Department of Mechanical and Automation Engineering

The Chinese University of Hong Kong

MAEG 5080 Smart Materials and Structures
1st term 2022-2023

Objectives:	To enable students to: 1. understand the basic characteristics of smart materials; 2. study the key elements of smart structures including smart actuators and sensors, structural modelling and design; 3. analyze the integrated systems for engineering applications

Lectures:

Monday	1:30 pm - 2:15 pm;	ERB 404
Wednesday	3:30 pm - 5:15 pm;	LSK LT1

Instructor: Prof. LIAO Wei Hsin
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Tutor:

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Textbook: None

References: *Smart Materials and Structures*, Institute of Physics

Journal of Intelligent Material Systems and Structures, Sage Publications

Smart Structures Theory, by I. Chopra and J. Sirohi, Cambridge University Press, 2013

Engineering Analysis of Smart Material Systems, by D. J. Leo, John Wiley & Sons, Inc., 2007

Adaptronics and Smart Structures: Basics, Materials, Design, and Applications, by H. Janocha (ed.), Springer-Verlag, 2nd edition, 2007

Adaptive Structures: Dynamics and Control, by R. L. Clark, W. R. Saunders, and G. P. Gibbs, John Wiley & Sons, Inc., 1998

Website: https://blackboard.cuhk.edu.hk/ (select MAEG5080)

Grading:

Assignments	25 %
Project	25 %
Final Exam	50 %

Assignments/ Project: Homework problems will be assigned and there is a project report. Due days for assignments/project report will be specified. Assignments/ project report will carry a 50 % penalty if handed in late. No credit will be given to assignments/project report, which are more than three days late. *Copying/plagiarism are strictly prohibited.* (see Honesty in Academic Work at http://www.cuhk.edu.hk/policy/academichonesty/)

Exam: No make-up exam is given unless you get approval from the Graduate School/Division or Registrar for permission for absence. If not permitted, a zero grade in that exam will be given. (See Postgraduate Student Handbook General Regulations Governing Postgraduate Studies 12.6 or Undergraduate Student Handbook Regulations and Rules 9.5 Absence from examinations, as well as Honesty in Academic Work)

Outlines: Overview of smart materials technology. Characteristics of smart materials such as piezoelectric materials, magnetorheological fluids, and shape memory alloys. Smart actuators and sensors. Structural modelling and design. Dynamics and control for smart structures. Integrated system analysis. Applications in biomedical devices, precision machinery, transportation, and buildings.

Learning Outcomes:
1. Able to apply knowledge of engineering mathematics and science, to the subject of smart materials and structures;
2. Able to design devices and/or systems using smart materials;
3. Able to identify, formulate, and solve problems using smart materials technologies;
4. Able to use the modern engineering tools for the subject of smart materials and structures.