

Course Syllabus

Course Number	SCME 211
Course Title	Computer Programming and Simulation
Credits	3 Credits (3-0-6)
Faculty	Faculty of Science
Semester/Year	Second / 2021
Hours/Date/Time	3 Hours / Tuesday / 13.30-16.30
Instructor	Dr. Chaiwoot Boonyasiriwat (chaiwoot@gmail.com)
Online Learning	https://mahidol.webex.com/meet/chaiwoot.boo
Course Web Page	http://mcsc.sc.mahidol.ac.th/courses/cps/
Degree	Bachelor of Science (Materials Science and Nano Engineering)
Course Topics	MATLAB, Python, C/C++, Java, numerical simulations
Teaching Methods	Lecture and in-class exercise
Media	Presentation slides and programming demonstration
Assignments	Assignments will be assigned every week and due within one week



Learning Outcomes	Student should <ul style="list-style-type: none">• Be able to describe basic programming concepts such as variables, data types, program controls, arrays, data inputs and outputs, functions, class and object• Be able to develop algorithms for solving problems• Be able to implement algorithms and write computer programs to solve problems• Be able to use mathematical methods and write programs to perform some numerical simulations
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Evaluation	- In-class assignments	30%
	- Homework assignments	40%
	- Term project	30%

Grading Letter grades will be assigned based on the total score percentage of each student according to the following table

Score Percentage Range	Letter Grade
[80,100]	A
[75,80)	B+
[70,75)	B
[65,70)	C+
[60,65)	C
[55,60)	D+
[50,55)	D
[0,50)	F

References

-  A. R. Bradley, 2011, Programming for Engineers: A Foundational Approach to Learning C and Matlab, Springer.
-  <https://www.w3schools.com>

📖 M. Ogihara, 2018, Fundamentals of Java Programming, Springer.

📖 C. Xu, 2018, Learning Java with Games, Springer.

Tentative Course Schedule

Week	Date	Topics
1	Jan 11	MATLAB: variables, data types, operators, arrays, built-in functions, graph plotting
2	Jan 18	MATLAB: conditioning constructs (if, else), iterative constructs (for, while), user-defined functions, timing
3	Jan 25	MATLAB: plotting of 2D and 3D functions, image processing, object-oriented programming
4	Feb 1	MATLAB: graphics user interface, animation, saving animation as video files
5	Feb 8	Python: variables, arrays (list, tuple, set, dictionary), conditions, loops, timing
6	Feb 15	Python: NumPy, Matplotlib
7	Feb 22	Python: making games using PyGame
8	Mar 1	Python: deep learning using Tensorflow and Keras
9	Mar 8	C/C++: variables, data types, conditions, loops, arrays, pointers, functions, timing
10	Mar 15	C/C++: inputs and output (standard IO and files), reading/writing image files
11	Mar 22	C/C++: 3D computer graphics using OpenGL, reading 3D models
12	Mar 29	Java: object-oriented programming, class, fields, methods, inheritance, event handling, drawing
13	Apr 5	Java: graphics user interface using SWING
14	Apr 12	Java: inputs and outputs, reading image files and sound clips
15	Apr 19	Writing dynamic web pages using HTML, CSS, and JavaScript
16	Apr 26	Project presentation