## Course Description (暫定)

**Department of Mathematics**

### Nature of the course
- **Required**
- **Elective**

### Area
- Algebra
- Analysis
- Geometry
- Statistics
- Applied Mathematics
- Discrete Mathematics
- Others

### Calculus
- **Calculus A**
- **Calculus B**

### Course number
- 201 101A1

### Section number
- 01-04

### Number of credits
- 4

### Course title
- Calculus

### Instructor
- 蔡雅如(01)、容志輝(02)、張鎮華(03)、張志中(04)

### Contents

<table>
<thead>
<tr>
<th>章次</th>
<th>週次</th>
<th>課程進度</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>第4週&lt;br&gt;10/1~10/5</td>
<td>[3.3] The d/dx Notation; Derivatives of Higher Order.&lt;br&gt;[3.4] The Derivative as a Rate of Change.&lt;br&gt;[3.5] The Chain Rule.</td>
</tr>
<tr>
<td></td>
<td>第5週&lt;br&gt;10/8~10/12</td>
<td>holiday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*[4.9] Velocity and Acceleration; Speed.</td>
</tr>
<tr>
<td>Week</td>
<td>Sections</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td></td>
</tr>
</tbody>
</table>
| 5. Integration | [5.1] An Area Problem; A Speed-Distance Problem.  
[5.3] The Function \( f(x) = \int_a^x f(t) \, dt \).  
| 第 7 週 10/22~10/26 | |
| 5. Integration | [5.5] Some Area Problems.  
[5.6] Indefinite Integrals.  
[5.7] Working Back from the Chain Rule; the \( u \)-Substitution.  
[5.9] Mean-Value Theorems for Integrals; Average Value of a Function. |
| 第 8 週 10/29~11/2 | |
[6.2] Volume by Parallel Cross-Sections; Discs and Washers.  
Buffer time  
**11/10(六) 13:30~16:00 期中 考試範圍 2.1~5.9 (英文命題).** |
| 第 9 週 11/5~11/9 | |
[6.4] The Centroid of a Region; Pappus’s Theorem on Volumes. |
| 第 10 週 | |
| 7. The Transcendental Functions | [7.1] One-to-One Functions; Inverse Functions.  
| 第 11 週 11/19~11/23 | |
| 7. The Transcendental Functions | [7.3] The Logarithm Function, Part II.  
[7.6] Exponential Growth and Decay. |
| 第 12 週 | |
| 第 13 週 12/3~12/7 | |
| 8. Techniques of Integration | [8.1] Integral Tables and Review.  
[8.2] Integration by Parts.  
[8.3] Powers and Products of Trigonometric Functions.  
[8.4] Integrals Featuring \( \sqrt{x^2 - a^2}, \sqrt{x^2 + a^2}, \sqrt{x^2 + a^2} \). |
| 第 14 週 12/10~12/14 | |
| 8. Techniques of Integration | [8.5] Rational Functions; Partial Functions.  
*[8.7] Numerical Integration. |
| 第 15 週 12/17~12/21 | |
[9.2] Integral Curves; Separable Equations.  
[9.3] The Equation \( y'' + ay' + by = 0 \). |
| 10. The Conic Sections; Polar Coordinates; Parametric Equations | [10.2] Polar Coordinates.  
[10.8] The Area of a Surface of Revolution; Pappus’s Theorem on Surface Area. |
11. Sequences; Indeterminate Forms; Improper Integrals

第 16 週
12/24~12/29

[11.5] The Indeterminate Forms (0/0).

第 17 週
12/31~1/4

[11.6] The Indeterminate Form (∞/∞); Other Indeterminate Forms.

Buffer time

1/5(六) 13:30~16:00 期末考 考試範圍 6.1~11.7 (英文命題).

說明：
I、（※）此符號標示之課程，可由任課教師自行決定是否為教學內容，不列入考試範圍中。
II. Course prerequisite:
    High School Mathematics

III. Reference material (textbook(s)):
    Calculus: One And Several Variables, tenth edition.

IV. Grading scheme:
    Midterm exam: 40%, Final exam: 40%, Quizzes and/or homework: 20%

V. Others:
    ☆上課時間: 三 56 五 56 、實習課時間: 一 9。
    ☆各班實習課分組教室: 將公告於微積分甲統一教學網站公佈。
    ☆微積分甲統一教學網站: http://www.math.ntu.edu.tw/~mathcal/a/。
    ☆各班助教 Office Hour 時間: 將公告於微積分甲統一教學網站公佈。
    ☆習題: 習題繳交與否依各授課教師規定; 習題解答將於公佈於微積分甲統一教學網站。
    ☆期中、期末考題目以英文命題。

VI. Course Goal:
    Study the process of approximation and its limitation (errors), learn the tools and techniques for analyzing regular mappings with applications, and deepen the understanding of elementary functions.