

# INTRODUCTION TO NUMERICAL COMPUTING – MATH 371 – TERM 193

(COORDINATOR: DR. FAISAL FAIRAG)

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 11:00AM-12:01PM via MS TEAMS

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## Textbook:

**Applied Numerical Methods with MATLAB** by Stephen C. Chapra, 4<sup>th</sup> Ed, McGraw-Hill (SmartBook) and (eBOOK)

## Reference:

**Numerical Analysis** by Richard L. Burden, J. Douglas Faires, 10<sup>th</sup> Edition, 2016

**Numerical Methods for Engineers** by Steven C. Chapra and Raymond P. Canale 8<sup>th</sup> edition (2020)

## Description:

- Floating-point arithmetic and error analysis.
- Solution of non-linear equations.
- Polynomial interpolation.
- Numerical integration and differentiation.

- Data fitting.
- Solution of linear algebraic systems.
- Initial and boundary value problems of ordinary differential equations.

## Student Learning Outcomes:

After completion of the course, the students should be able to:

- Use Taylor Series to approximate functions, evaluate the approximation errors and estimate their upper bounds.
- Understand and program algorithms to locate the approximate roots of equations.
- Understand and program algorithms to numerically solve linear systems of equations.
- Learn how to smooth collected engineering data using the least squares method.
- Use polynomials to interpolate collected precise (Note: Interpolation applies to precise data while the least-squares method applies to data exhibiting a significant degree of error or scatter.)
- Understand and program algorithms to evaluate the derivative or the integral of a given function, evaluate the approximation error involved and estimate its upper bound.
- Understand and program algorithms to solve engineering ordinary differential equations (ODEs) or partial differential equations (PDEs).
- Understand relationships among methods, algorithms, and computer errors.
- Apply numerical and computer programming tools to solve common engineering problems.

### Grading Policy:

- Reading Assignments (10%)  
30points (LearnSmart)
- Homework (25%) 75points
- Online Quizzes (40%) 120points
- Term Project (25%) 75points

### Resources:

- Blackboard (Course Material)
- Slack.com (t193math371.slack.com) for
  - Communications (no emails)
  - Taking attendance
  - Following grades

### Online Quizzes:

- 7 Online Quizzes.
- Every Sunday (6:00PM-7:00PM) Quizzes

### Online Quizzes (Date):

QUIZ	DATE
1	7June (6:00PM-7:00PM)
2	14June (6:00PM-7:00PM)
3	21June (6:00PM-7:00PM)
4	28June (6:00PM-7:00PM)
5	5July (6:00PM-7:00PM)
6	12July (6:00PM-7:00PM)
7	19July (6:00PM-7:00PM)

### Course Schedule:

Week	Sections Required	
0	2.1-2.5 and 3.1-3.5	Read and prepare for the course
1 (31/5 – 3/6/2020)	4.3 (21.2 tables), 22.1,22.2	
2 (7-11/6/2020)	22.4, 22.5, 18.2 (intro), 18.4,	
3 (14-18/6/2020)	9.2, 9.3, 9.4, 12.1,	
4 (21-25/6/2020)	14.3, 14.4, 15.1, 24.1, 24.3,	
5 (28/5-2/7/2020)	4.1, 4.2, 4.4 (1.3 Burden), 6.1, 6.2,	
6 (4-9/7/2020)	6.3, 17.1, 17.2, 17.3,	<b>Saturday is a normal Monday class.</b>
7 (12-16/7/2020)	19.1,19.2.19.3, 19.4, 19.5, 19.7, 10.1	
8 (19/7/2020)	10.2	

Evaluation:

Final grade is according to the scale

GRADE	RANGE
A+	[90%, 100%]
A	[80%, 90%)
B+	[75%, 80%)
B	[70%, 75%)
C+	[65%, 70%)
C	[60%, 65%)
D+	[55%, 60%)
D	[50%, 55%)
F	[0%, 50%)

Plagiarism and Cheating: (Please read carefully)

This course is composed of both individual as well as group assignments and activities. It is important that your individual assignment be completed with your own efforts instead of copying it from your fellow student. KFUPM instructors follow "zero tolerance" approach regarding cheating and plagiarism. During examinations, in person or online (quizzes, major exams, lab reports) cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of F in the course along with reporting the incident to the higher university administration.

MATLAB:

MATLAB will be used as the main computer algebra system for the course.

- Go to <https://www.mathworks.com/>
- Use your KFUPM email to create an account and download the software.