# Tamkang University Academic Year 113, 2nd Semester Course Syllabus

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| Course Title | ARTIFICIAL INTELLIGENCE PRACTICE | Instructor | SIN-YE JHONG |
| Course Class | TKFXB3B<br>DEPARTMENT OF ARTIFICIAL INTELLIGENCE, 3B | Details | ◆ General Course<br>◆ Required<br>◆ One Semester<br>◆ 3 Credits |
| Relevance to SDGs | SDG4 Quality education<br>SDG9 Industry, Innovation, and Infrastructure<br>SDG12 Responsible consumption and production<br>SDG17 Partnerships for the goals | | |

## 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:35.00)

B. Practical application.(ratio:35.00)

C. Professional attitude.(ratio:20.00)

D. Global Mobility.(ratio:10.00)

## Subject Schoolwide essential virtues

1. A global perspective. (ratio:15.00)
2. Information literacy. (ratio:30.00)
3. A vision for the future. (ratio:10.00)
4. Moral integrity. (ratio:10.00)
5. Independent thinking. (ratio:5.00)
6. A cheerful attitude and healthy lifestyle. (ratio:5.00)
7. A spirit of teamwork and dedication. (ratio:20.00)
8. A sense of aesthetic appreciation. (ratio:5.00)

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| Course Introduction | The students are expected to understand:<br>1. How AI and deep learning principles form the foundation of modern machine learning<br>2. How to preprocess data and design learning-based solutions for real-world problems<br>3. How to use toolkits to implement designed models<br>4. How to apply advanced AI techniques<br>5. How to optimize, fine-tune, and deploy AI models for practical applications<br><br>PS. This course lasts for 150 minutes, with the remaining time flexibly allocated at the professor's discretion. |

**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 |
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| 1 | Students will be able to articulate the fundamental principles of artificial intelligence and deep learning, demonstrating an understanding of their role as the underpinning framework for modern machine learning systems. | Cognitive |

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

| No. | Core Competences | Essential Virtues | Teaching Methods | Assessment |
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| 1 | ABCD | 12345678 | Lecture, Discussion, Experience | Testing, Discussion(including classroom and online), Report(including oral and written) |

Course Schedule

| Week | Date | Course Contents | Note |
|---|---|---|---|
| 1 | 114/02/17 ~ 114/02/23 | Course Logistics, Environment Setup | |
| 2 | 114/02/24 ~ 114/03/02 | Introduction to AI | |
| 3 | 114/03/03 ~ 114/03/09 | Data Preprocessing and Feature Engineering | |

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| 4 | 114/03/10 ~ 114/03/16 | Fundamentals of Machine Learning | |
| 5 | 114/03/17 ~ 114/03/23 | Neural Networks and Deep Learning Basics | |
| 6 | 114/03/24 ~ 114/03/30 | Introduction to PyTorch | |
| 7 | 114/03/31 ~ 114/04/06 | Spring Break | |
| 8 | 114/04/07 ~ 114/04/13 | Convolutional Neural Networks | |
| 9 | 114/04/14 ~ 114/04/20 | Midterm Exam/Midterm Assessment Week (teachers can adjust the week as needed) | |
| 10 | 114/04/21 ~ 114/04/27 | Transformer Architecture | |
| 11 | 114/04/28 ~ 114/05/04 | Multimodal Learning: Vision-Language Models | |
| 12 | 114/05/05 ~ 114/05/11 | Generative AI: GANs & Diffusion Models | |
| 13 | 114/05/12 ~ 114/05/18 | Advanced Application: Object Detection | |
| 14 | 114/05/19 ~ 114/05/25 | Advanced Application: Object Segmentation | |
| 15 | 114/05/26 ~ 114/06/01 | Guest Lecture/Recent Trends | |
| 16 | 114/06/02 ~ 114/06/08 | Final Project Presentation | |
| 17 | 114/06/09 ~ 114/06/15 | Final Exam/Final Assessment Week (teachers can adjust the week as needed) | |
| 18 | 114/06/16 ~ 114/06/22 | Flexible Teaching Week: Generally, no in-person classes; teachers may arrange teaching activities or final assessments, among other options. | |

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| Key capabilities | self-directed learning<br>Information Technology<br>Problem solving<br>Interdisciplinary |
| Interdisciplinary | STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist) |
| Distinctive teaching | Project implementation course<br>Special/Problem-Based(PBL) Courses |
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| Course Content | Logical Thinking<br>AI application |
| Requirement | Required: college-level calculus, linear algebra<br>Preferred: probability, statistics<br>Proficiency in Python; all assignments will be in Python |
| Textbooks and Teaching Materials | Self-made teaching materials:Presentations<br>Using teaching materials from other writers:Textbooks<br>Name of teaching materials:<br>Python 資料科學實戰教本 |
| References | |
| Grading Policy | ◆ Attendance： 20.0 % ◆ Mark of Usual：50.0 % ◆ Midterm Exam： 5.0 %<br>◆ Final Exam： 25.0 %<br>◆ 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 .<br>**※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.** |