**PHYS 3301: Math Methods for Physics/Engineering, Fall 2020**

**Instructor**
David Bixler, PhD  
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Email: [David.Bixler@angelo.edu](mailto:David.Bixler@angelo.edu)

Office: VIN 115  
In-Person Office Hours: MTWRF 9:00-10:00am; MW 10:00-11:00am  
Collaborate Office Hours: TRF 10:00-11:00am or by appointment

**Required materials**

**Prerequisites**
Mathematics 2414 or equivalent.

**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, you should be able to:
1. Solve quantitative problems relevant to the study of physics and engineering.
2. Evaluate quantitative information appropriate for the study of physics and engineering.
3. Demonstrate a satisfactory level of mathematical reasoning needed for studies in advanced physics and engineering.
4. Demonstrate a depth of analytical thinking appropriate for studies in advanced physics and engineering.

**Course structure**
This course is an online lecture course. The focus of the lectures will be to better understand concepts that are then practiced through the completion of homework assignments.

**Professionalism**
Professional standards apply in this class. You are expected to demonstrate a behavior consistent with the conduct of an individual working in a professional environment. You are expected to:
(1) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) demonstrate sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accept constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; and (7) maintain a good work ethic and integrity.

**Graded Material**

**Class Attendance, Participation, Timeliness and Teamwork**
You are expected to watch every video and take notes. Homework assignments will appear regularly in Blackboard. These assignments will be due at the time specified when the assignment is made. Assignments will be turned in via Blackboard. After each assignment is due, there will be a three-day grace period during which the assignment will still be accepted with a small penalty. After the assignment disappears in Blackboard, it will no longer be accepted.

**Exams**
This course will have four mid-term exams, and a comprehensive final exam.
Grades: Weighting and Letter Grades

The weighting system shown in the table will be used in determining final grade for the course.

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm exams (4)</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The instructor will determine letter grades for the course using his professional judgment, and the following standards as described in the University Catalog:

- A = excellent work
- B = good work
- C = average work
- D = poor work
- F = failing work

Classroom and University Policies and Student Support

General Policies

All students are required to follow the policies and procedures presented in the Angelo State University Student Handbook and Angelo State University Catalog.

Student Disability Services

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA), and subsequent legislation.

The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student’s responsibility to initiate such a request by contacting Ms. Dallas Swafford, Director of Student Disability Services, at 325-942-2047 or Dallas.Swafford@angelo.edu, or visit the Student Disabilities Services website.

Title IX Statement

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking.

As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance. Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.
Director of Title IX Compliance/Title IX Coordinator
Mayer Administration Building, Room 210
325-942-2022
michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

For more information about Title IX in general you may visit www.angelo.edu/title-ix.
Observance of Religious Holy Day
A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day for more information.

Incomplete Grade Policy
It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures for more information.

Student Conduct Policies
Academic Integrity
Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the Statement of Academic Integrity.

Plagiarism
Plagiarism is a serious topic covered in ASU’s Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft. It is expected that you will summarize or paraphrase ideas and give appropriate credit to the source.

Copyright Policy
Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

Required Use of Masks/Facial Coverings by Students
As a member of the Texas Tech University System, Angelo State University has adopted the mandatory Facial Covering Policy to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately. The student will be responsible to make up any missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.

Modifications to the Syllabus
This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.
<table>
<thead>
<tr>
<th>Dates</th>
<th>Lecture Topics</th>
<th>Text Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 17 – August 22</td>
<td>Matrices, Matrix operations, Inverse matrices, Special matrices, Determinants</td>
<td>Chapter 3 Sections: 1, 2, 3, 6, 9</td>
</tr>
<tr>
<td>August 24 – August 29</td>
<td>Vectors, Lines and Planes, Matrix operators, Complex matrices, Special matrices</td>
<td>Chapter 3 Sections 4, 5, 7, 9, 10</td>
</tr>
<tr>
<td>August 31 – September 5</td>
<td>Eigenvalues and Eigenvectors, Hermiticity, Diagonalization, Applications</td>
<td>Chapter 3 Sections 11, 12</td>
</tr>
<tr>
<td>September 4-6</td>
<td>TEST 1: Chapter 3</td>
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<tr>
<td>September 7</td>
<td>Labor Day Holiday</td>
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<tr>
<td>September 8 – September 12</td>
<td>Partial Derivatives, Differentials, Approximations, Lagrange Multipliers, Derivatives of integrals</td>
<td>Chapter 4 Sections 1, 3, 4, 9, 12</td>
</tr>
<tr>
<td>September 14 – September 19</td>
<td>Multiple integrals, Applications of integration, Change of variables, Surface integrals</td>
<td>Chapter 5 Sections 1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>September 18-20</td>
<td>TEST 2: Chapters 4, 5</td>
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<tr>
<td>September 21 – September 26</td>
<td>Vector identities and products, Fields, Directional derivatives, The Gradient, Divergence, Curl, and Laplacian</td>
<td>Chapter 6 Sections 1, 3, 5, 6, 7</td>
</tr>
<tr>
<td>September 28 – October 3</td>
<td>Line integrals, Green’s Theorem, The Divergence Theorem, Stokes’ Theorem</td>
<td>Chapter 6 Sections 8, 9, 10, 11</td>
</tr>
<tr>
<td>October 5 – October 10</td>
<td>Periodic functions, Fourier series, Parity, Fourier transforms and inverse transforms</td>
<td>Chapter 7 Sections 1, 2, 4, 5, 9, 12</td>
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<tr>
<td>October 9-11</td>
<td>TEST 3: Chapters 6, 7</td>
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<tr>
<td>October 12 – October 17</td>
<td>Linear, first order, differential equations; separable equations, Second order linear differential equations with constant coefficients, The principle of superposition</td>
<td>Chapter 8 Sections 1, 2, 3, 5, 6</td>
</tr>
<tr>
<td>October 19 – October 24</td>
<td>Other second-order equations, The Laplace Transform, Solving differential equations with the Laplace transform, The Dirac Delta function</td>
<td>Chapter 8 Sections 7, 8, 9, 11</td>
</tr>
<tr>
<td>Dates</td>
<td>Lecture Topics</td>
<td>Text Sections</td>
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<tr>
<td>October 26 – October 31</td>
<td>First and second order series solutions, Series solutions, Legendre’s Equation, Rodrigues’ Formula, Associated Legendre Functions</td>
<td>Chapter 12 Section 1, 2, 4, 5, 10</td>
</tr>
<tr>
<td>November 2 – November 7</td>
<td>The Method of Frobenius, Bessel’s Equation, Other kinds of Bessel functions, Hermite and Laguerre functions</td>
<td>Chapter 12 Sections, 11, 12, 13, 14, 16, 17, 22</td>
</tr>
<tr>
<td>November 6-8</td>
<td>TEST 4: Chapters 8, 12</td>
<td>----</td>
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<tr>
<td>November 9 – November 14</td>
<td>Partial differential equations, Laplace’s equation, boundary value problems, Fourier solutions</td>
<td>Chapter 13 Sections 1, 2</td>
</tr>
<tr>
<td>November 16 – November 21</td>
<td>Review and Final Exam</td>
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**End Notes**

1 http://www.angelo.edu/student-handbook/  
2 http://www.angelo.edu/catalogs/  
3 http://www.angelo.edu/services/disability-services/  
4 http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of  
5 http://www.angelo.edu/content/files/14197-op-1011-grading-procedures  
6 http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php  
7 http://www.texastech.edu/downloads/ttus-policy-face-coverings.pdf