# MATH 254: Multivariable Calculus

# Syllabus Spring 2021

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building #4 office #210

Credits: 5

Class Time: TBD, & Canvas online classroom

Office Hours:

***NWIC MISSION STATEMENT***

*Through education, Northwest Indian College promotes   
Indigenous self-determination and knowledge*

**Course Prerequisites:** MATH 126

# Required Text

None.

# Course Description

Presents multivariable calculus with emphasis on the calculus of vector-valued functions and space curves. Topics include partial derivatives, double and triple integrals, directional derivatives, gradient vectors, vector fields, Green’s Theorem, Stokes’ Theorem, and the Divergence Theorem. Real world applications are emphasized.

# Course Outcomes

# At the completion of this course students will be able to:

1. Find the domain and range of a multivariable function, and sketch its typical level curve or level surface.
2. Identify key features of multivariable functions.
3. Find both first-order and second-order partial derivatives of a multivariable function.
4. Compute the gradient and apply it to finding equations of tangent lines and planes, as well as to computing directional derivatives of multivariable functions.
5. Evaluate double and triple integrals; apply these multiple integration principles to solving area, volume, and average-value applications.
6. Compute line and surface integrals, and use them to solve relevant applications.
7. Use alternative coordinate systems to simplify multiple integration problems.
8. Compute gradient, curl, and divergence. Use vector and scalar fields appropriately.
9. Apply Green’s Theorem, Stokes’ Theorem, and the Divergence Theorem.
10. Solve first-order differential equations, including initial value problems.

# NWIC Institutional Outcomes

1. Effectively communicate in diverse situations, from receiving to expressing information, both verbally and non-verbally

1. Meet the technological challenges of a modern world
2. Work cooperatively toward a common goal

**Course Requirements and Expectations**

Students who have a valid issue that prevents them from attending class need to notify the instructor prior to the start of class, email messaging is preferred but phone message is acceptable. It is understood in some situations an absence will be unavoidable. In those situations students will be given the opportunity to make up attendance and participation by watching recordings of the class session that has been missed. Embedded in the recorded class session will be participation questions. If those questions are answered and submitted to the instructor within 1 week of the scheduled class session, attendance and participation points will be awarded based on the agreement reached between student and instructor.

Any exceptions to this attendance policy must be approved by the Department Chair and the instructor in writing before the start of the quarter.

***It will not be possible to earn a passing grade if a student misses more than 30% of this class without notifying the instructor.***

**Evaluation & Assessment**

|  |  |
| --- | --- |
| Homework Problem Presentations | 20% |
| Projects | 20% |
| Quizzes | 10% |
| Midterms | 30% |
| Final Exam | 20% |

Grading will be on a percentage system as detailed below:

* 1. Homework Problem Presentations – Each homework assignment will require that select problems are worked out in detail and submitted in class. Late assignments will receive a 10% deduction for each late day past the due date. weight – 20%
  2. Projects - There will be a group project with bi-weekly individual assignments due. weight – 20%
  3. Quizzes – There will be daily quizzes at the beginning of class covering topics from the previous class period, excluding exam days. Students must be in class to take the quiz. The lowest score will be dropped at the end of the quarter. No makeups. weight – 10%
  4. Midterm Exams – There will be 3 midterm exams throughout the quarter – see Canvas for expected dates. No makeups will be allowed without prior permission given by instructor. weight – 30%
  5. Final Exam – Comprehensive exam at the end of the quarter. No makeups will be allowed without prior permission given by instructor. weight – 20%

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# Course and Assignment Schedule:

**Tentative schedule**

**Weeks 1-4 Module I**

Functions of many variables, Vector valued functions

Partial Derivatives and applications, Tangent plane approximation

Gradient vectors, Directional derivatives and applications, Quiz

Multivariable Optimization, Maxima/Minima and Saddle points

Gradient fields, Divergence and Curl and applications

Midterm1

**Weeks 4-7: Module II**

Double and Triple integrals , Applications of multiple integration

Quiz

Multiple integration using Polar, spherical and cylindrical coordinates

Line and surface integrals

Midterm 2

**Weeks 7-10 Module III**

Vector and scalar fields, Divergence and curl,.

Line and Surface integrals, Green’s theorem, Stokes theorem,

Quiz

Divergence theorem

Differential Equations

**Instructor(s) Discretion:**

Should it be deemed necessary, the instructor(s) of this course reserves the right to make alterations, at any time, to the course materials or what is contained within this syllabus in order to improve the course itself, the learning environment or the opportunity for student success. If such a change is made, it will be made in a timely manner so as not to impede the learning process or interfere, in any way, with student success.