3. **Objectives**

The objective of this course is to learn how to use modern computational methods to solve problems in five important areas of scientific computation. After successfully completing the course, students will be able to:

- use modern computational methods to solve problems in five important areas of scientific computation.
- understand the derivation and analysis of these methods.
- understand the advantages and disadvantages of these methods.
- apply them appropriately to novel problems.
- present their solutions clearly using well-written English, making effective use of computer graphics and tables.

4. **Text**

There is no set text. Course notes will be distributed for much of the material.

5. **Content**

The course is divided into five sections:

1. **Fourier Transforms**
   - The Fourier Transform and its implementation via the Fast Fourier Transform. Applications in signal processing and CAT scans.
2. **Numerical Linear Algebra**
3. **Spline Approximation**
   - B-splines. Least squares approximation and least squares approximation.
4. **Scientific Computation**
   - Present their solutions clearly using well-written English, making effective use of computer graphics and tables.

Office Hours: Monday, Tuesday 12:00-1:00pm, Room 67-140, Mathematical Sciences Department.

Phone: 3365-1234, Fax: 3365-1234, Email: gac@maths.uq.edu.au

WWW: http://www.maths.uq.edu.au/~gac

Material related to the course can be found on the MATH3201 webpage:

4. Solution of Ordinary Differential Equations

- Implicit methods for stiff equations
- The method of lines

5. Monte Carlo Methods

- Pseudo-random numbers and generators
- Monte Carlo integration

6. Matlab

Practical computing in Matlab is an important part of the course. Many algorithms will be explained with Matlab code; and all assignments will need to be done with Matlab. Prepared course material (lecture notes) will be provided with Matlab code; and all assignments will need to be done with Matlab.

7. Times

- Lectures: Monday 3.00pm Room 8-212
- Wednesday 11.00am Room 8-212
- Friday 12.00noon Room 8-212

Tutorials: Wednesday 10.00am Room 8-212

Tutorials start in the second week.

8. Assessment

- The assessment criteria for this subject are available at

- The final mark will be calculated by
  50% from four assignments on the first four parts of the course.
  The assignments are due on Monday of weeks 5, 8, 10, and 12.
  Each assignment is worth 15% of the final mark.

- The final two-hour closed book exam.
  (There will be no choice of topics.)
11. Students with disabilities

Anystudent with a disability who may require alternative academic arrangements in the course is encouraged to seek advice at the commencement of the semester from a Disability Adviser at Student Support Services.

12. Assistance for Students

Students with English language difficulties should contact the lecturer. Students with English language difficulties who require development of their English skills should contact the Institute for Continuing and TESOL Education on extension 56565.

The Learning Assistance Unit located in the Relaxation Block in Student Support Services. You may consult learning advisers in the unit to provide assistance with study skills, writing assignments and the like. Individual sessions are available. Student Support Services also offers workshops and courses of study which are conducted during and outside of normal university hours. Assistance is free.


13. Plagiarism

The official University policy on plagiarism is:

Plagiarism is the action or practice of taking and using another’s thoughts or writings as one’s own without acknowledgment.

The following practices constitute acts of plagiarism and are major infringements of the University’s academic values:

1. (a) Where paragraphs, sentences or significant parts of a sentence which are copied directly are not enclosed in quotation marks and appropriately referenced

2. (b) Where direct quotations are not used, but are paraphrased or summarised and the source of the material is not acknowledged either by footnoting or otherwise

3. (c) Where an idea which appears to be original, is in fact the work of another, without adapting the original

When a student knowingly plagiarises someone else’s work, there is intent to gain an advantage and this may constitute misconduct. Students with English language difficulties should contact the Lecturer.

Students with English language difficulties should contact the Lecturer.
Library contact
TheliaisonlibrarianforMathsislocatedinthePhysicalSciencesandEngineeringLibraryintheHawkenBuildingandmaybeconsultedforassistancein
thecourse:-

LarahSeivl-Keevers,l.seivl-keevers@library.uq.edu.au,extension:52367

References
Studentsmayﬁndthefollowingbooksusefulasreferences.

- S.D.Conte,C.deBoor; ElementaryNumericalAnalysis:Analgorithmic
  approach,McGraw-Hill,1980
  CambridgeUniversityPress,1992.Thisisavailableonlinesectionbysection
- WilliamL.Briggs&VanEmdenHenson,TheDFT:anowner’smanualfor
- AvinashC.Kak&MalcolmSlaney,PrinciplesofComputerizedTomographic
- PaulDierckx,CurveisandSurfaceFittingwithSplines,Oxord:Clarendon
- PaulDierckx,CurveisandSurfaceFittingwithSplines,Oxord:Clarendon
  1997.Slidesbasedonthebookareavailablefrom
  http://www.cse.uiuc.edu/heath/scicomp/notes.html
  CambridgeUniversityPress,1992.Thisisavailableonlinesectionbysection

For unit I
- K.E.ATKINSON; AN INTRODUCTION TO NUMERICAL ANALYSIS. 2ND EDITION, WILEY, 1988.

For unit II

For unit III