Course Description(暫 定)

Department of Mathematics

Nature of the course ☑ required ☐ elective	Area 麻煩老師勾選類別，或直接填寫＿＿＿＿＿＿＿＿。 ☐ Algebra ☐ Analysis ☐ Geometry ☐ Statistics ☐ Applied Mathematics ☐ Discrete Mathematics ☐ Others
Calculus ☑ Calculus A ☐ Calculus B	

Course number	201 101A1	Section number	07-11	Number of credits	4
Course title	Calculus				
Instructor	陳鵬文(07)、周謀鴻(08)、莊正良(09)、劉瓊如(10)、郭鴻文(11)				

I. Contents：

章次	周次	課程進度
2. Limits and Continuity	第 1 週 9/10~9/14	[2.1] The Limit Process (An Intuitive Introduction). [2.2] Definition of Limit. [2.3] Some Limit Theorems. [2.4] Continuity.
3. The Derivative; The Process of Differentiation	第 2 週 9/17~9/21	[2.5] The Pinching Theorem; Trigonometric Limits. [2.6] Two Basic Theorems. [3.1] The Derivative. [3.2] Some Differentiation Formulas.
	第 3 週 9/24~9/28	[3.3] The *d/dx* Notation; Derivatives of Higher Order. [3.4] The Derivative as a Rate of Change. [3.5] The Chain Rule. [3.6] Differentiating the Trigonometric Functions. [3.7] Implicit Differentiation; Rational Powers.
4. The Mean-Value Theorem; Applications of the First and Second Derivatives	第 4 週 10/1~10/5	[4.1] The Mean-Value Theorem. [4.2] Increasing and Decreasing Functions. [4.3] Local Extreme Values. [4.4] Endpoint Extreme Values; Absolute Extreme Values.
	第 5 週 10/8~10/12	[4.5] Some Max-Min Problems. [4.6] Concavity and Points of Inflection.
	第 6 週 10/15~10/19	[4.7] Vertical and Horizontal Asymptotes; Vertical Tangents and Cusps. [4.8] Some Curve Sketching. *[4.9] Velocity and Acceleration; Speed. [4.10] Related Rates of Change Per Unit Time. [4.11] Differentials. *[4.12] Newton-Raphson Approximations.

5. Integration	第 7 週 10/22~10/26	[5.1] An Area Problem; A Speed-Distance Problem. [5.2] The Definite Integral of a Continuous Function. [5.3] The Function $f(x) = \int_a^x f(t)dt$ [5.4] The Fundamental Theorem of Integral Calculus.
	第 8 週 10/29~11/2	[5.5] Some Area Problems. [5.6] Indefinite Integrals. [5.7] Working Back from the Chain Rule; the *u*-Subtitution. [5.8] Additional Properties of the Definite Integral. [5.9] Mean-Value Theorems for Integrals; Average Value of a Function.
6. Some Applications of the Integral	第 9 週 11/5~11/9	[6.1] More on Area. [6.2] Volume by Parallel Cross-Sections; Discs and Washers.
	11/10(六) 9:00~11:30 期中考 考試範圍 2.1~5.9 (英文命題).	
	第 10 週 11/12~11/16	[6.3] Volume by the Shell Method. [6.4] The Centroid of a Region; Pappus's Theorem on Volumes. [7.1] One-to-One Functions; Inverse Functions. [7.2] The Logarithm Function, Part I.
7. The Transcendental Functions	第 11 週 11/19~11/23	[7.3] The Logarithm Function, Part II. [7.4] The Exponential Function. [7.5] Arbitrary Powers; Other Bases. [7.6] Exponential Growth and Decay.
	第 12 週 11/26~11/30	[7.7] The Inverse Trigonometric Functions. [7.8] The Hyperbolic Sine and Cosine. [8.1] Integral Tables and Review. [8.2] Integration by Parts.
8. Techniques of Integration	第 13 週 12/3~12/7	[8.3] Powers and Products of Trigonometric Functions. [8.4] Integrals Featuring $\sqrt{a^2-x^2}$, $\sqrt{a^2+x^2}$, $\sqrt{x^2-a^2}$. [8.5] Rational Functions; Partial Functions. [8.6] Some Rationalizing Substitutions. *[8.7] Numerical Integration.
9. Differential Equations	第 14 週 12/10~12/14	[9.1] First-Order Linear Equations. [9.2] Integral Curves; Separable Equations. [9.3] The Equation $y''+ ay'+ by = 0$. [10.2] Polar Coordinates. [10.3] Graphing in Polar Coordinates.
10. The Conic Sections; Polar Coordinates; Parametric Equations	第 15 週 12/17~12/21	[10.4] Area in Polar Coordinates. [10.5] Curves Given Parametrically. [10.6] Tangents to Curves Given Parametrically. [10.7] Arc Length and Speed. [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	[11.1] The Least Upper Bound Axiom. [11.2] Sequences of Real Numbers. [11.3] The Limit of a Sequence. [11.4] Some Important Limits. [11.5] The Indeterminate Forms (0/0).
	第 17 週 12/31~1/4	[11.6] The Indeterminate Form (∞/∞); Other Indeterminate Forms. [11.7] Improper Integrals.
	1/5(六) 9:00~11:30 期末考 考試範圍 6.1~11.7 (英文命題).	

說明：

1、（※）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：07-10 班 三 78 五 12 、 實習課時間：三 9。
11 班 二 78 四 56 、 實習課時間：二 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.