COURSE DESCRIPTION: Vectors, vector operations, and vector functions; multivariate functions, partial derivatives, gradients, and multiple integrals; integration in vector fields, Green’s, Stokes’, and the Divergence theorems.

TEXT/MATERIALS: The required textbook is Calculus (Early Transcendentals), 4th edition, by Rogawski and Adams, ISBN 9781319050740. Topics for MATH 3315 are included in chapters 11 thru 17 of the text.

SUPPLEMENTAL MATERIAL: A resource the instructor will occasionally draw from is S. Schlicker et. al, Active Calculus Multivariable, http://activecalculus.org

CALCULATORS: Each student will need a scientific calculator to use during exams. No graphing calculators or cell phone calculators will be allowed during exams. Having software available like Desmos and CalcPlot3D, will be useful in this course.

WITHDRAWL: The last day to withdraw from a full-session course with a grade of W is April 10, 2024. Note: You can find the withdrawal dates and procedures on: https://www.sfasu.edu/registrar/registration-information/dates-deadlines and https://www.sfasu.edu/registrar/registration-information/how-to-drop-withdraw

GRADING: Grades will be assigned according to the following percentages.

- Midterm worth 20%
- Final Exam Worth 30%
- Quizzes worth a total of 20%.
- Projects worth a total of 30%.

PROJECTS: Projects will be graded by correctness, rigor, and clarity of work. The purpose of these projects is to explain and use the ideas being discussed in the course in a new setting. Projects will be assigned and turned into the DropBox on D2L.

QUizzes: There will be weekly quizzes due on D2L on Fridays, corresponding suggested homework exercises will be posted with the quiz information.

MIDTERM EXAM: There will be an exam given approximately halfway through the course. The exam will be given during a lab time. You may find dates on the tentative schedule, note that dates may change due to pace of course.

MAKE-UP and LATEWORK POLICIES: No make-ups are allowed without prior discussion beforehand with the instructor, or in case of an emergency. If there are concerns with completing any work on time or being prepared for an exam please contact the instructor immediately. The decision of a make up or accepting late work is left to the discretion of the instructor and is final.
ACADEMIC HONESTY: The instructor encourages students to discuss homework and course material. However, each student is expected to turn in their own work on graded assignments and should be explained in the student’s own words. If the work is not the student’s own, then this can lead to a grade of zero on the assignment. Any additional material present that was not specified by the instructor or violations of academic integrity that occur during quizzes and exams is not permitted and may lead to a zero on the exam or a failing grade in the course.

FINAL EXAM: The Final is scheduled for Wednesday, May 8th of 2024 from 10:30 AM - 12:30 PM in Math Building Room 202. The final exam will be a comprehensive examination, worth thirty percent of the final grade.

GRADING SCALE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90%-100%</td>
</tr>
<tr>
<td>B</td>
<td>80%-89.99%</td>
</tr>
<tr>
<td>C</td>
<td>70%-79.99%</td>
</tr>
<tr>
<td>D</td>
<td>60%-69.99%</td>
</tr>
<tr>
<td>F</td>
<td>59.99% and Lower</td>
</tr>
</tbody>
</table>

TENTATIVE SCHEDULE: Note that material dates may change according to pace of the course.

<table>
<thead>
<tr>
<th>Week of</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Thursday/(Lab)</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/18-1/19</td>
<td></td>
<td></td>
<td><strong>First Day of Class</strong></td>
<td>Sec 11.1</td>
</tr>
<tr>
<td>1/22-1/26</td>
<td>Sec 11.2</td>
<td>Sec 11.2</td>
<td>Sec 11.3/11.4</td>
<td>Sec 11.4</td>
</tr>
<tr>
<td>1/29-2/2</td>
<td>Sec 12.1</td>
<td>Sec 12.2</td>
<td>Sec 12.2</td>
<td>Sec 12.3</td>
</tr>
<tr>
<td>2/5-2/9</td>
<td>Sec 12.3</td>
<td>Sec 12.4</td>
<td>Sec 12.4</td>
<td>Sec 12.5</td>
</tr>
<tr>
<td>2/12-2/16</td>
<td>Sec 12.5</td>
<td>Sec 12.6/12.7</td>
<td>Sec 12.7</td>
<td>Sec 13.1</td>
</tr>
<tr>
<td>2/19-2/23</td>
<td>Sec 13.1</td>
<td>Sec 13.2</td>
<td>Sec 13.2</td>
<td>Sec 13.3</td>
</tr>
<tr>
<td>2/26-3/1</td>
<td>Sec 13.3</td>
<td>Sec 13.4</td>
<td>Sec 13.4</td>
<td>Sec 13.4</td>
</tr>
<tr>
<td>3/4-3/8</td>
<td>Sec 13.5</td>
<td>Review</td>
<td><strong>Midterm Exam</strong></td>
<td>Sec 13.5</td>
</tr>
<tr>
<td>3/11-3/15</td>
<td><strong>No Class Due To</strong></td>
<td>Spring Break</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>3/18-3/22</td>
<td>Sec 14.1</td>
<td>Sec 14.1</td>
<td>Sec 14.2</td>
<td>Sec 14.2</td>
</tr>
<tr>
<td>3/25-3/29</td>
<td>Sec 14.3</td>
<td>Sec 14.4</td>
<td><strong>No Class Due To</strong></td>
<td>Easter Holiday</td>
</tr>
<tr>
<td>4/1-4/5</td>
<td>Sec 14.5</td>
<td>Sec 14.5</td>
<td>Sec 14.6</td>
<td>Sec 14.7</td>
</tr>
<tr>
<td>4/8-4/12</td>
<td>Sec 14.7</td>
<td>Sec 14.8</td>
<td>Sec 15.1</td>
<td>Sec 15.1</td>
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<tr>
<td>4/15-4/19</td>
<td>Sec 15.2</td>
<td>Sec 15.2</td>
<td>Sec 15.3</td>
<td>Sec 15.4</td>
</tr>
<tr>
<td>4/22-4/26</td>
<td>Sec 15.6</td>
<td>Sec 15.6</td>
<td>Sec 16.1</td>
<td>Sec 16.1</td>
</tr>
<tr>
<td>4/29-5/3</td>
<td>Sec 16.2/16.3</td>
<td>Sec 16.4</td>
<td>Sec 16.5</td>
<td>Review</td>
</tr>
<tr>
<td><strong>Finals Week</strong></td>
<td>Final Exam</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5/6-5/10</td>
<td><strong>Final Exam</strong></td>
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<tr>
<td></td>
<td>10:30AM-12:30 PM, Math Building Room 202</td>
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</tbody>
</table>
Math 3315–Calculus III (Lecture)
Course Syllabus

Course description: Vectors, vector operations, and vector functions; multivariate functions, partial derivatives, gradients, and multiple integrals; integration in vector fields, Green’s, Stokes’, and the Divergence theorems.

Credit hours: 3

The following is an excerpt from SFA Policy 5.4:

The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;

2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

Course Prerequisites and Corequisites: MATH 2314 and MATH 2114

Course outline:

- Vector operations and vector functions
  - Vectors and vector operations
    - Definition, addition, scalar multiplication
    - Vector products: dot, cross, box
    - Lines and planes in space
  - Vector-valued functions
    - Limits and continuity; differentiation and integration
    - Arc length
    - Unit tangents and normals, curvature

- Multivariate functions
  - Definitions, domain/range, surfaces, level curves/surfaces
  - Limits and continuity
  - Partial derivatives/implicit differentiation
    - The extended chain rule
    - Directional derivatives and gradients
    - Tangent planes
    - Extreme values
  - Multiple integrals
    - Double integrals, areas, moments and center of mass
    - Triple integrals, masses and moments
    - Substitution with multiple integrals, Jacobians
    - Integrals in other coordinate systems

- Integration in vector fields
  - Line integrals

Approximate time spent

20%
40%
40%
Vector fields: work and potential, circulation, flux
Green’s Theorem: divergence and curl
Surface integrals
Stokes’ Theorem
Divergence Theorem

Student Learning Outcomes (SLO): At the end of MTH 3315/3115, a student who has studied and learned the material should be able to:
1. Perform and interpret the standard vector operations. [PLO: 1,2,3]
2. Calculate and interpret the arc length, unit tangent vector, curvature, and principal unit normal of vector-valued functions parameterized either by time or arc length. [PLO: 1,2,3]
3. Demonstrate an understanding of the connection between the gradient of a multivariate function, directional derivatives, and tangent planes. [PLO: 1,2,3]
4. Set up, manipulate, transform, and interpret multiple integrals to solve mathematical and real-world problems. [PLO: 1,2,3]
5. Calculate line integrals in vector fields and relate these integrals to the notions of circulation and flux. [PLO: 1,2,3]
6. Use Green’s Theorem to connect the flux of a vector field to its divergence and the circulation to the curl. [PLO: 1,2,3]
7. Calculate surface integrals and relate them to real-world applications. [PLO: 1,2,3]
8. Generalize Green’s Theorem in the plane to Stokes’ Theorem and the Divergence Theorem on surfaces. [PLO: 1,2,3]

Program Learning Outcomes (PLO): Students graduating from SFA with a B.S. Degree and a major in mathematics will:
1. Written Communication - SFA Mathematics majors communicate mathematical ideas effectively in written form, integrating mathematical notation correctly and consistently.
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3. Mathematical Maturation - SFA Mathematics majors grow from a computational understanding of mathematics to an integrated approach which includes critical thinking proficiency, computational facility, conceptual understanding, and problem-solving persistence.

Academic Integrity
The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

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**Student Wellness and Well-Being**
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dos@sfasu.edu

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Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

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Date of document: 08/23/2023
Math 3115–Calculus III (Lab)
Course Syllabus

Course description: Vectors, vector operations, and vector functions; multivariate functions, partial derivatives, gradients, and multiple integrals; integration in vector fields, Green's, Stokes’, and the Divergence theorems.

Credit hours: 1

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Approximate time spent

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40%
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*Date of document: 08/23/2023*