UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Numerical Analysis
Module Code	COS5018-B
Academic Year	2024/5
Credits	20
School	School of Computer Science, AI and Electronics
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Directed Study	164
Lectures	12
Tutorials	12
Laboratories	12

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

Computers have become indispensable for today?s digital industry and people?s everyday lives. One of the reasons is that by implementing numerical methods, computers can solve complicated mathematical problems in many real-world applications such as Finance, Game Design, Graphics, Machine Learning, preparation and response to crises. Numerical Analysis is a subject that develops and analyses such numerical methods/algorithms.

In this module, we will introduce the basic concepts of error analysis and iteration, and elementary numerical methods for solving algebraic equations; develop and implement efficient numerical algorithms and instil an appreciation of the techniques available for numerical interpolation and linear algebra.

Outline Syllabus

Key topics:

Number Representation
IAS Machine Model
Instruction Set and Machine Language
Computation Error
Root Finding and Iterative Solution
Finite Difference
Numerical Integration
LU Factorization

Learning Outcomes

Outcome Number	Description
01	Demonstrate a good understanding of some of the basic techniques of numerical analysis.
02	Apply in realistic situations the fundamental methods of numerical algebra and calculus.
03	Construct/validate many of the numerical tools inherent in the construction and analysis of numerical methods.
04	Learn and work independently, be able to assess and solve problems logically through an analytical approach, write coherently and clearly communicate results.

Learning, Teaching and Assessment Strategy

There will be a one-hour lecture per week followed by a one-hour tutorial and one-hour laboratory for this module. Utilising current research and case studies on the topic of Numerical Analysis and using Matlab as the programming language, the students will participate in timetabled sessions and independent study to explore concepts and solve real-world problems. The teaching and learning methods have been selected to engage students in developing their knowledge and understanding of Numerical Analysis through formal learning opportunities such as lectures and tutorials where the basic theory and illustrative examples are presented and developed; experiential learning through lab sessions where complementary tailor-made example sheets are provided; and informal and social learning through team-working on tutorial questions and lab exercises with assistances from academic staff, either on a one-to-one basis or as a staff or student-led group.

This module provides a supportive learning environment, where all teaching materials are provided online in advance of the teaching sessions toensure accessibility and clarity, and support comprehension.The module adopts a nurturing teaching and learning approach, where lots of opportunities are provided for students to design their own solutions and to express their own ideas, choosing from a variety of tools and methodologies, in practical lab sessions. The lab sessions also provide the space for questions and discussions, as well as for students to receive formative feedback. An emphasis is also placed on the importance of planning and goal setting, allowing students to forge a learning pathway that is suitable for their needs, while respecting the requirements of module.

The module will be summative assessed through a Coursework (40%) and an Exam (60%). The Coursework will require students to construct numerical tools in Matlab and validate the effectiveness of the tool. The Exam will assess the understanding of basic techniques of Numerical Analysis and their applications.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Written	Software solution using Matlab	40%
Summative	Examination - Closed Book	Exam ? closed book	60%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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