Faculty:	Faculty of Computing	**Page:**	1 of 5
Program name:	Bachelor of Computer Science (Software Eng./Data Eng./Bioinformatics/Network Security)		
Course code:	SECI 1113	**Academic Session/Semester:**	20232024/2
Course name:	Computational Mathematics	**Pre/co requisite (course name and code, if applicable):**	-
Credit hours:	3		

Course synopsis	This course is a combination of linear algebra and numerical methods as preparation for computer science student to apply mathematics knowledge in core knowledge of computer science. The first part of this course is an introduction to linear algebra. The topics that are covered in linear algebra are linear equations, linear combinations, linear independence, linear transformation, and vector spaces. The second part of this course cover numerical methods that can be used to solve non-linear equation, linear systems, eigenvalue problems, interpolation, differentiation and integration. At the end of the course, students should be able to apply mathematics knowledge to solve mathematical problems. Implementation of engineering tools such as MATLAB and Python, would enhance student to use simple programming technique for solving mathematical problems.			
Course Coordinator	Dr. Nor Haizan bt Mohamed Radzi			
Course lecturer(s)	**Name**	**Office**	**Contact no.**	**E-mail**
	Dr. Nor Haizan bt Mohamed Radzi	428-21		nzah@utm.my
	Dr. Nor Azizah bt Ali	439-03		suhailamy@utm.my
	Dr. Muhammad Aliif Bin Ahmad			muhammadaliif@utm.my

Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO (Code)	*Taxonomies and **generic skills	T&L methods	***Assessment methods
CLO1	Apply matrices, linear system, linear combinations, linear independence, vector spaces, and linear transformation to solve problems in computer science.	PLO1(KW) PLO5 (THDS)	C3 TH1	Lecture, Active learning	Quiz (10%) Asg (10%) Test (20%)
CLO2	Solve nonlinear equations, linear systems, differentiation, and integration using numerical methods.	PLO1(KW)	C3	Lecture, Active learning	Quiz (5%) Asg (7%) Final (28%)
CLO3	Estimate data values using Newton formulas, Lagrange, and Least-Squares Regression.	PLO1(KW) PLO5 (THDS)	C4 TH1	Lecture, Active learning	Asg (3%) Final (12%)
CLO4	Use engineering tool to manipulate matrices, solve linear systems, curve fitting, perform numerical	PLO5 (THDS)	TH1	Project-based learning	Asg (5%)

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	differentiation, and numerical integration.				

Refer
*Taxonomies of Learning and
**UTM's Graduate Attributes, where applicable for measurement of outcomes achievement
***T – Test; Q – Quiz; HW – Homework; Asg – Assignment; PR – Project; Pr – Presentation; F – Final Exam L-Lab etc.

Details on Innovative T&L practices:

No.	Type	Implementation
1.	Active learning	Conducted through in-class activities
2.	Project-based learning	Conducted through lab assignment. Students in a group of 3 are given project that require student to use simple programming technique for solving mathematical problems. The solution for the problem need to be given in the form of programming code and written reports.

Weekly Schedule:

Week 1 (Online) 17 – 21 Mac. 2025	**Chapter 1** - **System of Linear Equations and Matrices** System of linear Equations**,** Matrices Determinants, Matrix Inverses
Week 2 (Online) 24 – 28 Mac. 2025	**Chapter 1 - System of Linear Equations and Matrices (cont'd)** Elementary Row Operations**,** Gaussian Elimination Gauss Jordan, Matrix Factorization
Week 3 (Online) 31 Mac – 4 Apr. 2025 Aidilfitri (31/3-1/4) **ASG #1 (Ch.1 – Ch.2)**	**Chapter 2 - Euclidean Vector Space** Vector in R^n, Linear Combinations, Linear Independence
Week 4 7 Apr – 11 Apr. 2025 **QUIZ #1 (Ch. 1)**	**Chapter 3 - General Vector Spaces** Definition of a Vector Space, Subspaces
Week 5 14 Apr – 18 Apr. 2025	**Chapter 3 - General Vector Spaces (cont'd)** Basis and Dimension, Coordinates and Change of Basis
Week 6 21 Apr – 25 Apr. 2025 **QUIZ #2 (Ch. 3)**	**Chapter 4 - Linear Transformations (cont'd)** Linear Transformation The null Space and Range
Week 7 28 Apr – 2 May. 2025 **ASG #2 (Ch.3 – Ch.4)**	**Chapter 4 - Linear Transformations (cont'd)** Linear Transformation The null Space and Range

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*Labour Day (1 May)	
Week 8 5 May – 9 May. 2024	**Mid-Semester Break**
Week 9 12 – 16 May. 2025 **TEST (Ch.1 – Ch.4)** **(14 May 2024 – Wed) 5pm – 7 pm**	**Chapter 5** - **Introduction to Numerical Method** Error, Modulus Error and Relative Error Rounding Error *Introduction to Python Programming for Numerical Methods
Week 10 19 – 23 May. 2025 **ASG #3 (Ch.5 – Ch.6)**	**Chapter 6** - **The Solution of Non-linear Equations** Bisection Method, Secant Method, Newton's Method
Week 11 26 – 30 May. 2025	**Chapter 7 - Eigen Values and Eigen Vector** Gerschgorin Theorem, Power Method, Inverse Power Method
Week 12 2 – 6 Jun. 2025 **QUIZ #3 (Ch. 7)**	**Chapter 8 - Interpolation and Approximation** Newton Interpolation**,** Lagrange Interpolation, Least-Squares Regression
Week 13 9 – 13 Jun. 2025	**Chapter 9 - Numerical Differentiation** First Derivatives, Second Derivatives
Week 14 16 – 20 Jun. 2025 **ASG #4 (Ch.7 – Ch.10)** *Eidul Adha (17 Jun)	**Chapter 10 - Numerical Integration** Trapezoidal Rule**,** Simpson's Rule
Week 15 23 – 27 Jun. 2025	**Chapter 10 - Numerical Integration (Continue)** Romberg Integration

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

Team working; Written communication

Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content	**Teaching and Learning Activities**		**TOTAL SLT**
	Guided Learning (Face to Face)	**Guided Learning Non-Face to Face**	**Independent Learning Non-Face to face**

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outline							
CLO	**L**	**T**	**P**	**O**			
CLO 1	19					35	**54**
CLO 2	11					18	**29**
CLO 3	10					18	**28**
CLO4	2					4	**6**
Total SLT	**42**					**75**	**117**

Continuous Assessment		**PLO**	**Percentage**	**Total SLT**
1	ASG1	PLO1, PLO5	5	As in CLO1 &4 (1h)
2	ASG2	PLO1, PLO5	5	As in CLO1 (1h)
3	ASG3	PLO1, PLO5	7	As in CLO2,3&4(1.5h)
4	ASG4	PLO1, PLO5	8	As in CLO 2 & 3 (1h)
5	TEST	PLO1, PLO5	20	As in CLO1 (2h)
6	QUIZ 3	PLO1, PLO5	15	As in CLO1 (1.5h)
Final Assessment		**Percentage**	**Total SLT**	
1. Final Examination		PLO1, PLO5	40	3h
		Grand Total	**100**	**120h**
L: Lecture, T: Tutorial, P: Practical, O: Others				

Special requirement to deliver the course (e.g: software, nursery, computer lab, simulation room):

Computer lab with MATLAB or Python programming.

Learning resources:

Text book (if applicable)

Teaching Module Computational Mathematics, Department of Computer Science, Faculty of Computing, 2021

Main references

i. Howard Anton and Chris Rorres, Elemetary Linear Algebra with Supplemental Applications, 10th ed.Wiley,2011

ii. DeFranza, J. and Gagliardi, D., Introduction to Linear Algebra with Applications, Mc Graw Hill, 2009.

Additional references

i. Lay, D.C. Linear Algebra and its applications, 3rd ed. Addison Wesley, 2003.

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ii. Mathews and Fink, Numerical Methods using MATLAB, Prentice Hall, 1999

iii. Q. Kong, T. Siauw, A. Bayen, Python Programming and Numerical Methods: A Guide For Engineers and Scientist, 1st Ed. Academic Press Inc (US), 2020.

Online

http://elearning.utm.my

Academic honesty and plagiarism: *(Below is just a sample)*

Assignments are individual tasks and NOT group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES). Copying of work (texts, simulation results etc.) from other students/groups or from other sources is not allowed. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words used to explain what you have read. It is not acceptable to retype existing texts and just acknowledge the source as a reference. Be warned: students who submit copied work will obtain a mark of **zero** for the assignment and disciplinary steps may be taken by the Faculty. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy.

Other additional information (Course policy, any specific instruction etc.):

1. Attendance is compulsory and will be taken in every lecture session. Student with less than 80% of total attendance is not allowed to sit for final exam.
2. Students are required to behave and follow the University's dressing regulation and etiquette all the time.
3. Exercises and tutorial will be given in class and some may be taken for assessment. Students who do not do the exercise will lose the coursework marks for the exercise.
4. Assignments must be submitted on the due dates. Some points will be deducted for late submissions. Assignments submitted three days after the due date will not be accepted.
5. Make up exam will not be given, except to students who are sick and submit medical certificate confirmed by UTM panel doctors. Make up exam can only be given within one week of the initial date of exam.

Disclaimer:

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