

MATH 1.5: CALCULUS II

I. Course description:

1. **Credit points:** 3 ECTS

2. **Time commitment:**

| Items | Lecture | Tutorial | Practical | Total |
|--------------|---------|----------|-----------|-------|
| No. of hours | 24 | 12 | 0 | 36 |

3. **Prerequisites:** Calculus I.

4. **Recommended background knowledge:** N/A.

5. **Subject description:**

This course is the continuation of **Calculus I** and focuses on multivariable calculus, vector calculus and ordinary differential equations.

6. **Objectives & Outcome:**

7. **Assessment/ Evaluation**

| Component | Attendance | Exercises | Assignments | Reports | Midterm | Final |
|--------------|------------|-----------|-------------|---------|---------|-------|
| Percentage % | 5 | 5 | 0 | 0 | 30 | 60 |

8. **Prescribed Textbook(s):**

[1] James Stewart, CALCULUS, Early Transcendentals, 7th Edition, Thomson Books/Cole, 2012.

[2]. James C. Robinson, An introduction to Ordinary Differential Equations, Cambridge Univ. Press, 2004.

[3] Giáo trình Toán cao cấp I, II, III, Nguyễn Đình Trí, NXB Giáo dục 2005.

II. Course content & schedule:

1. Vectors

- Vectors in general
- The dot product
- The cross product

2. Functions of several variables

- Graphs and surfaces
- Limits and continuity
- Partial derivatives and the differential
- Gradient and directional derivatives
- The chain rule

- Second-order partial derivative
- 3. Optimization
 - Critical points : local extrema
 - Optimization
 - Lagrange multiplier
- 4. Integrating functions of several variables
 - The definite integral of a function of two variables
 - Iterated integrals, Fubini's theorem
 - Triple integrals
 - Double integrals in polar coordinates
 - Integrals in cylindrical, spherical coordinates
- 5. Line and surface integrals. Stoke and Green theorems
 - Line integrals
 - Flux integrals and divergence
 - Curl and Stoke's theorem
- 6. First-order ordinary differential equation
 - Euler's method
 - Separation of variables
 - Applications and modeling
- 7. Second-order ordinary differential equations (constant coefficients)
 - General theory : existence and uniqueness, linearity
 - The Wronskian
 - Homogeneous and inhomogeneous second-order linear equations.