MECH 3001 ADVANCED DYNAMICS

Credit Points 10

Legacy Code 300763

Coordinator Helen Wu (https://directory.westernsydney.edu.au/search/name/Helen Wu/)

Description This unit covers the analysis and control of dynamical behaviour of mechanical systems. It discusses the fundamental principles in controlling mechanical dynamic systems. In particular, the unit will cover contents in: multi-degree of freedom vibration analysis and modelling; open and closed loop systems; transfer function and state variable methods in mechanical system modelling; concepts of stability; design and analyse control systems using root-locus, bode diagram and state-space methods for mechanical systems.

School Eng, Design & Built Env

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) MECH 3004 OR
MECH 2001

Incompatible Subjects ENGR 3006 - Control Systems

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Analyse and develop mathematical models of multi-degree of freedom mechanical dynamical systems.
2. Analyse system response characteristics based on physical properties of the system.
3. Determine absolute and relative stability of a system using system responses to various control inputs and disturbances.
4. Analyse the effects of a controller in the system and its effects on system stability.
5. Design controllers in both frequency and time domain for linear time-invariant systems.

Subject Content

- Multi-degree of freedom vibration analysis and modelling;
- Open and closed loop systems;
- Transfer function and state variable methods in mechanical system modelling;
- System responses and concepts of stability;
- design and analyse control systems using root-locus, bode diagram and state-space methods for mechanical systems.

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/ Group Task
Practicals	6 hours (in total)	10	N	Individual
Numerical Problem Solving	About 3 hours each	35	N	Individual
12 x Quizzes: Online multiple-choice questions and short answer questions	30 minutes each	5	N	Individual
Final exam	2 hours	50	N	Individual

Prescribed Texts

- Ogata K 2010, Modern Control Engineering, 5th edn, Pearson Prentice Hall, Upper Saddle River NJ

Teaching Periods

2022 Semester 1

Penrith (Kingswood)

Day

Subject Contact Helen Wu (https://directory.westernsydney.edu.au/search/name/Helen Wu/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MECH3001_22-AUT_KW_D#subjects)

Parramatta - Victoria Rd

Day

Subject Contact Helen Wu (https://directory.westernsydney.edu.au/search/name/Helen Wu/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MECH3001_22-AUT_PS_D#subjects)

2022 Trimester 2

Sydney City

Day

Subject Contact Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/) Peter Lendrum (https://directory.westernsydney.edu.au/search/name/Peter Lendrum/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=MECH3001_22-SC2_SC_D#subjects)