The Art of Scientific Computing – An Introduction

Course information

Organised by Tally Ho Tutors

Purpose

Computing forms part of any Mathematics, Physics or Engineering undergraduate degree. This course provides an essential introduction to Scientific Computing topics. The course will be a foundation for the further pursuit of knowledge of theoretical and practical aspects of a number of computing applications which are dealt with in greater detail in the first years of the a degree programme of a related discipline. This course is available to any one who wishes to learn these topics at an introductory level.

Aims and Objectives

The aim of this course is to provide an inspiring and informative introduction to the activities and capabilities of Scientific Computing in the past, present and future, and to provide a

The objectives are to provide foundation knowledge in topics in Scientific Computing which may be easily developed in related components of degree course, to develop an understanding of the application of computing in solving real life problems in education and industry and developing software for sensing, monitoring and measuring of processes, to gain experience in handling data (including statistical analysis) and to provide an introduction to future career options in computing.

Teaching and exams

Teaching will consist of:

- Lectures, 30 hours.
- Seminars/problem classes, 3-6 hours.
- One laboratory session, 6 hours.
- Required written work (2 essays, 1 problem sheet).
- Private reading, 30 hours.

The assessment will consist of:

- There is no formal examination for the course
- However, weekly problem sheets will be set which the students should try on their own time.
- The sheets will be discussed in the next class.

Prerequisites

There are no prerequisites for this course.

Description

The course begins with an overview lecture outlining, with the aid of demonstrations and visual aids, the scope of Scientific Computing topics to be covered in subsequent lectures. The course will broadly be split into two main sections, the first will provide information about the history and development of computing technology and the second will describe the development of programming applied in the physical sciences in problem solving. As part of the course, laboratory sessions will enable students to gain experience in acquiring practical programming, using previously described theory, and perform statistical analysis on collected data. Since the aim of the course is to provide an exciting and up to date introduction to Scientific Computing topics, the course will also include a number of specialist lectures, discussing the current application of state of the art computing technologies. The final lecture will describe the possible research projects which may be undertaken in the at research level and outline possible career options in computing. Students will develop foundation knowledge which will be directly transferable to all the other related subjects in a degree, including their possible project work.

Brief Syllabus

The aim will be to make the student familiar with all aspects of scientific computing at a basic level.

1. **Introduction to Scientific Computing**.
2. **Storing Data**.
3. **Setting constant values**.
4. **Performing operations**.
5. **Making statements**.
6. **Using functions**.
7. **Working with bits**.
8. **Pointing to data**.
9. **Manipulating strings**.
10. **Building structures**.
11. **Reading and writing files**.
12. **Interesting functions**.

Core Texts

There is no formal text book for the course. However the following books are good readers for any one who likes to read on the subject.

- S. Prata. *C++ Primer Plus,* The Waite Group Inc., 1998
- I. Chivers and J. Sleightholme. *Introduction to Programming with Fortran*. Springer Verlag, 2006

Fees

- Give us a call at 020 8445 6407 or write an email.
- A discount of 5% to students who are already registered with us.