# Tamkang University Academic Year 113, 1st Semester Course Syllabus

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| Course Title | UNMANNED AERIAL VEHICLE NETWORKS, COMMUNICATIONS, NAVIGATION AND COUNTERATTACK | Instructor | HSIN-YI HSU |
| Course Class | TEBXD1A<br>DOCTORAL PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A | Details | ◆ General Course<br>◆ Selective<br>◆ One Semester<br>◆ 3 Credits |
| Relevance to SDGs | SDG7 Affordable and clean energy<br>SDG8 Decent work and economic growth<br>SDG9 Industry, Innovation, and Infrastructure<br>SDG17 Partnerships for the goals | | |

## Departmental Aim of Education

Ⅰ. To prepare students who have a comprehensive understanding of the principles of applied sciences and engineering to be innovators in the field of mechanical and electromechanical engineering.

Ⅱ. To train emerging professionals who possess a high level of expertise and ethical standards who will become independent research and development leaders in the industry.

Ⅲ. To motivate students who will pursue continuing education as a means to stay on the cutting edge of global competiveness and meet changes in their careers and the workplace with confidence and ease.

## Subject Departmental core competences

A. Head: Knowledge of mechanical and electromechanical engineering.(ratio:20.00)

B. Hand: Hands-on skills and practical realization.(ratio:60.00)

C. Heart: Love of learning and innovation.(ratio:10.00)

D. Eye: Vision of progress and improvements.(ratio:10.00)

## Subject Schoolwide essential virtues

1. A global perspective. (ratio:10.00)

2. Information literacy. (ratio:30.00)

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:5.00)

7. A spirit of teamwork and dedication. (ratio:5.00)

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

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| Course Introduction | This course starts with the assembly and theory of "quadrotor drone", explores it through communication and inertial navigation experiments, and finally conducts the artificial intelligence Internet of Things (AIOT) application of drones and analysis of Counterattack. |

**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 | This teaching process is based on "learning by doing" and "ability-based", with the goal of guiding students to build basic exploration, analysis, design and implementation capabilities for drone AIOT technical practice. | 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, Publication, Practicum, Experience, Imitation | Testing, Study Assignments, Discussion(including classroom and online), Practicum, Report(including oral and written), Activity Participation |

Course Schedule

| Week | Date | Course Contents | Note |
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| 1 | 113/09/09 ~ 113/09/15 | 1. Overview of course content 2. Hardware assembly of quadcopter drone | Teacher’ s practical demonstration and student practice + Homework |

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| 2 | 113/09/16～<br>113/09/22 | The dynamics of a quadcopter drone | Multimedia teaching |
| 3 | 113/09/23～<br>113/09/29 | Quadcopter drone control system | Same as above |
| 4 | 113/09/30～<br>113/10/06 | Drone communication | Same as above |
| 5 | 113/10/07～<br>113/10/13 | UAV communication experiment | Teacher’ s practical demonstration and student practice + Homework |
| 6 | 113/10/14～<br>113/10/20 | Same as above | Same as above |
| 7 | 113/10/21～<br>113/10/27 | Same as above | Same as above |
| 8 | 113/10/28～<br>113/11/03 | Same as above | Same as above |
| 9 | 113/11/04～<br>113/11/10 | Midterm | Personal learning experience report |
| 10 | 113/11/11～<br>113/11/17 | UAV inertial navigation system | Teacher’ s practical demonstration and student practice + Homework |
| 11 | 113/11/18～<br>113/11/24 | UAV inertial navigation system experiment | Same as above |
| 12 | 113/11/25～<br>113/12/01 | Same as above | Same as above |
| 13 | 113/12/02～<br>113/12/08 | Same as above | Same as above |
| 14 | 113/12/09～<br>113/12/15 | Drone Artificial Intelligence Internet of Things (AIOT)<br>Application and Counterattack Analysis | Teachers and students discuss together |
| 15 | 113/12/16～<br>113/12/22 | Same as above | Same as above |
| 16 | 113/12/23～<br>113/12/29 | Same as above | Same as above |
| 17 | 113/12/30～<br>114/01/05 | Final exam | Personal learning experience report |
| 18 | 114/01/06～<br>114/01/12 | Same as above | Same as above |

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| Key capabilities | self-directed learning<br>International mobility<br>Information Technology<br>Problem solving |
| Interdisciplinary | STEAM course (S:Science, T:Technology, E:Engineering, M:Math, A field:Integration of Art and Humanist)<br>Competency-based education 'competency exploration' sustained competency or global issues STEEP (Society, Technology, Economy, Environment, and Politics)<br>In addition to teaching content of the teacher's professional field, integrate other subjects or invite experts and scholars in other fields to share knowledge or teaching |
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| Distinctive teaching | Project implementation course<br>Special/Problem-Based(PBL) Courses<br>Collaborative teaching (multiple teachers and business teachers in the school) course |
| Course Content | Computer programming or Computer language (students have hands-on experience in related projects)<br>Intellectual Property (learning intellectual property)<br>Gender Equality Education<br>Logical Thinking<br>Environmental Safety<br>Green Energy<br>AI application<br>Sustainability issue |
| Requirement | |
| Textbooks and Teaching Materials | Self-made teaching materials:Textbooks, Presentations, Handouts, Videos, Worksheets<br>Using teaching materials from other writers:Textbooks, Presentations, Handouts, Videos, Worksheets |
| References | |
| Grading Policy | ◆ Attendance： 10.0 % ◆ Mark of Usual：10.0 % ◆ Midterm Exam： 30.0 %<br>◆ Final Exam： 50.0 %<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.** |