The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Mathematical Analysis I
1. **Course title**: Mathematical Analysis I

2. **Course number**: (0301311)

3. **Credit hours (theory, practical)**: 3

   **Contact hours (theory, practical)**: 3

4. **Prerequisites/corequisites**: (0331212)

5. **Program title**: B.Sc.

6. **Program code**: 

7. **Awarding institution**: The University of Jordan

8. **Faculty**: Science

9. **Department**: Mathematics

10. **Level of course**: College requirement

11. **Year of study and semester (s)**: all Semesters

12. **Final Qualification**: B.Sc. in Mathematics

13. **Other department (s) involved in teaching the course**: None

14. **Language of Instruction**: English

15. **Date of production/revision**: 1.11.2016

**16. Course Coordinator:**

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Abdallah Tallafha

**17. Other instructors:**

Office numbers, office hours, phone numbers, and email addresses should be listed.

**18. Course Description:**

*As stated in the approved study plan.*

19. Course aims and outcomes:

**A- Aims:**
1. Discuss the concepts of functions of bounded variation.
2. Understand and R-S-integral.
3. To comprehend the concept of vector fares.

**B- Intended Learning Outcomes (ILOs):** Upon successful completion of this course students will be able to...

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding Skills:** Student is expected to
A1. Understand the concept of variation and total variation of functions on \([a,b]\).
A2. Understand the Basic structure of functions of bounded variations
A3. Understand the Riemann Steiltjes integral: existence and evaluation of such integrals especially when one of the functions is a step function.
A4. Understand the structure of vector fields concerning the differentiability, and how to find the derivative of a given vector field as a matrix.
A5. Understand the Hessian matrix associated with a vector field

**B. Intellectual Analytical and Cognitive Skills:** Student is expected to
B1. To be able to handle ideas of vector fields, and functions of Balded variations

**C. Subject- Specific Skills:** Student is expected to
C1. To relate different topics in mathematics together.

**D. Creativity /Transferable Key Skills/Evaluation:** Student is expected to
D1. Applications to maximum and minimum of functions of several variables.
20. Topic Outline and Schedule:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Week</th>
<th>Instructor</th>
<th>Achieved ILOs</th>
<th>Evaluation Methods</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>The definite matrices</td>
<td>1</td>
<td></td>
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<tr>
<td>The Hessian matrix</td>
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<tr>
<td>Maxima and minima of functions of several variables</td>
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<tr>
<td>Total variation of a function on [a, b].</td>
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<tr>
<td>Functions of bounded variation on [a, b].</td>
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<tr>
<td>Continuous functions of bounded variation.</td>
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<tr>
<td>The Riemann-stieltjes integral, the definition.</td>
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<tr>
<td>Basic properties of R-S integral.</td>
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<tr>
<td>Integration by parts.</td>
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<td>Continuous functions and the R-S integral.</td>
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<td>Monotone functions and the R-S integral.</td>
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<td>Mean value theorems for R-S integral.</td>
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<td>The fundamental theorem for R-S integral.</td>
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<tr>
<td>Linear transformations on R^n and their matrix representation (fast revision).</td>
<td>9</td>
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<tr>
<td>Functions from R^n to R^m (Vector fields) basic setup and examples.</td>
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<tr>
<td>The derivative of a vector field, the definition.</td>
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<td>Differentiability of vector forces.</td>
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<td>Matrix representation of the derivative.</td>
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<td>The gradient and its relation to derivative of vector forces.</td>
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<td>The chain rule.</td>
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<td>The mean value theorem.</td>
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<td>Higher order derivatives (the second).</td>
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<tr>
<td>The inverse function theorem.</td>
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<td>The implicit function mapping theorem (the statement only).</td>
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</table>

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.
- Students are also encouraged to use graphing calculators extensively and to use computer software supplements.
22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

<table>
<thead>
<tr>
<th>ILO/s</th>
<th>Learning Methods</th>
<th>Evaluation Methods</th>
<th>Related ILO/s to the program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lectures</td>
<td>Exam</td>
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</tbody>
</table>

23. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student’s ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on homework.

24. Required equipment:

Data Shows

25. References:

A- Required book(s), assigned reading and audio-visuals:

Mathematical Analysis, Apostol, T.M.

B- Recommended books, materials, and media:

Mathematical Analysis, Apostol, T.M.
26. Additional information:

Name of Course Coordinator: Dr. Abdallah Tallafha Signature: ------------------------- Date: 1/11/2016

Head of curriculum committee/Department: Dr. Hisham M. Hilow Signature: --------------------------

Head of Department: Dr. Baha Alzalg Signature: -------------------------------

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature: ----------------------------

Dean: Dr. Sami Mahmood Signature: -----------------------------------

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Head of Department
Assistant Dean for Quality Assurance
Course File