

Lecturers:

First half:

Lecturer: Dr Nick Hale*E-Mail:* nickhale@sun.ac.za*Office:* A410, General Engineering

Second half:

Lecturer: Prof André Weideman*E-Mail:* weideman@sun.ac.za*Office:* A315, General Engineering**Module:***Web page:* <http://dip.sun.ac.za/courses/TW776/>*Credits:* 16*Time:* Tuesday 16:00–16:50*; Wednesday and Thursday 10:00–10:50.

(* Tuesday lecture time (and day) is provisional and subject to change.)

Place: M203

Contents: The module focuses on matrix computations. We study the effective solution of linear systems, involving both square and rectangular matrices (least-squares). Direct as well as iterative methods are considered, with the emphasis on sparse matrices and matrices with structure. Numerical methods for the eigenvalue problem are also considered. Pitfalls such as numerical instability and ill-conditioning are pointed out. Model problems are taken from partial differential equations, data analysis and image processing. Theory, algorithmic aspects, and applications are emphasized in equal parts.

Prerequisites: An undergraduate module in matrices/linear algebra plus some programming experience in an environment such as MATLAB or Python.

Text: We plan to cover a few chapters from M. T. Heath, *Scientific Computing: An Introductory Survey*, McGraw-Hill, 1997. Further resources will be recommended on the web page throughout the term.

Assessment: Continuous assessment, based on computer assignments and written tests. Assignments are due at regular intervals throughout the semester—please watch the web page. There are also two tests that cover theory (each covering about half of the work of the semester; dates to be announced on the web page). Final marks are calculated as follows:

Test 1	25 %
Test 2	25 %
Assignments	50 %
	<u>100 %</u>
Pass mark	50 %
Distinction	75 %