Course specifications

Programme(s) on which the course is given   M.Sc. Mathematics, Pure
mathematics
  Major or minor element of programs   Major
  Department offering the program   Mathematics
  Department offering the course   Mathematics
  Date of specification approval   September 2009
A- Basic Information

    Title: Real analysis   Code: M616
    Credit Hours: 2   Lecture: 2
    Tutorial: 0   Practical: 0   Total: 2
    Teaching Staff   Prof. Dr. Abd El Shakoor Mesaed
B- Professional Information

1 – Overall aims of course
        To develop understanding of fundamental concepts and techniques of
real analysis, presents the properties of the real number system R. Provide
the student with some practice in writing proofs of elementary results.
Throughout this course the Supremum property and its ramifications are
discussed. We give a thorough treatment of sequences in R and the
associated limit concepts. Sequences of functions and uniform convergence
are discussed, and the basic transcendental functions are put on a firm
foundation by using uniform convergence. It introduces the student to the
concept and basic properties of a metric space. Several examples of metric
spaces are considered. Defining and discussing compactness and continuous
functions on metric spaces. This course also gives a brief introduction to the
inner product spaces and Hilbert spaces

On successful completion of this course unit students will

  - be familiar enough with real analysis that can effectively use the tools
    and ideas of these fundamental subjects in a variety of applications,
  - understand the importance of the sequences, Variation function,
    Riemann Integral and Riemann Stieltjes Integrals

  - understand the basic inequalities such as Holder inequality,
    Minkowski's inequality,   Cauchy- Buntakowski inequality,

- understand normed spaces, finite dimensional normed spaces and the concept of equivalent norms.
- understand the concept of the inner product spaces and Hilbert spaces.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1-Understand the metric spaces, the normed spaces, the inner product spaces.

a2- Know the sequences, Variation function, and the Riemann Integral

b- Intellectual skills

b1- Identify the difference between the metric spaces , normed spaces and inner product spaces.

b2- Think perfectly to check for complete and incomplete spaces.

c- Professional and practical skills

c1-apply the understanding of the sequences, Riemann Stieltjes Integral, the metric spaces in further related mathematical courses .

c2- use the knowledge and understanding of the metric spaces , the normed space and the inner product spaces in practice for other related courses.

d- General and transferable skills

d1- creative thinking to use the concepts and principles learned from this course.

d2- able to develop his skills in this area of study.

3- Contents

Topic	No. of	Lecture
Basic results in R .Sequence of numbers. Sequence of functions. Compactness in R. Variation function. Riemann Integral . Riemann Stieltjes Integral	6	3

Basic inequalities such as Holder inequality, Minkowski's inequality, Cauchy- Buntakowski inequality. Definition of metric space. Some examples on metric spaces.	6	3
Definition of normed space. Some examples on normed spaces. Finite dimensional normed spaces. Equivalent norms. Isomorphic normed linear spaces.	6	3
Definition of inner product space. Some examples on inner product space. Continuity of inner product space. Complete inner product space (Hilbert space).	6	3

4– Teaching and learning methods

   4.1- Lectures
   4.2- Working on hand in assignments
   4.3- Attainting practical classes

5- Student assessment methods

   5.1 Mid term written exam…   to assess   understanding competencies
   5.2 Semester hand in assignments to assess   attendance and interesting
   5.3 Final term written Exam   to assess
   Learning outcomes and understanding .

Assessment schedule

   Assessment 1… Mid term……………….   Week 4 and 7
   …………….
   Assessment 2 …semester activities………………   Week 5 and 8
   …………….
   Assessment 3…Final term oral exam…………   Week 13…………….
   Assessment 4…final term written exam………….   Week 14…………….

Weighting of assessments

   Mid-Term Examination   20%
   Final-term Examination   60%
   Semester Work   20%
   Other types of assessment   00%
         Total   100%

Any formative only assessments

6- List of references

  6.1- Course notes

    Collected and prepared notes that cover the main topics

  6.2- Essential books (text books)

    Linear Algebra , Vol.2, Eagle Mathematics series , Michael Oʼ Nan, 1971

  6.3- Recommended books

ISBN Number	Author	Date	Title	Publisher
0-12-050257-7	C. D. Aliprantis O. Burkinshaw	1998	Principles of real analysis	Academic press
0-13-045786-8	William F. Trench	2003	Introduction to real analysis	William F. Trench
0-387-98480-1	Sterling K. Berberian	1999	Fundamentals of Real Analysis	Springer-Verlag New York, Inc.

  6.4- Periodicals, Web sites, … etc

    None

7- Facilities required for teaching and learning

    Non

Course coordinator: Prof. Dr. Abd El Shakoor Mesaed, Dr. Manar Abdel-Allh

Head of Department: Prof. Dr. Mohamed A. Ramadan

Date: / /