

Multivariable Calculus

Fall 2024

DGIST Hyosang Kang

Class Information

- Instructor: Hyosang Kang
- Email: hyosang@dgist.ac.kr
- Office: E7-G11
- Office Hours: make an appointment via email
- Class Time: Wed/Fri 10:30-12:30 (Section 3), 14:30-16:30 (Section 5)
- Class Room: E7-223

Grading

1. In-class participation: 30%

- There will be individual and group activities in class.
- Participation in these activities will be graded.

2. Project: 40%

- Each chapter closes with a project.
- The project summarizes the chapter and requires Python programming.
- The project should be done in groups.

- List of (tentative) projects (parentheses indicate the related mathematical concept):
 - i. Creating CAPTCHA images (Vectors and matrices)
 - ii. Making a calculator (Sequence and series)
 - iii. Implementing a contour plot algorithm (Graphs and continuity)
 - iv. Spring oscillation simulation (Differentiation of single variable functions)
 - v. Visualizing Heat flow (Partial differentiation)
 - vi. Implementing a simple neural network (Applications of derivatives)
 - vii. Computing length using Crofton's formula (Integration)
 - viii. Simulating electro-magnetic fields (Vector calculus)
 - ix. Game of areas of polygon (Multiple integrals)

3. Report: 30%

- Each projects should be accompanied by a report.
- The report should follow the formal paper format, including an abstract, introduction, methodology, results, and conclusion.
- A template will be provided, but you can use your own format too.

Grade Scale

- The letter grade will be assigned based on the following scale:

Grade	Score								
A+	90-100	B+	65-74	C+	40-49	D+	15-24		
A0	80-89	B0	55-64	C0	30-39	D0	5-14		
A-	75-79	B-	50-54	C-	25-29	D-	1-4	F	0

- If you do not submit a project or a report, you will receive an F.
- Any act of plagiarism will result in an F.

Weekly Schedule

- **Week 1**
 - **Class 1:** Orientation, 1.1. Vectors
 - **Class 2:** 1.2. Matrices, 1.3. Project I
- **Week 2**
 - **Class 3:** 2.1. Sequence
 - **Class 4:** 2.2. Series
- **Week 3**
 - **Class 5:** 2.3. Project II
 - **Class 6:** 3.1. Functions, 3.2. Continuity

- **Week 4**
 - **Class 7:** [Korea's Thanksgiving Day](#)
 - **Class 8:** 3.3. Project III
- **Week 5:**
 - **Class 9:** 4.1. Differentiation
 - **Class 10:** [TBA](#)
- **Week 6:**
 - **Class 11:** 4.2. Theorem of differentiation
 - **Class 12:** 4.3. Project IV
- **Week 7:**
 - **Class 13:** [Hangul Day](#)
 - **Class 14:** 5.1. Partial differentiation

- **Week 8: Presentation Week**
- **Week 9:**
 - **Day 1:** 5.2. The Chain Rule
 - **Day 2:** 5.3. Project V
- **Week 10:**
 - **Day 1:** 6.1. Lagrange Multiplier
 - **Day 2:** 6.2. Hessian
- **Week 11:**
 - **Day 1:** 6.3. Project VI
 - **Day 2:** 7.1. Definite integrals
- **Week 12:**
 - **Day 1:** 7.2. Multiple integrals
 - **Day 2:** 7.3. Project VII

- **Week 13:**
 - **Day 1:** 8.1. Line integrals
 - **Day 2:** 8.2. Surface integrals
- **Week 14:**
 - **Day 1:** 8.3. Project VIII
 - **Day 2:** 9.1. Green and Stokes' theorem
- **Week 15:**
 - **Day 1:** 9.2. Divergence theorem
 - **Day 2:** 9.3. Project IX
- **Week 16: Presentation Week**