Tamkang University Academic Year 113, 1st Semester Course Syllabus

Course Title	CALCULUS	Instructor	HSU, MIN-JIE
Course Class	TKFXB1P DEPARTMENT OF ARTIFICIAL INTELLIGENCE, 1P	Details	◆ General Course ◆ Required ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education SDG9 Industry, Innovation, and Infrastructure		

Departmental Aim of Education

Ⅰ. Students may analyze problems in applied science based on the fundamental knowledge of programming, mathematics, and artificial intelligence.

Ⅱ. Students may plan and implement an AI system following the procedures of problem analysis, experiment testing, data visualizing, derivation and deduction.

Ⅲ. Educate the students to be AI engineers who may accomplish their missions indepedently and may collaborate with their colleagues in the workplace.

Ⅳ. Students may have basic skills and global competence for career diversification, and may keep lifelong learning.

Subject Departmental core competences

A. Professional analysis.(ratio:75.00)

B. Practical application.(ratio:15.00)

C. Professional attitude.(ratio:5.00)

D. Global Mobility.(ratio:5.00)

Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:20.00)

3. A vision for the future. (ratio:10.00)

4. Moral integrity. (ratio:5.00)

5. Independent thinking. (ratio:30.00)

6. A cheerful attitude and healthy lifestyle. (ratio:10.00)

7. A spirit of teamwork and dedication. (ratio:10.00)

8. A sense of aesthetic appreciation. (ratio:5.00)

Course Introduction	Calculus serves as a cornerstone in modern mathematics, finding wide applications in science, engineering, and social sciences. This course aims to bridge the concepts and techniques of calculus with the realm of artificial intelligence, exploring the intersection of these two fields. This course provides students with opportunities for practical problem-solving, deepening their understanding in both calculus and artificial intelligence fields, and turning them into skilled professionals in practice.

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.
II.Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.
III.Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	Educate students to understand the mathematical principles of calculus in daily life and artificial intelligence.	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABCD	12345678	Lecture	Testing, Study Assignments

Course Schedule

Week	Date	Course Contents	Note
1	113/09/09 ~ 113/09/15	Introduction of Calculus	
2	113/09/16 ~ 113/09/22	Limits and Derivatives	
3	113/09/23 ~ 113/09/29	The Derivative and the Tangent Line Problem, Basic Differentiation Rules and Rates of Change, Product and Quotient Rules	
4	113/09/30 ~ 113/10/06	The Chain Rule, Implicit Differentiation, Related Rates	

5	113/10/07～113/10/13	Extrema on an Interval, Rolle’ s Theorem and the Mean Value Theorem and Its Application	
6	113/10/14～113/10/20	Exponential Functions, Indeterminate Forms and L’ Hopital’ sRule	
7	113/10/21～113/10/27	Partial Derivatives	
8	113/10/28～113/11/03	Optimization Problems	
9	113/11/04～113/11/10	Midterm Exam/Midterm Assessment Week (teachers can adjust the week as needed)	
10	113/11/11～113/11/17	Definite Integrals, Indefinite Integrals and The Net Change Theorem	
11	113/11/18～113/11/24	The Substitution Rule, Area of Region Between Two Curves	
12	113/11/25～113/12/01	Integration by Parts, Trigonometric Integrals, Partial Fractions	
13	113/12/02～113/12/08	Inverse Trigonometric Functions: Differentiation, Inverse Trigonometric Functions: Integration, Hyperbolic Functions	
14	113/12/09～113/12/15	Arc Length and Surfaces of Revolution	
15	113/12/16～113/12/22	Sequences, Series, Alternating Series and Absolute Convergence	
16	113/12/23～113/12/29	Power Series , Taylor Series	
17	113/12/30～114/01/05	Final Exam/Final Assessment Week (teachers can adjust the week as needed)	
18	114/01/06～114/01/12	Flexible Teaching Week: Generally, no in-person classes; teachers may arrange teaching activities or final assessments, among other options.	

Key capabilities	Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)
Distinctive teaching	

Course Content	Logical Thinking AI application
Requirement	
Textbooks and Teaching Materials	Using teaching materials from other writers:Textbooks, Presentations Name of teaching materials: Essential Calculus 2e Metric Version
References	
Grading Policy	◆ Attendance： 25.0 % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： 25.0 % ◆ Final Exam： 30.0 % ◆ Other〈 〉： %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . ※ **Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**