Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME536</td></tr>
<tr><td>Subject Title</td><td>Vibrations and Structure-borne Noise</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Students should have basic knowledge in Dynamics.

Exclusion: ME6101 Advanced Theory and Methods in Vibration Analysis</td></tr>
<tr><td>Objectives</td><td>To provide the students an in-depth study in vibration analysis and measurement, and to equip the students with the ability for treating the general vibration problems related to noise abatement at source.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of the noise radiation and vibration mechanism, the relation between noise and vibration and vibration control;
b. apply their knowledge, skills and hand-on experience to measure and analyse the content of vibration and design the vibration control system;
c. extend their knowledge of the analysis of structural vibration and sound radiation to different situations of engineering context and professional practice; and
d. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Noise Pollution Control at Source: Relation between vibration and noise vibration as noise sources; classification of analysis of machinery vibrations.
Vibration Control: Sources of vibration; vibration basics; vibration analysis of continuous structures; vibration isolation and absorption; passive and active vibration control.
Experimental Assessment of Vibrations: Basic measurement system; signal processing; modal parameter identification; time-domain and frequency-domain vibration analysis.
Noise Generated by Vibrating Structures and Control: Elementary noise radiators; noise radiation by machine; noise source identification; sound intensity measurement; identification of noise source; noise radiation and transmission; design principles for noise reduction.
Typical Laboratory Experiments:
• Structural modal testing
• Vibration control
• Measurement of sound intensity</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for vibrations and structure-borne noise.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="4">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and presentation</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed			
		a	b	c	d
1. Homework assignment	20%	√	√	√	√
2. Test	20%	√	√		
3. Case study report and presentation	10%	√	√	√	
4. Examination	50%	√	√	√	√
Total	100%				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

$0.50 \times$ End of Subject Examination + $0.50 \times$ Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, and case study report & presentation. They are aimed at evaluating the progress of student study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

The examination is used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study/Laboratory	15 Hrs.
Other student study effort:	
▪ Self Study	42 Hrs.
▪ Case study report preparation and presentation	24 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Rao S. S., *Mechanical Vibrations*, Third Edition, Addison-Wesley, latest edition.
2. Thomson W. T, *Theory of Vibration with Applications*, Prentice Hall, latest edition.
3. Dimarogonas A., *Vibration for Engineers, Second Edition*, Prentice-Hall, latest edition.
4. Ewins D.J., *Modal Testing: Theory and Practice*, Research Studies Press Ltd., John Wiley, latest edition.
5. Barron R., *Engineering Condition Monitoring*: Practice, Methods and Applications, Addison Wesley Longman, latest edition.
6. Lyon R. H., *Machinery Noise and Diagnostics*, Butterworths, latest edition.
7. Junger M. C. and Feit D., Sound, Structures and Their Interaction, ASA, latest edition.