Course Specifications: Numerical analysis MTH201

1. Basic Information

Program Tile	Biomedical Engineering
Department offering the Program	Biomedical Engineering
Department Responsible for the Course	Engineering Mathematics and Physics
Course Title	Numerical analysis
Course Code	MTH201
Year/ Level	Level 200
Credit Hours	4
Specialization	Major
Requirements	MTH101
Authorization data of course specification	

Teaching Hours	Credit	Lectures	Tutorial	Practical
	4	2	2	3

2. Course Aims:

No.	Aims
1	Apply knowledge of mathematics and engineering concepts to use numerical analysis in solving engineering problems.
5	Use modern numerical modeling techniques to design biomedical systems in a teamwork manner.

3. Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding:

No.	Knowledge and Understanding
A_1	Identify the concepts and theories of numerical analysis to solve engineering problems
A_5	State the methodologies of numerical design methods.

B. Intellectual Skills

No.	Intellectual Skills
B_1	Select appropriate methods of numerical analysis and analyzing problems.
B_2	Investigate appropriate solutions of engineering problems based on analytical thinking.
B_{11}	Criticize and analyze the results of numerical models using numerical techniques.
B15	Apply processing procedures and apply numerical techniques to solve biomedical engineering problems

C. Professional Skills

No.	Professional Skills
C1	Apply appropriate methods of numerical analysis to solve simple engineering problems.
C_7	Apply numerical modeling methods for engineering problems.
C_{13}	Apply and select the appropriate numerical technique and computing methods for modeling and analyzing engineering problems.

D. General Skills

No.	General Skills
D_1	Collaborate effectively.
D_4	Demonstrate IT capabilities in numerical analysis
D_9	Refer to relevant literatures in numerical analysis

4. Course Contents:

No.	Topics	Weeks
1	Approximation and errors.	1-2
2	Interpolation with divided difference	3-4
3	Lagrange interpolation	5-6
4	Curve fitting	7,9
5	Numerical solutions of equations	10-11
6	Numerical solutions of ordinary differential equations	12-13
7	Approximation of functions	14

5. Teaching and Learning Methods:

No.	Teaching Method
1	Lectures
2	Case Studies
3	Discussion Sessions

6 Teaching and Learning Methods for Disabled Students:

No.	Teaching Method	Reason
1	Online assignment	To help them practice at home

7. Student Evaluation:

7.1 Student Evaluation Methods:

No.	Evaluation Method	ILOs
1	Mid Term Examination	A1, A5, B1
2	Semester work	A1, A5, B1, B2, B11, C1, C7, C13, D1, D4
3	Final Term Examination	A1, A5, B1, B2, B15

7.2 Evaluation Schedule:

No.	Evaluation Method	Weeks
1	Mid Term Examination	8
2	Semester work	Every week
3	Final Term Examination	15

7.3 Weighting of Evaluations:

No.	Evaluation Method	Weights
1	Mid Term Examination	15%
2	Semester work	35%
3	Final Term Examination	50%
Total		100%

8. List of References

No.	Reference List
1	Stoer, Josef, and Roland Bulirsch. *Introduction to numerical analysis*. Vol. 12. Springer Science & Business Media, 2013.
2	.Sauer, Tim. Numerical analysis. Boston: Pearson, 2012
3	Neumaier, Arnold. *Introduction to numerical analysis*. Cambridge University Press, 2001.
4	Burden, Richard L., and J D. Faires. Numerical analysis. Boston, MA: Brooks/Cole, Cengage Learning, 2015

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System
5	Wireless Internet

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aims	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
1	Approximation and errors.	1	A1, A5		C1, C7	
2	Interpolation with divided difference	1	A1, A5	B2		D1, D4
3	Lagrange interpolation	1,5	A1, A5	B11	C1, C13	D1, D4
4	Curve fitting	5	A5		C7,C13	D1, D4
5	Numerical solutions of	5	A5	B2	C1, C7	D1, D4

	equations					
6	Numerical solutions of ordinary differential equations	1,5	A5		C7,C13	D4
7	Approximation of functions	1	A5	B11,B15	C7	D9

Course Coordinator: Prof.Dr.
Head of Department: Assoc. Prof. Hossam Eldeen Salah
Date of Approval: