

Tamkang University Academic Year 110, 1st Semester Course Syllabus

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| Course Title | STRUCTURAL DYNAMICS | Instructor | CHIEH-HSUN WU |
| Course Class | TECXM1A MASTER'S PROGRAM, DEPARTMENT OF CIVIL ENGINEERING, 1A | Details | <ul style="list-style-type: none"> ◆ General Course ◆ Selective ◆ One Semester |
| Relevance to SDGs | SDG4 Quality education | | |
| D e p a r t m e n t a l A i m o f E d u c a t i o n | | | |
| <ul style="list-style-type: none"> I . Develop students' ability and knowledge of civil engineering to meet the requirements of employability and further education. II. Equip students with the ability to integrate engineering profession and information technology to strengthen their competitiveness. III. Enable students to understand the international trends, and to activate a lifelong learning concept. | | | |
| S u b j e c t D e p a r t m e n t a l c o r e c o m p e t e n c e s | | | |
| <ul style="list-style-type: none"> A. Each student should have the advanced professional knowledge of engineering design and analysis.(ratio:70.00) B. Each student should have the ability to integrate interdisciplinary knowledge and information technology.(ratio:20.00) C. Each student should have independent thinking and ability of research conducting and dissertation writing.(ratio:10.00) | | | |
| S u b j e c t S c h o o l w i d e e s s e n t i a l v i r t u e s | | | |
| <ul style="list-style-type: none"> 2. Information literacy. (ratio:40.00) 5. Independent thinking. (ratio:60.00) | | | |

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| Course Introduction | This course introduces the basics of vibration theory that is fundamental in structural dynamics. It begins with the free & forced vibrations of a single degree of freedom system (DOF). Systems of two and more DOFs are discussed later. |
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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 | Students will be able to learn the fundamentals of structural dynamics through understanding the basics of vibration theory. | Cognitive |

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

| No. | Core Competences | Essential Virtues | Teaching Methods | Assessment |
|-----|------------------|-------------------|---------------------------------|---|
| 1 | ABC | 25 | Lecture, Discussion, Experience | Study Assignments, Discussion(including classroom and online), Report(including oral and written) |

Course Schedule

| Week | Date | Course Contents | Note |
|------|--------------------------|--|------|
| 1 | 110/09/22 ~ 110/09/28 | Introduction/Oscillatory Motion | |
| 2 | 110/09/29 ~ 110/10/05 | Free Vibration - Vibration Model, Equation of Motion | |
| 3 | 110/10/06 ~ 110/10/12 | Free Vibration - Energy Method, Rayleigh Method, Principle of Virtual Work | |
| 4 | 110/10/13 ~ 110/10/19 | Free Vibration - Energy Method, Rayleigh Method, Principle of Virtual Work | |

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| 5 | 110/10/20 ~ 110/10/26 | Harmonically Excited Vibr. - Forced Harmonic Vibr. | |
| 6 | 110/10/27 ~ 110/11/02 | Harmonically Excited Vibr. - Rotating Unbalance | |
| 7 | 110/11/03 ~ 110/11/09 | Harmonically Excited Vibr. - Support Motion, Vibration Isolation | |
| 8 | 110/11/10 ~ 110/11/16 | Harmonically Excited Vibr. - Energy dissipated by damping, Equivalent Viscous Damping, Structural Damping, Sharpness of Resonance, Vibration-Meas. Instruments | |
| 9 | 110/11/17 ~ 110/11/23 | Transient Vibr. - Impulse Excitation, Arbitrary Excitation | |
| 10 | 110/11/24 ~ 110/11/30 | Transient Vibr. - Pulse Excitation & Rise Time | |
| 11 | 110/12/01 ~ 110/12/07 | Transient Vibr. - Shock Response Spectrum, Shock Isolation | |
| 12 | 110/12/08 ~ 110/12/14 | Transient Vibr. - Finite Difference, Runge-Kutta Method | |
| 13 | 110/12/15 ~ 110/12/21 | 2DOF System - The Normal Mode Analysis, Initial Conditions | |
| 14 | 110/12/22 ~ 110/12/28 | 2DOF System - Coordinate Coupling, Forced Harmonic Vibr. | |
| 15 | 110/12/29 ~ 111/01/04 | Properties of Vibr. Systems - Flexibility Influence Coefs., Reciprocity Theorem, Stiffness Influence Coefs. | |
| 16 | 111/01/05 ~ 111/01/11 | Properties of Vibr. Systems - Orthogonality of Eigenvectors, Modal Matrix | |
| 17 | 111/01/12 ~ 111/01/18 | Properties of Vibr. Systems - Decoupling Forced Vibr. Equations, Modal Damping, Normal Mode summation | |
| 18 | 111/01/19 ~ 111/01/25 | | |
| Requirement | Students are expected to have basic understanding on using tools like MATLAB, Fortran, Python or any other software than can be used to run your computer codes. | | |
| Teaching Facility | Computer, Projector | | |
| Textbooks and Teaching Materials | Theory of Vibration with Applications, 5-th edition, by Thomson & Dahleh. | | |
| References | | | |
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| Number of Assignment(s) | (Filled in by assignment instructor only) |
| Grading Policy | <p>◆ Attendance : 10.0 % ◆ Mark of Usual : 10.0 % ◆ Midterm Exam : %</p> <p>◆ Final Exam : %</p> <p>◆ Other (Course assignments) : 80.0 %</p> |
| 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> |