<table>
<tr><td>1.</td><td colspan="5">Name of Course</td><td>Numerical Analysis</td></tr>
<tr><td>2.</td><td colspan="5">Course Code</td><td>JNUA2203</td></tr>
<tr><td></td><td colspan="6">JNUA the first alphabet identify the faculty within which the subject is offered., JNUA = the remaining three alphabet identify the course that offers the subject, 2203 = the first digit identify level of study; in this case undergraduate level, 2203 = the second and third digits identify subject identity and 2203 = the fourth digit identify credit value or credit hours</td></tr>
<tr><td>3.</td><td colspan="5">Name(s) of academic staff</td><td>To be Assigned</td></tr>
<tr><td>4.</td><td colspan="5">Rationale for the inclusion of the course/module in the programme</td><td>To equip student with techniques for solving civil engineering problem using a programme language.</td></tr>
<tr><td>5.</td><td colspan="5">Semester and Year offered</td><td>2/3</td></tr>
<tr><td rowspan="3">6.</td><td colspan="2" rowspan="3">Total Student Learning Time (SLT)
L = Lecture T = Tutorial
P = Practical S=Studio Works
O= Others</td><td colspan="4">Face to Face</td><td rowspan="3">Total Guided and Independent Learning
Independent Study(IS) = 70
Total = 126</td></tr>
<tr><td>L</td><td>T</td><td>P/S</td><td>O</td></tr>
<tr><td>42</td><td>14</td><td>-</td><td>-</td></tr>
<tr><td>7.</td><td colspan="5">Credit Value</td><td>3.0</td></tr>
<tr><td></td><td colspan="6">Lectures: 3 hours per week x 14 weeks
Tutorial: 1 hour per week x 14 weeks</td></tr>
<tr><td>8.</td><td colspan="5">Prerequisite (if any)</td><td>None</td></tr>
<tr><td>9.</td><td colspan="6">Course Objectives
1. To expose student to techniques used for solving civil engineering problem;

Course Learning Outcomes (CLO)
At the end of the semester students should be able to:

CLO1: Develop necessary numerical methods written in a computer programming language for solving engineering problems.
CLO2: Establish good problem-solving technique and to understand the applications and limitations of the numerical methods.
CLO3: Apply software packages developed by and for engineers for carrying out simple as well as complex analysis and design of engineering systems.</td></tr>
<tr><td>10.</td><td colspan="6">Transferable Skills:
This course is expected the development of the following transferable skills:
▪ An ability to learn both independently and co—operatively;
▪ An ability to manage time and task
▪ An ability to take responsibility and carry out task;
▪ An Ability to analysis;
▪ An ability to solve problem;
▪ An ability to use software to solve civil engineering problem.</td></tr>
<tr><td>11.</td><td colspan="6">Teaching-learning and assessment strategy
A variety of leaching strategies are used throughout the course, including the following:
• Classroom Lessons; Lecturer and power point presentations
• Tutorial Session;
• Student-Lecturer Discussion
• Collaborative and Co-operative learn;
• Independent study.</td></tr>
</table>

	Assessment strategy: **Couse work** **40%** Assignment 10% Tutorial/ Quizzes 10% Test 20% **Examination** **60%** **Total** **100%**
12.	**Synopsis:** This course introduces the techniques for solving Civil Engineering problems using a programming language and Numerical Methods.
13.	**Mode of Delivery:** Lectures; Tutorials; Studio Work.

14.	**Performance Criteria :**						
	CLO-PLO	Assessment Tool	1	2	3	4	5
	Marks		0-39	40-49	50-59	60-74	75-100
	Grade		**(F)**	**(D,D+)**	**(C-,C,C+)**	**(B-,B,B+)**	**(A-,A,A+)**
	CLO1: Develop necessary numerical methods written in a computer programming language for solving engineering problems.	**Assignment** **Tutorial** **Quizzes** **Test** **Examination**	**Fail To:** -Learn both independently and cooperatively -manage time and task -Use software to solve civil engineering problem.	**Poor To**: -Learn both independently and cooperatively -manage time and task -Use software to solve civil engineering problem.	**Satisfactory To**: -Learn both independently and cooperatively -manage time and task -Use software to solve civil engineering problem.	**Good To**: -Learn both independently and cooperatively -manage time and task -Use software to solve civil engineering problem.	**Excellent To:** -Learn both independently and cooperatively -manage time and task -Use software to solve civil engineering problem.
	CLO2: Establish good problem-solving technique and to understand the applications and limitations of the numerical methods.	**Assignment** **Tutorial** **Quizzes** **Test** **Examination**	**Fail To:** -Learn both independently and cooperatively -manage time and task -analysis and solve problem -Use software to solve civil engineering problem.	**Poor To**: -Learn both independently and cooperatively -manage time and task -analysis and solve problem -Use software to solve civil engineering problem.	**Satisfactory To**: -Learn both independently and cooperatively -manage time and task -analysis and solve problem -Use software to solve civil engineering problem.	**Good To:** -Learn both independently and cooperatively -manage time and task -analysis and solve problem -Use software to solve civil engineering problem.	**Excellent To:** -Learn both independently and cooperatively -manage time and task -analysis and solve problem -Use software to solve civil engineering problem.
	CLO3: Apply software packages developed by and for engineers for carrying out	**Assignment** **Tutorial** **Quizzes** **Test** **Examination**	**Fail To:** -Learn both independently and cooperatively -manage time and	**Poor To**: -Learn both independently and cooperatively -manage time and	**Satisfactory To**: -Learn both independently and cooperatively -manage time and	**Good To**: -Learn both independently and cooperatively -manage time and	**Excellent To:** -Learn both independently and cooperatively -manage time and

	simple as well as complex analysis and design of engineering systems.		task -analysis and solve problem -Use software to solve civil engineering problem.	task -analysis and solve problem -Use software to solve civil engineering problem.	task -analysis and solve problem -Use software to solve civil engineering problem.	task -analysis and solve problem -Use software to solve civil engineering problem.	task -analysis and solve problem -Use software to solve civil engineering problem.

15. **Mapping of the Programme Objectives to the Programme Learning Outcomes**

Programme Learning Outcomes (PLO) / Programme Objectives (PO)	**PLO1:** Ability to acquire and apply knowledge of science and engineering fundamentals;	**PLO2:** Acquired in-depth technical competence in civil engineering discipline;	**PLO3:** Ability to undertake problem identification, formulation and solution;	**PLO4:** Ability to utilize systems approach to design and evaluate operational performance;	**PLO5:** Understanding of the principles of design for sustainable development;	**PLO6:** Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	**PLO7:** Ability to communicate effectively, not only with engineers but also with the community at large;	**PLO8:** ability to function effectively as an individual;	**PLO9:** Ability to function effectively in group with the capacity to be a leader or manager;	**PLO10:** Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	**PLO11**: ability to become Entrepreneur;
PEO1: To produce graduates with proficient knowledge and competency in various areas in Civil/ Electrical/ Mechanical Engineering	✓	✓	✓								
PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.				✓	✓	✓			✓	✓	
PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills							✓	✓	✓		✓

16. **Mapping of the course Learning Outcome to the Programme Outcome**

Programme Learning Outcomes (PLO) / Course Learning Outcome (CLO)	**PLO1:** Ability to acquire and apply knowledge of science and engineering fundamentals;	**PLO2:** Acquired in-depth technical competence in civil engineering discipline;	**PLO3:** Ability to undertake problem identification, formulation and solution;	**PLO4:** Ability to utilise systems approach to design and evaluate operational performance;	**PLO5:** Understanding of the principles of design for sustainable development;	**PLO6:** Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	**PLO7:** Ability to communicate effectively, not only with engineers but also with the community at large;	**PLO8:** ability to function effectively as an individual;	**PLO9:** Ability to function effectively in group with the capacity to be a leader or manager;	**PLO10:** Recognising the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	**PLO11**: ability to become Entrepreneur;
CLO1: Develop necessary numerical methods written in a computer programming language for solving engineering problems.	✓										
CLO2: Establish good problem-solving technique and to understand the applications and limitations of the numerical methods.	✓										
CLO3: Apply software packages developed by and for engineers for carrying out simple as well as complex analysis and design of engineering systems.	✓	✓	✓								

17.	Content outline of the course/module and the SLT per topic						
		Details	**SLT (Hour)**				
			L	**T**	**P**	**IS**	**Total**
	Topic 1	**Spread sheet programmer** ▪ Basic engineering tools ▪ Visual basic programming ▪ Application to engineering problems	3	1	-	5	**9**
	Topic 2	**Roots of equations** ▪ Bracketing Method: Bisection Method & false Position Method. ▪ Open Method: Newton Raphson Method & Secant Method	3	1	-	5	**9**
	Topic 3	**Curving fitting Examining Relationship and Data Analysis.** • Regression/Square Method (Linear Poly nomial and Nonlinear Models, Multiple Line- regression).	6	2	-	10	**18**
	Topic 4	**Matrices and Systems of simultaneous Equations** • Gauss, Elimination, Gauss Jardon Elimination, Gauss Seidal Method, Homogenerous Algebraic Equations (Eigencalue Problems)	6	2	-	10	**18**
	Topic 5	**Numerical Integration and Differentiation** ▪ Integration using the Trapezoidal Rule, Integration using Simpson's Rule and Romberg Integration; Numerical differentiation. ▪ Engineering Applications: ▪ Analysis of graphs ▪ Elasticity, vibrations ▪ Stress-strain analysis, interpretation and correlation of experimental data with mathematical models. ▪ Areas under curves cut and fill.	9	3	-	15	**27**
	Topic 6	**Application of Computer Techniques to the solution of Civil Engineering Problems.** • The use of standard computer software packages in structural analysis, soil mechanics, surveying, highway and etc.	6	2	-	10	**18**
	Topic 7	**Computer Aided Design** • Interactive approach to engineering design; Graphing by computer; Digital X-Y plotter; Digitizer and its application in drafting and mapping.	9	3	-	15	**27**
		Total (Hour)	**42**	**14**	**-**	**70**	**126**
18.	**Main references supporting the course** J. N. Sharma, J. N. Sharma (M.A.). 2007. Numerical methods for engineers and scientists. Alpha Science International, 2007						
	Additional references supporting the course						
19.	**Other additional information** All materials will be available to the students in the library.						