Aalto University

# MEC-E1040
# Dynamics of structures

*Luc St-Pierre*

# Why study vibrations?

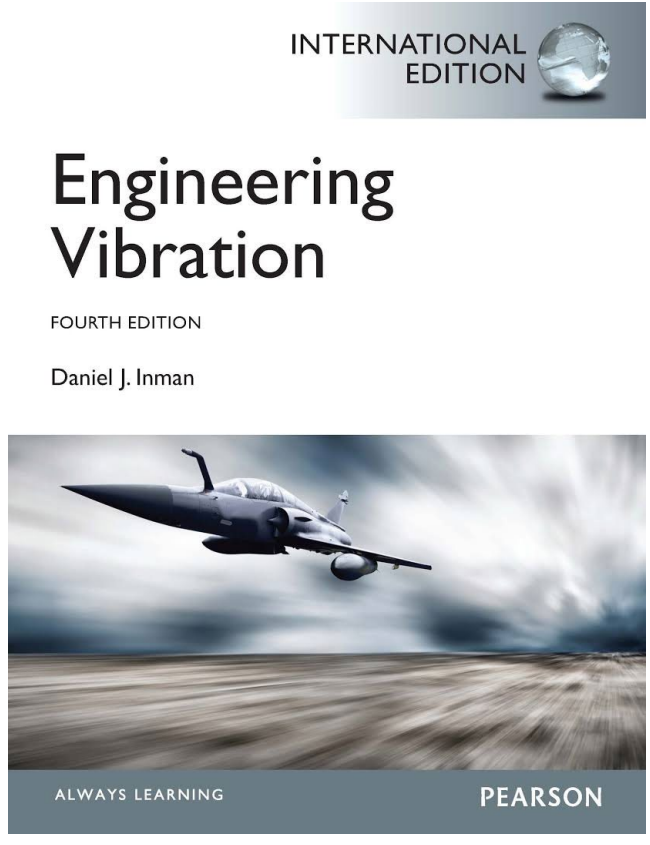
- **Vibrations can be a problem:**
  - Lead to fatigue failure (bike, washing machine).
  - Uncomfortable for the user (car, motorbike).
  - High stresses/accelerations (earthquake).

- **Vibrations can be useful:**
  - Musical instruments.

# Material

- All lecture notes, assignments, solutions and relevant information will be communicated via **MyCourses.**

- If you need additional information, consult the textbook:
  - Daniel J Inman, Engineering Vibration, 4th edition, 2014.



# Schedule

**No traditional lectures:**

- No lectures on Mondays, 14.15-16.00. Use this time to go through the material available online.

**Seminars:**

- Tuesdays, 10.15-12.00 in Otakaari 4, room 215.
- I will provide a summary of the theory and example problems.

**Calculation hours:**

- Wednesdays, 12.15-14.00 in Otakaari 4, room 216.
- Get help to solve the assignments.

# Evaluation

- **Assignments (30%)**
  - Your best 3 out of 5 weekly assignments.
  - Submit your assignment by **Sunday 23.59**.
    - *All assignments should be uploaded via MyCourses.*
    - *Late submissions will not be accepted*.

- **Exam (70%)**
  - Thursday Dec 7, 13.00-17.00 in Otakaari 4 room 216.
  - In-person, closed-book. You will have a list of formulas.
  - (2nd exam: Friday Feb 23, 13.00-17.00).

# Grading

| Grade | Final mark % |
|---|---|
| 5 | ≥90 |
| 4 | 80-89 |
| 3 | 70-79 |
| 2 | 60-69 |
| 1 | 50-59 |
| 0 – Fail | ≤49 |

- **Assignments (30%)**
- **Exam (70%)**

# Learning outcomes

After the course, you will be able to:

- derive the equation of motion for vibrating systems with one or two degrees-of-freedom;
- solve the equation of motion for undamped and damped systems under free or forced vibration;
- compute the natural frequencies and mode shapes of systems with multiple degrees-of-freedom;
- use the theory of vibration to solve design problems.

# Contact persons

**Teacher in charge:**

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