

## T6. Course Specification (CS)

Institution: <b>Najran University</b>	Date : 13-8-1439 H
College/Department: <b>College of Arts and Sciences/ Mathematical Department</b>	

### A. Course Identification and General Information:

1. Course title: <b>Numerical Analysis 1</b> and cod : <b>452 Math-3</b>			
2. Credit hours :three hours			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)			
Program of Mathematic			
4. Name of faculty member responsible for the course : Assoc. Prof. Mustafa Khirallah			
5. Level/year at which this course is offered <b>Level 6 / third year</b>			
6. Pre-requisites for this course (if any) <b>Calculus 2(121Math-3)</b>			
7. Co-requisites for this course (if any) None			
8. Location if not on main campus College of Arts and Sciences-Najran (male and female ) College of Arts and Sciences- Sharurah (male and female)			
9. Mode of Instruction (mark all that apply)			
a. Traditional classroom		What percentage ?	
b. Blended (traditional and online)	/	What percentage ?	100
c. e-learning		What percentage ?	
d. Correspondence		What percentage ?	
f. Other		What percentage ?	
Comments :			
None			

## B. Objectives

1. What is the main purpose for this course ?
<p>1- The student will learn the types of errors in numerical calculations.</p> <p>2- The student knows the methods of polynomial interpolation</p> <p>3- The student will also understand the numerical integration and the numerical differentiation.</p> <p>4- The student learn the difference between the direct and iterative methods to solve nonlinear equations and the systems of linear equations.</p>
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)
Review the syllabus, references and teaching strategies of this course periodically taking advantage of experiences of the local, regional and global mathematical departments.

C. Course Description (Note: General description in the form used in the Bulletin or handbook should be)attached.

Course Description:
This course will cover the foundations of numerical analysis . The main focus of this course is find numerical solution of ( nonlinear equation, system of linear equation, interpolations, numerical differentiation and integration, differential equation

1. Topics to be Covered :		
List of Topics	No. of Weeks	Contact Hours
Numerical errors: absolute error – relative error – truncation error	1	3
Solution of nonlinear equations: Bisection Method, Newton Raphson method, Secant method and fixed point method	3	9
Functions approximation : Difference operators – Newton divided differences - Lagrange's formula - Newton forward method for evenly spaced data - least square method	3	9
Numerical integration and differentiation: Trapezoidal rule - Simpson's rule - Gaussian quadrature	3	9
Numerical Solution of linear system Matrices : Jacobi method – Gaussian –seidel method	2	6

<b>Numerical solutions to ordinary differential equations: The Taylor-series method - Euler method – RungeKutta method.</b>	<b>3</b>	<b>9</b>
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1.Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or studio	Practical	Other:	Total
Contact Hours	45					45
Credit	3					3

3-Additional private study/learning hours expected for students per week	4
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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy.
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On the table below are the five NQF Learning Domains, numbered in the left column.

**First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table)

**Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes.

**Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain).

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	<b>Knowledge: After studying this course, the student will able to</b>		
1.1	<b>Define the elementary concepts of Numerical Analysis(errors, numerical solution, interpolation, iteration method,...)</b>	<b>lecture</b>	<b>Exams, homework</b>
1.2	<b>Specify the methods used in numerical solutions to solve( nonlinear equation, differential equation, system of linear equation, ...)</b>	<b>lecture</b>	<b>Exams, homework</b>
2.0	<b>Cognitive Skills After studying this course, the student will able to</b>		
2.1	<b>use appropriate theories, principles and concepts relevant to the numerical methods that are</b>	<b>Discussion and exercises during</b>	<b>Exams, homework</b>

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
	<b>applicable to real problems.</b>		
2.2	<b>Solve various problems in numerical analysis</b>	<b>Discussion and exercises during</b>	<b>Exams, homework</b>
2.3	<b>Compare between numerical methods to find the numerical solutions</b>	<b>Examples and problems to be solved during the lecture</b>	<b>Exams, homework</b>
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b> <b>After studying this course, the student will able to</b>		
3.1	<b>Work as part of a team and independently</b>	<b>Group problems solving during tutorial</b>	<b>Evaluate the student's works</b>
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b> <b>After studying this course, the student will able to</b>		
4.1	<b>use language program for solving numerical problem.</b>	<b>Laboratory exercises</b>	<b>Using computers</b>
4.2	<b>use the Internet.</b>	<b>Use Websites</b>	<b>Using computers</b>
	<b>use mathematical programs (Mathematica - Matlab - Mabel - Mathkad) to solve differential equations analytical and approximately as well as for drawing curves solutions.</b>	<b>Training courses for programs mathematics.</b>	<b>student work program to solve differential equation</b>
<b>5.0</b>	<b>Psychomotor</b>		
5.1	<b>Not applicable</b>	<b>Not applicable</b>	<b>Not applicable</b>
5.2			

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, Quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	<b>First exam</b>	<b>6</b>	<b>25%</b>
2	<b>Second exam</b>	<b>12</b>	<b>25%</b>
3	<b>Final exam</b>	<b>16</b>	<b>50%</b>

#### D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- The office hours for this course are 3 hours/ week.

### E. Learning Resources

1. List Required Textbooks :

- **R. Burden, and J. D. Faires, Numerical Analysis, PWS-Kent Publishers, (1993).**

2. List Essential References Materials (Journals, Reports, etc.)

**V. A. Patel, Numerical Analysis, Harcourt Brace, College Publishers, (1994).**

**[2]- W. Cheney and D. Kincaid, Numerical Mathematics and Computing, Brooks/Cole Publishing Company, (2003).**

**[3]- John H. Mathews & Kurtis D. Fink, Numerical Methods Using Matlab, Fourth Edition (& Higher). UpperSaddleRiver: Pearson Prentice Hall, 2004.**

3. List Electronic Materials Web Sites, Facebook, Twitter, etc.

- <http://www.uaemath.com/ar/aforum>.
- <http://www.mathramz.com/xyz/index.php>
- <http://www.yzeed.com>.

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

- **MATLAB**
- **MAPLE**
- **Computer languages (Fortran , C, C++,... etc.)**

### F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

**Classroom with suitable seats**

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

- **Classroom .**
- **Computer lab.**
- **Rooms equipped with modern teaching techniques and different display devices.**

2. Computing resources (AV, data show, Smart Board, software, etc.)

Classroom with Smart Board and Data Show

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)  
None

#### G. Course Evaluation and Improvement Processes:

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- **Course evaluation by the students at the end of the semester**

2. Other Strategies for Evaluation of Teaching by the Instructor or by the department.

- **Qualitative analysis of students' results**
- **Peer Evaluation**

2. Processes for Improvement of Teaching:

**Follow-up new teaching strategies and apply them for this course**

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- **Measurement of the course learning outcomes**
- **Course report at the end of semester**
- **Applying the new system of Faculty staff members evaluation**

5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :

Periodic meetings with outstanding students to learn the positive and negative aspects in the decision.

- **Reviewing the course contents periodically**
- **Updating the text book and references**

Name of instructor ر **Assoc. Prof. Mustafa Khirallah**

Signature : \_\_\_\_\_ Date Report Completed: 13-8-1439

Name of field experience teaching staff: \_\_\_\_\_

Program coordinator :Hamoud Al-Haddad

Signature: \_\_\_\_\_ Date received: \_\_\_\_\_