

# MECH 7003 ADVANCED DYNAMIC SYSTEMS

**Credit Points** 10

**Legacy Code** 301019

**Coordinator** Helen Wu ([https://directory.westernsydney.edu.au/search/name/Helen Wu/](https://directory.westernsydney.edu.au/search/name/Helen%20Wu/))

**Description** This subject covers three-dimensional kinematics and kinetics of a rigid body. The principles of virtual work are used to investigate the equilibrium and dynamics of mechanisms. Some key aspects of mechanical vibrations are introduced, including vibration response, vibration isolation and vibration measurement.

**School** Eng, Design & Built Env

**Discipline** Mechanical Engineering

**Student Contribution Band** HECS Band 2 10cp

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Postgraduate Coursework Level 7 subject

## Restrictions

Students must be enrolled in a postgraduate program

## Learning Outcomes

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

1. Use Virtual work to determine the equilibrium position of a mechanism
2. Analyse the three-dimensional kinematics and kinetics of a rigid body
3. Model a real world system as a collection of simple mechanical components
4. Determine the response to free and forced vibrations using standard differential methods or Laplace transforms
5. Balance a rotating disk to reduce vibrations according to standards
6. Analyse vibration isolation systems and measurement systems
7. Verify the theory presented in the lectures by taking the measurements in the real world and use them for verification purposes

## Subject Content

1. Virtual work and potential energy method
2. Three-dimensional kinematics and kinetics of a rigid body
3. Modelling a real world system and determining the equations of motion for mechanical systems
4. Response to free and forced vibrations
5. Balancing a rotating disk
6. Vibration isolation
7. Vibration measurement
8. Using Laplace transforms to determine the response to impulse and step forces.

## 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.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Final Exam	2 hours	50	N	Individual	Y
Quiz	4 x 1 hour	20	N	Individual	Y
Report	10 pages	20	N	Individual	Y
Practical	2 times x 3 hours each	10	N	Individual	Y

Teaching Periods

## Autumn (2025)

**Parramatta City - Macquarie St**

### On-site

**Subject Contact** Helen Wu ([https://directory.westernsydney.edu.au/search/name/Helen Wu/](https://directory.westernsydney.edu.au/search/name/Helen%20Wu/))

View timetable ([https://classregistration.westernsydney.edu.au/odd/timetable/?subject\\_code=MECH7003\\_25-AUT\\_PC\\_1#subjects](https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=MECH7003_25-AUT_PC_1#subjects))