CSE5004 Scientific Computation with Python (2023 Spring)

Course descriptions: This course aims at Python programming for scientific computations by introducing the NumPy package for numerical computing, the SciPy toolbox for various scientific computing tasks, and the Matplotlib package for visualization. The course focuses on Python programming of basic numerical algorithms such as interpolation, integration, differentiation, ODE and PDE solvers, and basic linear algebra.

Class meetings:
WED 1:00 PM - 4:00 PM
ASTC 516

Instructor:
Jung-Il Choi (ASTC 610-B, jic@yonsei.ac.kr)

Teaching assistant:
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Textbooks:

- Q. Kong, T. Siauw, and A.M. Bayen, Python Programming and Numerical Methods, Academic Press, 2021
- P. Moin, Fundamentals of Engineering Numerical Analysis, 2nd edition, Cambridge University Press, 2010

Assignments and evaluation: The final grade in the course will be determined based on homework assignments (80%) and final project (20%).

Outline: The following outline is tentative.

Week 01	Introduction to Scientific Computation with Python	
Week 02	Basic Python Syntax & Data Structures	
Week 03	Numerical Computing with Numpy & Plotting with Matplotlib	HW1
Week 04	Programming & Debugging	HW2
Week 05	Discretization & Numerical Differentiation	HW3
Week 06	Numerical Interpolation / TDMA & Programming	HW4
Week 07	Numerical Integration & Programming	HW5
Week 08	Programming Clinic - 1	
Week 09	Numerical Solutions of ODE & Programming - 1	HW6
Week 10	Numerical Solutions of ODE & Programming - 2	HW7
Week 11	Numerical Solutions of PDE & Programming - 1	HW8
Week 12	Numerical Solutions of PDE & Programming - 2	HW9
Week 13	Numerical Solutions of Poisson Equation & Programming	HW10
Week 14	Profiling & Parallel Implementation	
Week 15	Programming Clinic - 2	
Week 16	Advanced Topics	