

Tamkang University Academic Year 110, 1st Semester Course Syllabus

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| Course Title | PRINCIPLES OF SENSORS AND TIME-FREQUENCY ANALYSIS | Instructor | |
| Course Class | TEBXM1A MASTER'S PROGRAM, DEPARTMENT OF MECHANICAL AND ELECTRO-MECHANICAL ENGINEERING, 1A | Details | <ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester |
| Relevance to SDGs | <p>SDG4 Quality education</p> <p>SDG9 Industry, Innovation, and Infrastructure</p> | | |
| Departmental Aim of Education | | | |
| <p>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.</p> <p>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.</p> <p>III. To motivate students who will pursue continuing education as a means to stay on the cutting edge of global competitiveness and meet changes in their careers and the workplace with confidence and ease.</p> | | | |
| Subject Departmental core competences | | | |
| <p>A. Head: Knowledge of mechanical and electromechanical engineering.(ratio:40.00)</p> <p>B. Hand: Hands-on skills and practical realization.(ratio:40.00)</p> <p>C. Heart: Love of learning and innovation.(ratio:10.00)</p> <p>D. Eye: Vision of progress and improvements.(ratio:10.00)</p> | | | |
| Subject Schoolwide essential virtues | | | |
| <p>1. A global perspective. (ratio:10.00)</p> <p>2. Information literacy. (ratio:20.00)</p> <p>3. A vision for the future. (ratio:10.00)</p> <p>5. Independent thinking. (ratio:60.00)</p> | | | |

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| Course Introduction | The course will introduce the fundamentals and practices of sensors and signal processing techniques, such as Fourier transform, digital filter design, envelope analysis, time-frequency analysis. Students are expected to learn MATLAB programming language and get practical experiences. |
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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 | 1. The students might learn the fundamental theory of signal processing and spectrum analysis technology. 2. The students might learn the practical experiments of spectrum analysis technology. | 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 | 1235 | Lecture, Discussion | Testing, Study Assignments, Discussion(including classroom and online) |

Course Schedule

| Week | Date | Course Contents | Note |
|------|-----------------------|---|------|
| 1 | 110/09/22 ~ 110/09/28 | Introduction to principles of sensors and time-frequency analysis | |
| 2 | 110/09/29 ~ 110/10/05 | Sensor and signal | |
| 3 | 110/10/06 ~ 110/10/12 | Digital processing of analog signal | |

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| 4 | 110/10/13 ~ 110/10/19 | Introduction to MATLAB | |
| 5 | 110/10/20 ~ 110/10/26 | Introduction to MATLAB | |
| 6 | 110/10/27 ~ 110/11/02 | Fourier transform | |
| 7 | 110/11/03 ~ 110/11/09 | Fourier transform | |
| 8 | 110/11/10 ~ 110/11/16 | Fourier transform | |
| 9 | 110/11/17 ~ 110/11/23 | Midterm exam | |
| 10 | 110/11/24 ~ 110/11/30 | Correlation & convolution | |
| 11 | 110/12/01 ~ 110/12/07 | Digital filter design | |
| 12 | 110/12/08 ~ 110/12/14 | Envelope analysis | |
| 13 | 110/12/15 ~ 110/12/21 | Envelope analysis | |
| 14 | 110/12/22 ~ 110/12/28 | Time-frequency analysis | |
| 15 | 110/12/29 ~ 111/01/04 | Time-frequency analysis | |
| 16 | 111/01/05 ~ 111/01/11 | Time-frequency analysis | |
| 17 | 111/01/12 ~ 111/01/18 | Advanced signal processing | |
| 18 | 111/01/19 ~ 111/01/25 | Final exam | |
| Requirement | This course will require students to use the MATLAB programming language, and students must confirm that they are willing to learn and write programs in this course. | | |
| Teaching Facility | Computer, Projector | | |
| Textbooks and Teaching Materials | SPECTRAL ANALYSIS OF SIGNALS, Petre Stoica and Randolph Moses, Prentice Hall, Inc, 2005. Measurement Systems Application and Design, Ernest O. Doebelin, Mcgraw-Hill College, 1989. | | |
| References | lecture notes | | |
| Number of Assignment(s) | 6 (Filled in by assignment instructor only) | | |
| Grading Policy | ◆ Attendance : 15.0 % ◆ Mark of Usual : 30.0 % ◆ Midterm Exam : 25.0 % ◆ Final Exam : 30.0 % ◆ Other < > : % | | |
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| Note | <p>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 .</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p> |
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