# PME 434200 Mechanical Vibrations
## 振動學
Spring 2014

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| Instructor: | Prof. Jen-Yuan (James) Chang 張禎元 教授 | Credits: | 3 credits. |
| Class meetings: | **R7R8R9** | Office hours: | Thursdays 18:00-19:00 |

Goal:     To gain a physical and mathematical understanding of how systems vibrate. First, we will gain a better understanding of how simple systems vibrate. We will then develop an understanding of the fact that complicated systems have "modes" of vibration that behave in a very similar way to simple systems. An additional goal will be to develop an understanding of some modern analytical and experimental techniques with a team work design project for vibration reduction/isolation.

Textbook:     S. Graham Kelly, "Mechanical Vibrations – Theory and Applications," SI Edition, Carnegie Learning, Stamford, CT, USA, 2012.

Reference:     Singiresu S. Rao "Mechanical Vibrations," 5th SI Edition, Prentice Hall, Singapore, 2011.
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Teaching Method:     Classroom lectures will be offered in English with teaching materials posted in Moodle.

Assessments:
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| Quizzes | 35% | |

- Approximately 45 minutes/quiz, 7 quizzes total.
- Closed book and notes.
- Missed quizzes: Notify Prof. Chang in advance and take quiz early.

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| Lab assignment | 15% | - 3 laboratory assignments, 4 students per group. |
| Term project | 15% | - group project, 4 students per group. |
| Final Exam | 35% | - in-class individual effort, closed book and notes. |

Topics Covered:

(1)   Free and forced response of single degree-of-freedom systems.
(2)   Free and forced response of multi-degree-of-freedom systems.
(3)   Analytical modal analysis.
(4)   Resonance and damping.
(5)   Vibration isolation/absorption.
(6)   Basic concepts of spectral analysis. Fourier series, transfer function.
(7)   Vibration measurement techniques.
(8)   Continue systems – the wave equation and beam problem.
(9)   Introduction of finite element methods in vibrations.