

EGN 4323 Vibration Synthesis and Analysis

ABET Course Syllabus

1. **Course number and name:** Vibration Synthesis and Analysis/EGN 4323
2. **Credits and contact hours:** 3 credits / Two 80 minute lectures each week
3. **Instructor's or course coordinator's name:** Dr. S. Glegg
4. **Text book, title, author, and year:** Mechanical Vibrations - S.S. Rao, 6th Edition, Prentice Hall, 2017.
5. **Specific course information:**
 - (a) Brief description of the content of the course (catalog description): Free and forced vibration of mechanical systems; damping; periodic and transient excitations; vibration control; multiple degree of freedom and continuous systems.
 - (b) Prerequisites: Dynamics EGN 3321, MAP 3305 Engineering Mathematics I or MAP 2302 Differential Equations (all with a grade of C or above).
 - (c) Indicate whether a required, elective, or selected elective course in the program: Required
6. **Specific goals for the course:**
 - (a) Specific outcomes of instruction (course specific objective): To introduce the students to basic theory and applications of mechanical vibration analysis and vibration control design techniques. Emphasis is on developing sound modeling and analysis techniques as well as engineering insights in treating practical mechanical vibration problems.
 - (b) Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course. The learning outcomes of the course (and related ABET Criterion 3) outcomes are:
 1. Students will be well aware of the notion of free vibration in the context of the single degree of freedom system. (a,e,k/1,2,6)
 2. Students will be familiar with harmonically excited vibrations for the single degree of freedom system. (a,e,k/1,2,6)
 3. Students will be familiar with transient vibration under general forcing conditions. (a,e,k/1,2,6)
 4. Students will learn multi-degree of freedom systems' basic notions including determination of the frequencies and mode shapes. (a,e,k/1,2,6)
 5. Students will learn longitudinal vibrations of bars and flexural vibrations of beams. (a,e,k/1,2,6)
 6. Students will be able to effectively communicate by writing a report. (g/3)
7. **Brief list of topics to be covered:**
 - Free vibration of single-degree-of-systems.
 - Harmonic excited vibration.
 - Vibration under general conditions.
 - Two-degree-of-freedom systems.
 - Multiple-degree-of-freedom systems.
 - Determination of natural frequencies and natural modes.
 - Continuous systems.
 - Vibration reduction and isolation.