

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 Course Details

<https://www.ed.ac.uk/global/study-abroad/course/index.php?browseby=subject&brow...>

Host Institution Campus

Edinburgh

Host Institution Faculty

Host Institution Degree

Host Institution Department

Physics and Astronomy

Course Last Reviewed

2019-2020

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