UVU UTAH VALLEY UNIVERSITY™

Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Course Prefix: MATH
Course Title: Calculus III

Year: 2025
Course and Section #: 2210 section 002
Credits: 4

Course Description

Includes vectors in 3-space, quadric surfaces, partial derivatives, gradient, Lagrange multipliers, multiple integrals, line integrals, Green's Theorem, surface integrals, the Divergence Theorem, and Stokes' Theorem. Is an honors course which includes a student project.

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Dr. David Fearnley

Student Learning Outcomes

Course Outcomes: Upon successful completion, students should be able to:

1. Find dot and cross products of vectors, projections, equations of lines and planes in 3D-space, and graphs of quadric surfaces.
2. Compute the rectangular, cylindrical, and spherical coordinates of points in space, tangent vectors and tangent lines to curves in space, arc length, velocity, acceleration, and distance traveled of objects moving in space.

3. Find partial derivatives of functions of several variables, the gradient, directional derivative, and linear approximations.
4. Find critical points, extreme values, and saddle points of functions of two variables using methods such as the Second Partial Derivative Test, the Extreme Value Theorem, and Lagrange multipliers.
5. Compute double integrals in rectangular or polar coordinates or via change of variables.
6. Determine parametric representations of curves or surfaces with orientation and compute line and surface integrals of scalar functions and vector fields.
7. Compute triple integrals in rectangular, cylindrical, or spherical coordinates or via change of variables.
8. Find the curl and divergence of a vector field.
9. Apply the Fundamental Theorem of Line Integrals, Green's theorem, Stokes' theorem, and the Divergence theorem to compute appropriate double, triple, line, or surface integrals.

Course Materials and Texts

Open Stax Calculus 3 (free online text)

Course Requirements

Course Assignments, Assessments, and Grading Policy

Homework: Homework is 5% of your grade and is due the class day after the test corresponding to the homework. Homework will not generally be checked for accuracy. However, we start most class days with homework questions so please ask any that you have questions about. Please mark clearly where each homework section begins. If at least four problems are attempted in the homework for section in the text then the student will get credit for that section, but the listed problems are the recommended problems that students should do in order to understand the material (for most of you, it will probably be to your advantage to do the problems listed). If you feel you understand the material and do not need to do more problems than four, that is fine; I am not interested in wasting your time. If you feel you need to do more problems and are not understanding the material after doing the full set of the recommended problems then it is advised that you do so. If you would prefer to do different problems in the section from those I have recommended, that is also fine. The purpose of the homework is to get you ready for the tests and help you understand the material. Students are free to exercise a significant degree of freedom in deciding how best to use the homework to accomplish that objective.

Honors Projects: In addition to the normal homework, students in the honors section are expected to hand in three honors projects over the course of the semester which give a greater theoretical grounding. These projects are attempting to understand and then writing important proofs in calculus in your own words. The projects should be handed in at the same time as homework assignments 2, 3 and 4. This is what should be submitted with the honors project:

Project 1: Read and understand, and then write the proof of Clairaut's Theorem.

Project 2: Read and understand, and then write the proof of Fubini's Theorem (parts (a), (b) and (c) of Theorem 8.51 in the supplemental calculus text file).

Project 3: Read and understand, and then write the proof of the simplified form of Green's Theorem (any form of Green's Theorem from either text).

These three projects together constitute 5% of your grade.

Tests: There will be four tests preceding the final. The tests will cumulatively constitute 60% of your grade. All tests are in class (the testing center has been closed) and are therefore timed, so I must collect the tests at the end of the class period. Tests will probably not be given late unless the student is quite ill on the day of the test, or has a UVU approved school function or similarly unavoidable emergency. Students should be prepared to provide evidence of their reason for missing the exam (such as a doctor's note). A busy schedule, not being aware of the test, or just being out of town are not normally acceptable excuses for missing a test on the scheduled day. Students who miss a test for reasons which are not acceptable excuses cannot make the test up and their test score is zero. There are no re-takes and there is no extra credit. In some borderline cases where an excuse is not sufficient (but is fairly reasonable) a compromise may be offered wherein the student may take a more difficult version of the exam late. Students in the honors section have only 60% of the grade dependent upon tests with 5% dependent on additional honors assignment projects.

Final Examination: The final exam is 30% of your grade. Except in exceptional emergencies students may not take the final early or late. Students will not normally receive a grade lower than that which would correspond to a course average of their final exam score percentage minus 10% (even if their course average would be below that amount).

SRI: To encourage filling out the SRI at the end of the course, a one half of one percent extra credit is offered for students filling out their SRI.

Grading: Grades are essentially distributed as

93-100 A

90-92 A-

87-89 B+

83-86 B

80-82 B -

77-79 C+

70-76 C

67-69 C -

63-66 D+

60-62 D

55-59 D-

Averages between two percentage points are usually rounded to the nearest percentage point except in the case of C, C- and D- grades, where the grade is rounded up to those grades if the average is less than one percentage point away.

Required or Recommended Reading Assignments
It is recommended that students follow the text as we cover each topic. Reading a section ahead of where we finish before each class is likely to improve student understanding.

General Description of the Subject Matter of Each Lecture or Discussion

	2210 Spring 2025
	Dates are approximate and depend on the pace of the class
6-Jan	2.1: 1, 9, 11, 15, 19, 21, 23, 33, 45, 51, 47, 49, 55
7-Jan	2.2: 78, 79, 81, 89, 98, 99, 101, 104, 107, 109, 110
8-Jan	2.3: 128, 143, 147, 154, 171, 173, 177, 181
9-Jan	2.4: 183, 187, 191, 195, 212, 214, 220
13-Jan	2.5: 243 (a, b), 256, 257, 258, 259, 262, 263, 273, 276, 277, 284, 290, 296, 297
14-Jan	2.6: 304, 307, 320, 330, 339, 341
15-Jan	2.7: 363, 365, 367, 370, 373, 376, 381, 383, 388, 394, 395, 400
16-Jan	3.1: 4, 7, 8, 10, 15, 16, 23, 26
20-Jan	Martin Luther King Jr. Day

21-Jan	3.2: 46, 47, 57, 59, 60, 61, 64, 66, 70, 71, 100, 101
22-Jan	3.3: 103, 104, 111, 113, 117, 132, 133, 136, 137, 141, 142, 143, 148
23-Jan	3.3 continued
27-Jan	3.4 : 157, 163, 164, 173, 174, 175, 176, 177, 181, 183, 184, 185, 187
28-Jan	Review
29-Jan	Review
30-Jan	Test 1
3-Feb	4.1: 6, 7, 11, 13, 14, 23, 27, 34, 40, 51
4-Feb	4.2: 70, 75, 86, 87, 88, 89
5-Feb	4.3: 114-117, 120, 122, 124, 130, 134, 145, 148, 149
6-Feb	4.4: 164, 171, 176, 183, 186, 192, 208, 209
10-Feb	4.5: 215, 216, 227, 237, 245, 251, 257
11-Feb	4.6: 268, 281, 287, 294, 298, 272, 287, 295, 300, 290-293, 302-305,
12-Feb	4.6 continued
13-Feb	4.7: 318, 321, 322, 333, 346
17-Feb	Presidents' Day
18-Feb	4.8: 361,365, 371, 382, 389
19-Feb	Review
20-Feb	Review
24-Feb	Test 2
25-Feb	5.1: 11, 12, 15, 19, 23, 24, 27, 33, 36, 42

26-Feb	5.2: 62, 65, 67, 69, 74, 75, 78, 86, 93, 97, 98, 102, 109
27-Feb	5.3: 122, 123, 125, 129, 131, 134, 138, 141, 145, 147, 150, 162
3-Mar	5.4: 192, 193, 195, 197, 202, 205, 211, 212, 219, 223, 225, 227, 229
4-Mar	5.5: 243, 244, 245, 249, 252, 255, 259, 262, 267, 268, 270, 271, 276, 278, 281-285, 292
5-Mar	5.5 continued
6-Mar	5.6: 297, 303, 305, 309, 315, 317, 321, 327, 329, 338, 346 Ignore the calculator parts of the problems
10-Mar	Spring Break
11-Mar	Spring Break
12-Mar	Spring Break
13-Mar	Spring Break
17-Mar	5.7: 359, 361, 365, 371, 378, 381, 382, 387, 389, 392, 393, 394, 395, 405
18-Mar	Review
19-Mar	Review
20-Mar	Test 3
24-Mar	6.1: 5, 6, 8 , 15, 17, 19, 23, 26, 32-38
25-Mar	6.2: 55, 58, 62, 65, 67, 71, 74, 82, 92
26-Mar	6.3: 104, 105, 108, 111, 113, 120, 123, 129, 134, 136 (don't use a computer, though)
27-Mar	6.4: 146, 151, 153, 161, 163, 187, 188
31-Mar	6.5: 213, 219, 223, 225, 233, 236, 255, 257, 261, 263, 263
1-Apr	6.6: 273, 277, 281, 285, 292, 300, 301, 302, 303
2-Apr	6.6 continued

3-Apr	6.7: 326, 333, 335, 344, 345, 350, 371
7-Apr	6.7 continued
8-Apr	6.8: 385, 386, 387, 391, 392, 393, 412
9-Apr	Review
10-Apr	Review
14-Apr	Review
15-Apr	Test 4
16-Apr	Review
17-Apr	Review
21-Apr	Review
22-Apr	Review
	Classes are not held after this date
28-Apr	Final Exam in class 11:00-12:50

Required Course Syllabus Statements

Generative AI
<u>Use of Artificial Intelligence</u>: AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts that you must develop over time to develop your own individual voice. At the same time, you should learn how to use AI and in what instances AI can be helpful to you.

The use of generative AI tools (e.g. ChatGPT, Google Bard, etc.) is permitted in this course for the following activities:

- Brainstorming and refining your ideas;
- Fine tuning your research questions;
- Finding information on your topic;
- Drafting an outline to organize your thoughts; and

- Checking grammar and style.

The use of generative AI tools is not permitted in this course for the following activities:

- Impersonating you in classroom contexts, such as by using the tool to compose discussion board prompts/responses assigned to you or content that you put into a Teams/Canvas chat.

- Completing group work that your group has assigned to you, unless it is mutually agreed upon that you may utilize the tool.

- Writing a draft of a writing assignment.

- Writing entire sentences, paragraphs or papers to complete class assignments.

You are responsible for the information you submit based on an AI query (for instance, that it does not violate intellectual property laws, or contain misinformation or unethical content). Your use of AI tools must be properly documented and cited in order to stay within university policies on academic honesty.

Any student work submitted using AI tools should clearly indicate what work is the student's work and what part is generated by the AI. In such cases, no more than 25% of the student work should be generated by AI. If any part of this is confusing or uncertain, please reach out to me for a conversation before submitting your work.

Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.
To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.