Module Description: Introduction to Scientific Computing

Code:	CS3200	
Semester:	Spring 2020	
Lectures :	MEK 3550 in the Mechanical Engineering Building Monday and Wednesday 1.25pm-2.45pm.	
Credits:	3 credits (6 assignments +10 in class exercises and both exams)	
Prerequisites:	Prerequisites: "C-" or better in CS 1410 OR EAE 1410 AND MATH 2270	
Co-requisites:		
Assessment:	6 practical assignments: (66%); Exams: One hour and 20 minutes midterm (10%) one two hour final (14%). 10 in class activities (10%) **Exam Dates:** **Mid-term** Monday February 24th 2020 **Final** **Wednesday** April 29th 2020	
Faculty:	Professor Martin Berzins, mb@sci.utah.edu 801 585 1545 TA Wenzheng Tao and Rui Luo	
Objectives: On completing of this module students should be able to: (i) Use polynomial; interpolation and/or least squares to compute intermediate values in a data sets for scientific computing and data science. (ii) Use numerical techniques for integration and differentiation to compute n numerical approximations to integrals and differential equations (iii) Solve both small and large systems of linear equations and understand when such procedures work and when they don't. (iv) Use eigenvalue –based approaches in to calculate the solution to data science type problems (v) Be able to solve single nonlinear and systems of non linear equations (vi) Be aware of the challenges of using finite precision floating point arithmetic.		
Syllabus: CS 3200 serves as an introduction to several computational science & engineering techniques & The goal is to create a course that will be useful to engineering & science undergraduates who are interested in learning more about problem solving using a computational approach. Background knowledge of programming, linear algebra & calculus is assumed. Topics we'll cover during the semester related to these areas including: Continuous, discrete, & statistical modeling of problems, solving linear (direct and iterative methods) & non-linear systems, interpolation & approximation, least squares data approximation, eigenvalues, sin gular value decomposition		

Monte Carlo methods **Course Texts :** the course will be based on of the following online texts Computing with MATLAB **by Cleve Moler** A traditional textbook print edition, published by the Society for Industrial and Applied Mathematics, is available from the SIAM Web site. An online version is available at https://www.mathworks.com/moler/chapters.html Scientific Computing by Timo Heister Leo G Rebholz Available in print and ebook forms from google apps store See https://www.math.clemson.edu/~heister/scicompbook/ In addition the practical exercises will make use of Matlab. This may be purchased from the campus Office of Software Licensing for $30. Matlab is available on the Engineering CADE lab machines. https://software.utah.edu/news/mathworks.php	