AI Azhar University - Gaza

## Planning and Quality Assurance Affairs

## Course Specifications

## General Information

| Course name | Numerical Analysis |
| :--- | :--- |
| Course number | MATH3310 |
| Faculty |  |
| Department |  |
| Course type | 3 |
| Course level | 3 |
| Credit hours (theoretical) | 0 |
| Credit hours (practical) |  |
| Course Prerequisites |  |

## Course Objectives

1 - Numerical Solution of Mathematical Problems
2 - Introducing computer algorithms for mathematical problems
3 - Convergence and error analysis of the numerical methods

## Intended Learning Outcomes

| Knowledge and Understanding | * Difference between numerical and analytical solutions |
| :--- | :--- | :--- |
|  | * Definition of the mathematical problem |
|  | * When we use numerical methods |
|  | * Main concepts of numerical methods |
|  | * flowcharts and computer algorithms |
|  | * Results analysis |
|  | * Develope Cababilities in using mathematical softwares |
|  | * approxamating solutions of unsolved problems |
|  | * Modification of Numerical methods in some cases to get closer solution with |
| Intellectual Skills | less error |
| Professional Skills | * Writing MATLAB usersubroutine to solve mathematical problems |
| General Skill | * Develop cababilities in Programming |

## Course Contents

1 - Numerical Methods for Mathematical Problems
2 - Solving Non-Linear Equations
3 - Solving Sets of Equations and Matrix Computations,
4 - Interpolation and Curve Fitting,
5 - Numerical Differentiation and Numerical Integration
6 - Implementation of the computer algorithms into the mathematical package matlab.

## Teaching and Learning Methods

1 - Lectures
2 - Discussions
3 - Homeworks
4- assignments
5 - Computer implementations
6 - Projects

## Students Assessment

| Assessment Method | TIME | MARKS |
| :--- | :--- | :---: |
| First Hour Exam | 60 min. | 20 |
| Second Hour Exam | 60 min. | 20 |
| Quizzez | 15 min. | 5 |
| Project | two weeks | 5 |
| Final Exam | 120 min | 50 |

## Books and References

| Course note | Class lectures Notes |
| :--- | :--- |
| Essential books | Applied Numerical Analysis, Gerald, Sixth Edition, "Text" |
| Other References <br> (Periodical, web sites, <br> $\ldots$. etc.) | Numerical Analysis, Richard Burden |
|  | Numerical Analysis, Lee, Johnson |

Knowledge and Skills Matrix

| Main Course Contents | Study Week | Knowledge and <br> Understanding | Intellectual Skills | Professional Skills | General Skill <br> Introduction, Numerical <br> Computing and Computers |
| :--- | :--- | :--- | :--- | :--- | :--- |


| Numerical Integration |  <br> Fourteen | Numerical <br> methods and <br> Integration <br> problems | Studying <br> modification of <br> methods to <br> minimize error | Introducing <br> computer <br> algorithms and <br> built-in computer <br> packages <br> functions | mathematic <br> al <br> integration <br> problems <br> and <br> numerical <br> methods <br> with <br> convergenc <br> e |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Projects | Fifteen | studying <br> mathematical <br> problems and <br> numerical <br> solutions | modification of <br> methods and <br> analysis | writing scientific <br> reports and using <br> computer <br> packages | Numerical <br> problem <br> solving, <br> introduction <br> to scientific <br> research, <br> writing <br> scientific <br> reports. |
| Exams | sixteen | Numerical <br> solution of <br> mathematical <br> problems | Numerical <br> solution of <br> mathematical <br> problems | Numerical solution <br> of mathematical <br> problems | Numerical <br> solution of <br> mathematic <br> al problems |

