COURSE DETAIL

MODELING AND VISUALIZATION IN PHYSICS
Country United Kingdom - Scotland
Host Institution University of Edinburgh
Program(s) University of Edinburgh
UCEAP Course Level Upper Division
UCEAP Subject Area(s) Physics
UCEAP Course Number 103
UCEAP Course Suffix
UCEAP Official Title MODELING AND VISUALIZATION IN PHYSICS
UCEAP Transcript Title MODEL & VISUAL PHYS
UCEAP Quarter Units 4.00
UCEAP Semester Units 2.70

Course Description
This course covers the process of mapping a scientific problem onto a computer algorithm to enable it to be modeled, along with an introduction to visualization techniques (e.g., via either gnuplot, Matplotlib, or similar), to help visualize the solution. Example problems are drawn from the Junior Honors physics program, with additional examples from everyday problems. The course consists of lectures on the algorithms and weekly hands-on practical sessions, with three checkpoints. Topics include theoretical background of core simulation techniques (including Monte-Carlo integration and Monte-Carlo simulations, cellular automata, and molecular dynamics simulations or partial differential equations); implementation of these core techniques in Python to solve specific (and potentially unseen) physics problems; integration of visualization (evolving fields, moving particles, live graphs, etc.) and graphical user interfaces into simulation codes; the notion and origin of errors and instabilities in numerical algorithms, and simple techniques for handling them; and key issues that arise in the development of scientific software, such as compromises between efficiency and flexibility, the incorporation of third-party library code (and its distinction from plagiarism), and the utility of good-quality documentation and coding style.

Language(s) of Instruction
English

Host Institution Course Number
PHYS10035

Host Institution Course Title
MODELLING AND VISUALISATION IN PHYSICS

Host Institution Campus
Edinburgh

Host Institution Faculty

Host Institution Degree

Host Institution Department

Physics and Astronomy

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