
September 9 – September 14	Eigenvalues and Eigenvectors, Hermiticity, Diagonalization, Applications	Chapter 3 Sections 11, 12

<b>September 14-15</b>	<b>TEST 1: Chapter 3</b>	-----
September 16 – September 21	Partial Derivatives, Differentials, Approximations, Implicit Differentiation, Extrema Problems	Chapter 4 Sections 1, 3, 4, 5, 6, 8
September 23 – September 28	Lagrange Multipliers, Change of Variable, Legendre Transformations, Derivatives of integrals, Multiple integrals	Chapter 4 Sections 9, 11, 12 Chapter 5 Sections 1, 2
September 30 – October 5	Applications of integration, Change of variables, Surface integrals	Chapter 5 Sections 3, 4, 5
<b>October 5-6</b>	<b>TEST 2: Chapters 4, 5</b>	-----
October 7 – October 12	Vector identities and products, Fields, Directional derivatives, The Gradient, Divergence, Curl and Laplacian	Chapter 6 Sections 1, 3, 5, 6, 7
October 14 – October 19	Line integrals, Green’s Theorem, The Divergence Theorem, Stokes’ Theorem	Chapter 6 Sections 8, 9, 10, 11
October 21 – October 26	Periodic functions, Fourier series, Parity, Complex exponential form	Chapter 7 Sections 1, 2, 4, 5, 7, 9
October 28 – November 2	Fourier transforms and inverse transforms Linear, first order, differential equations; separable equations	Chapter 7 Section 12 Chapter 8 Sections 1, 2, 3
<b>November 2-3</b>	<b>TEST 3: Chapters 6, 7</b>	-----
November 4 – November 9	Second order linear differential equations with constant coefficients, The principle of superposition, The Laplace Transform	Chapter 8 Sections 5, 6, 8
November 11 – November 16	Solving differential equations with the Laplace transform, The Dirac Delta function, first and second order series solutions	Chapter 8 Sections 8, 9, 11 Chapter 12 Section 1
November 18 – November 23	Series solutions, Legendre’s Equation, Rodrigues’ Formula, The Method of Frobenius, Bessel’s Equation	Chapter 12 Sections 2, 4, 5, 10, 11, 12, 13, 14, 16, 17
November 23-24	TEST 4: Chapters 8, 12	
November 25 – November 26	Other kinds of Bessel functions, Hermite and Laguerre functions	Chapter 12 Sections 17, 22
December 1 – December 6	Partial differential equations, Laplace’s equation, boundary value problems, Fourier solutions	Chapter 13 Sections 1, 2
<b>December 6-7</b>	<b>FINAL EXAM</b>	-----