

Course Specifications

Programme(s) on which the course is given	B.Sc.
mathematics, pure Mathematics,	Computer
science and pure mathematics	and statistics
Major or Minor element of programmes	Major
Department offering the programme	Mathematics
Department offering the course	Mathematics
Academic year / Level	First / 1
Date of specification approval	September
2012	
A- Basic Information	
Title: Mathematical Analysis (1)	Code:
M111	
Credit Hours: 3 hrs. Lecture:2 hrs.	
Tutorial: 2 hrs. Practical: 0	Total: 3 hrs.
Teaching Staff Prof. dr. Mohamed A. Ramadan, Dr. Naglaa M. El-Shazly	
B- Professional Information	
1 – Overall Aims of Course	
- Introduce basic mathematical concepts and techniques for students who do not have sufficient mathematical training in calculus. - Develop skills in the ability to think quantitatively and analysis problems critically. - Investigates the elementary of mathematics: polynomials, logarithms, trigonometric functions, their inverse, arithmetic combinations and compositions of these functions	

and functions implicitly defined through relationships between them.

- Explain properties of these functions and the rules for finding their derivatives.

- State theorems about continuous and differentiable functions about limits, and be able to use them in simple, direct applications. (Mean Value Theorem, Rolle theorem).

2 – Intended Learning Outcomes of Course (ILOs)

a- Knowledge and Understanding:

Having successfully completed the course, student will be able to:

- a1- Know the limit of a function at a point or at infinity analytically.

- a2- Identify the continuity of functions at points.

- a3- Understand the derivatives of functions: constant, power, logarithmic, exponential, trigonometric, inverse trigonometric, hyperbolic and inverse hyperbolic.

- a4- State theorems about continuous and differentiable functions and be able to use them in simple, direct applications. (Mean Value Theorem, Rolle theorem).

b- Intellectual Skills

- b1- Evaluate the routine operations involving the topics in the syllabus.

- b2- Analyze a mathematical problem and show logical thinking.

- b3- Solve some simple problems in scientific and engineering applications involving function limits, derivatives and continuity of functions.

c- Professional and Practical Skills

- c1- Implement basic operations to evaluate limits and derivative of functions.

c2- Apply mathematical methods to a range of problems in scientific and engineering applications involving function limits, derivative and continuity of function.

d- General and Transferable Skills

d1- Have a set of tools and methods that can be applied and transferred.

d2- Weight the outcomes of the course through its use in practical application in different scientific fields.

3- Contents

Topic	No. of hours	Lecture	Tutorial/Practical
1-sequences of real number -Algebraic operations on sets: -Family of sets, Cartesian product of sets, well ordered set, supremum and infimum, Denumerable sets -Algebraic properties of sets of rationals $\mathbb{Q}$ and the set of real $\mathbb{R}$ -Sets in $\mathbb{R}$, Neighborhood, Interior, exterior, boundary, bounded, adherent and limit point - Open and closed sets, dense set -Types of real functions, operations on functions	4	1	2

, bounded functions			
2-function, limits and continuity - Functions , inverse functions, limits of a function. - Continuity of functions, cases of discontinuity by (δ, ε) definition - Increments of a function in one variable.	14	4	6
3-Derivatives of functions. - Derivative of a function $y = x^n$ - Derivatives of trigonometric functions - Derivatives of e^x , $\log x$, $\ln x$ and a^x - Derivatives of inverse trigonometric functions - Derivatives of hyperbolic functions. - Right hand derivatives ,left hand derivatives	20	5	10
4-Some theorems of differentiable functions - Rolle' s theorem - Cauchys theorem - Lagrange' s theorem - Taylor theorem - L'Hospital rule	16	4	8

4– Teaching and Learning Methods

4.1- Lectures.

4.2- working on hand in assignments.

4.3- Attaining practical classes.

5- Student Assessment Methods

5.1 Mid term written exam to assess understanding competencies.

5.2 Oral exam to assess attendance and interesting.

5.3 Semester hand in assignments to assess understanding professionalism.

5.4 Final term written exam to assess comprehension.

Assessment Schedule

Assessment 1.....	Week 7
Assessment 2	week 5 and 8
Assessment 3.....	Week 13
Assessment 4.....	Week 14

Weighting of assessments

Mid-Term Examination	20%
Semester Work (homework assignments + oral tests)	20%
Other types of assessment	00%
Final-term written Examination	60%
Total	100%

Any formative only assessments

6- List of references

6.1 Course notes

Collected and prepared notes that cover the main topics in the course content

6.2 Essential books (text books)

W. Rudin, Principles of Mathematical Analysis, 2nd

6.3 Recommended books

**-T.M.Apostol,Mathematical
Analysis,Reading,Mass:Addison-Wesley,1957**

**-G.Baranenkov,B.Demidovich,’’Problems in
Mathematical Analysis Translated from the Russian by**

6.4 Periodicals, Web sites, ... etc

Non.

7- Facilities required for teaching and learning

None

Course coordinator: Prof. Mohamed A. Ramadan

Head of Department: Prof. Mohamed A. Ramadan

Date: / /