Syllabus for MAEG 5130 Computational Mechanics

Time and Venue: Mon 1:30 – 2:15 pm, ERB 404

Wed 2:30 – 4:15 pm, YIA LT5

Instructor: Prof. ZHANG Weizhao

Room 216, William M.W. Mong Engineering Building

E-mail: weizhaozhang@cuhk.edu.hk

Office hour: by email appointment

Tutor: ZHANG Wanrui

Room G09, William M.W. Mong Engineering Building

E-mail: wrzhang@mae.cuhk.edu.hk

Office hour: Mon 2:30 – 3:30 pm, **email appointment is required**

Textbook: Jacob, Fish, and Belytschko Ted. *A first course in finite elements*. Wiley, 2007.

Belytschko, Ted, et al. *Nonlinear finite elements for continua and structures, 2nd edition*. John wiley & sons, 2014.

Software: MATLAB: https://www.itsc.cuhk.edu.hk/all-it/procurement-support/campus-wide-software/matlab-and-simulink/

Abaqus: https://edu.3ds.com/en/software/abaqus-learning-edition

Caution: Please download and install these software packages at the beginning of this term to avoid any technical issue that may delay your project completion.

Grading Scheme: 5 Assignments: $5 \times 6\% = 25\%$ Final exam: 40%

3 Project Reports: $3\times 10\% = 30\%$

Assessment Criteria:

- Homework and Reports: The assignments and projects will be published on Blackboard and the due date will be specified. **All submission should be made online via Blackboard in softcopy**. It will carry a **20% penalty if handed late**. **No credit will be given if the submission is late for more than four days**.

- Tutorials: Tutorials of this course will be arranged in a partial Flipped Classroom format. **You will have chance to present correct solutions to the tutors and other students during tutorial sessions to regain credits that are lost in assignments**. Details of tutorial arrangement and procedure of presentation registration will be published on Blackboard.

- Final Exam: For students absent from the final exam with approval from the RES, only one make-up exam will be arranged. It is the responsibility of those who request for a make-up exam to ensure their availability. Please note that the course instructor has the final discretion on all arrangement of the make-up exam.

Grading Disputes: Please check grades of assignments and final exam as soon as they are released. Any discrepancy should be reported to Tutors **within one week from the date of score releasing**. Late complaint will NOT be accommodated.

Course Schedule (Tentative, subject to revision)

Week	Date	Activity	Project/Tutorial	Key date
1	Jan. 9 Jan. 11	- Introduction - 1D Strong and Weak Forms (1)		
2	Jan. 16 Jan. 18	- 1D Strong and Weak Forms (2) - 1D Trial Solution Approximation		
3	Jan. 23 Jan. 25	- Lunar New Year Vacation		
4	Jan. 30 Feb. 1	- Generalized 1D Formulation	Project 1: Introduction to MATLAB	Assignment 1 Due: Feb. 15 Project 1 Report Due: Feb. 22
5	Feb. 6 Feb. 8	- Continuum Mechanics		
6	Feb. 13 Feb. 15	- Strong and Weak Forms of Multidimensional Scalar Fields		Assignment 2 Due: Mar. 1
7	Feb. 20 Feb. 22	- Multidimensional Trial Solution		
8	Feb. 27 Mar. 1	- Generalized Formulation for Multidimensional Scalar Fields	Project 2: Plasticity Modeling using Abaqus	Assignment 3 Due: Mar. 15 Project 3 Report Due: Mar. 22
9	Mar. 6 Mar. 8	- Formulation for 2D Linear Elasticity Field		
10	Mar. 13 Mar. 15	- Modeling of Elasticity	Tutorial for Assignments 1 & 2	Assignment 4 Due: Mar. 29
11	Mar. 20 Mar. 22	- Modeling of Plasticity		
12	Mar. 27 Mar. 29	- Modeling of Hyperelastic-Plastic	Project 3: Application of MATLAB for Plasticity	Assignment 5 Due: Apr. 12 Project 3 Report Due: Apr. 19

13	Apr. 3 Apr. 5	- Stress Update Algorithms (1) - Ching Ming Festival		
14	Apr. 10 Apr. 12	- Easter - Stress Update Algorithms (2)	Tutorial for Assignments 3 & 4	
15	Apr. 17 Apr. 19	- Supplementary Information for Constitutive Laws - Review		
16	Apr. 24	(- Class make-up)	Tutorial for Assignments 5	
	TBD	Final Exam		