Tamkang University Academic Year 114, 1st Semester Course Syllabus

Course Title	CALCULUS	Instructor	YU-TING CHIN
Course Class	TKFXB1C DEPARTMENT OF ARTIFICIAL INTELLIGENCE, 1C	Details	◆ General Course ◆ Required ◆ One Semester ◆ 3 Credits
Relevance to SDGs	SDG4 Quality education		

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	This course builds a solid foundation in calculus for AI-related fields. It covers limits, continuity, derivatives, integrals, and multivariable functions, with emphasis on their applications in AI and data analysis. Through theory and practice, students learn to analyze problems mathematically and support AI model development.

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	To develop students' ability to apply calculus principles in analyzing natural phenomena, engineering problems, and the mechanisms behind AI models.	Cognitive
2	To equip students with practical skills in using derivatives and integrals to solve real-world problems and support AI applications.	Affective
3	To foster a professional mindset characterized by active learning, precise reasoning, and mathematical literacy, enhancing students' logical thinking and communication.	Affective
4	To enhance students' ability to communicate using the universal language of mathematics, preparing them for future global collaboration and research.	Psychomotor

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	A	125	Lecture, Discussion, Experience	Testing, Study Assignments, Discussion(including classroom and online)

2	B	25	Lecture, Discussion, Experience	Testing, Study Assignments, Discussion(including classroom and online)
3	ABCD	25	Lecture, Discussion	Testing, Study Assignments, Discussion(including classroom and online)
4	ABCD	12345678	Lecture	Testing, Study Assignments, Discussion(including classroom and online)

Course Schedule

Week	Date	Course Contents	Note
1	114/09/15 ~ 114/09/21	Course Introduction & Prerequisites	
2	114/09/22 ~ 114/09/28	AI with Calculus, Functions and Graphs	
3	114/09/29 ~ 114/10/05	Concept of Limits	
4	114/10/06 ~ 114/10/12	Continuity and Discontinuity	
5	114/10/13 ~ 114/10/19	Definition and Computation of Derivatives	
6	114/10/20 ~ 114/10/26	Applications of Derivatives I: Monotonicity and Extrema	
7	114/10/27 ~ 114/11/02	Applications of Derivatives II: Concavity and Inflection Points	
8	114/11/03 ~ 114/11/09	Applications of Derivatives III	
9	114/11/10 ~ 114/11/16	Midterm Exam	
10	114/11/17 ~ 114/11/23	Basic Concepts of Integration	
11	114/11/24 ~ 114/11/30	Integration Techniques	
12	114/12/01 ~ 114/12/07	Applications of Integration: Area and Volume	
13	114/12/08 ~ 114/12/14	Introduction to Differential Equations	
14	114/12/15 ~ 114/12/21	Parametric Equations and Polar Coordinates	
15	114/12/22 ~ 114/12/28	Multivariable Functions and Partial Derivatives	
16	114/12/29 ~ 115/01/04	AI Application Integration and Implementation Guide	
17	115/01/05 ~ 115/01/11	Final Exam	
18	115/01/12 ~ 115/01/18	Flexible Teaching Week for Teachers	

Key capabilities	self-directed learning Problem solving
Interdisciplinary	STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist) Competency-based education 'competency exploration' sustained competency or global issues STEEP (Society, Technology, Economy, Environment, and Politics)
Distinctive teaching	Special/Problem-Based(PBL) Courses
Course Content	Logical Thinking AI application
Requirement	
Textbooks and Teaching Materials	Self-made teaching materials:Textbooks
References	
Grading Policy	◆ Attendance： 10.0 % ◆ Mark of Usual：30.0 % ◆ Midterm Exam： 30.0 % ◆ Final Exam： 30.0 % ◆ Other〈 〉： %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at https://web2.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. ※"Adhere to the concept of intellectual property rights" and "Do not illegally photocopy, download, or distribute." Using original textbooks is advised. It is a crime to improperly photocopy others' publications.