

## Faculty of Engineering & Technology

### Vibration Principles and Monitoring

#### Information :

**Course Code :** MKT 510

**Level :** Undergraduate

**Course Hours :** 2.00- Hours

**Department :** Specialization of Mechatronics Engineering

#### Instructor Information :

Title	Name	Office hours
Professor	Hassan Ahmed Ahmed Mohamed Metered	1
Teaching Assistant	Osama Ahmed Ibrahim Mohamed Montaser	

#### Area Of Study :

- Gain a through introduction to mechanical vibration of single and multi-degree of freedom systems.
- Enrich the student's knowledge about techniques of machinery vibration control.
- Introduce the processes of monitoring operating conditions of industrial machinery and its relevance to fault detection and diagnosis.

#### Description :

Introduction to Vibration Principles, Fault detection techniques, Vibration as a Fault detection and diagnosis technique, Vibration Measurements and analysis, use of Vibration as a machinery condition monitoring.

#### Course outcomes :

##### a. Knowledge and Understanding: :

- 1 - Identify fundamentals of vibration analysis and control of mechanical systems.
- 2 - Describe vibration isolation techniques for mechanical systems
- 3 - Explain machinery vibration monitoring, and mechanical systems fault diagnosis.

##### b. Intellectual Skills: :

- 1 - Develop mathematical models for dynamic systems.
- 2 - Analyse vibration response of single and multi-degree of freedom systems
- 3 - Relate vibration response analysis to machine condition monitoring and fault diagnosis and use available software packages.

##### c. Professional and Practical Skills: :

- 1 - Perform experimental measurement for vibration isolation and control considering the safety precautions.
- 2 - Analyse recorded data of vibration testing.
- 3 - Prepare technical report for vibration control experimental work.
- 4 - Construct response curves of tested vibration control systems.

**d.General and Transferable Skills: :**

1 -	Work in stressful environment and within constrains through assignments and term papers.
2 -	Communicate effectively through technical reports and representations.
3 -	Search for information and engage in life-long self-learning discipline through self-study tasks.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to vibration as a machine condition monitoring	2	2	0
Vibration analysis of damped and undamped, single and multi-degree of freedom systems.	12	8	4
Vibration transmission, isolation, foundation design, and vibration control techniques.	9	6	3
Characteristics of vibration signals, frequency analysis.	6	4	2
Vibration measurement and spectrum analysis.	7	4	3
Vibration as a machine condition monitoring and fault diagnosis.	9	6	3

**Teaching And Learning Methodologies :**

Interactive Lecturing
Problem solving
Discussion
Experiential Learning
Term Paper
Research

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
Assignment	5.00		
Final Exam	40.00		
First Midterm Exam	15.00		
Participation	5.00		
Quizzes	10.00		
Report	10.00		
Second Midterm Exam	15.00		

**Course Notes :**

Lecture notes on the course Moodle page, FUE website.

**Recommended books :**

"Engineering Vibration" By: Daniel J. Inman, 3rd ed., Prentice-Hall Inc., (ISBN: 0132281732) (2002).  
"Vibration Condition Monitoring of Machines) By: J.S. Rao, CRC Press, (ISBN: 0849309379) (2000)