## Faculty of Engineering & Technology

### Vibration Principles and Monitoring

**Information :**

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|---|---|---|---|---|---|
| **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 | 3 |
| Assistant Lecturer | Rana Mohamed Abdel Rahman Saleh | 5 |

**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 :**

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| **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. |



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| 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 | 0 |
| Vibration analysis of damped and undamped single and multi-degree of freedom systems | | 8 | 4 |
| Vibration transmission and isolating foundation design, vibration control techniques. | | 6 | 3 |
| Characteristics of vibration signals and frequency analysis. | | 4 | 2 |
| Vibration as a machine condition monitoring and fault diagnosis. | | 4 | 3 |

**Teaching And Learning Methodologies :**

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| Interactive Lecturing |
| Problem solving |
| Discussion |
| Experiential Learning |
| Term Paper |
| Research |

**Course Assessment :**

| Methods of assessment | Relative weight % | Week No | Assess What |
|---|---|---|---|
| Assignments, Participation, & Quizzes | 20.00 | | |
| Final Exam | 40.00 | 16 | |
| First Midterm Exam | 15.00 | 5 | |
| Second Midterm Exam | 15.00 | 10 | |
| Term Paper (SelfStudy) | 10.00 | | |

**Course Notes :**

Lecture notes on the course Moodle page, FUE website.

**Recommended books :**



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"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)
"Machinery Vibration Analysis and Predictive Maintenance", By: Cornelius Scheffer, and Paresh Girdhar, Elsevier ISBN: 978-0-7506-6275-8) (2004).



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