



مركز الاعتماد
وإضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus:

Mathematical Packages

| | | |
|-----------|---|---------------------------------------|
| 1 | Course title | Mathematical Packages |
| 2 | Course number | (0341473) |
| 3 | Credit hours (theory, practical) | 3 |
| | Contact hours (theory, practical) | 3 |
| 4 | Prerequisites/corequisites | (0331301) |
| 5 | Programtitle | B.Sc. |
| 6 | Programcode | |
| 7 | Awarding institution | The University of Jordan |
| 8 | Faculty | Science |
| 9 | Department | Mathematics |
| 10 | Level of course | Obligatory Specialization requirement |
| 11 | Year of studyandsemester (s) | 4 th year, 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 | 9/2/2016 |

16. Course Coordinator:

Officenumbers,officehours, phonenumbers,andemailaddressesshouldbelisted.

Dr.AdnanAwad

17.Other instructors:

Officenumbers,officehours, phonenumbers,andemailaddressesshouldbelisted.

18. Course Description:

As stated in the approved study plan.

Mathematica package is used in a computer Lab to illustrate selected mathematical concepts, explore some mathematical facts, build algorithms for problem solving cases, do numerical and analytical computations, do simulation studies and plot graphs. The selected topics can cover a wide range of mathematical topics such as geometry, calculus, linear algebra, linear programming, differential equations, probability, statistics, number theory, Fourier and Laplace transforms. The course starts with training on using the package and ends with writing Mathematica programs to solve some specific Mathematical problems.

19. Course aims and outcomes:**A- Aims:**

- 1- Know the programs available in the mathematics package.
- 2- Know the language of mathematica.
- 3- Write programs to solve some practical problems.
- 4- Design teaching aided material through simulation and animation.

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. Master using the numerical, graphical, and analytical capabilities of Mathematica and to discover its limitations.
- A2. Recall main mathematical concepts, facts, algorithms, and applications from several mathematical topics such as foundation of mathematics, linear algebra, number theory, calculus, differential equations, probability, and statistics in order to apply Mathematica in solving problems related to these topics.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1. Explore Mathematica7 Package including its syntax, commands and capabilities of solving mathematical problems.
- B2. Analyze a situation, design a plane to understand it or to solve a problem related to it, write a Mathematica block that can help in that situation, test the produced code, and implement it.

C. Subject- Specific Skills: Student is expected to

- C1. Interpret computer output, and make critical comments on obtained results.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

- D1. Have confidence in his work, when he compares what he obtained by hand computations with the computer solution.
- D2. Produce animated graphs that illustrate some mathematical concepts or facts. From the above stated topics
- D3. Be involved in the process of building algorithms and exploring facts, together with strengthening his ability in logical thinking.

20. Topic Outline and Schedule:

| Topic | Week | Instructor | Achieved ILOs | Evaluation Methods | Reference |
|--|------|------------|---------------|--------------------|-----------|
| Notebook | 1 | | | | |
| Syntax | 1 | | | | |
| Conditioning | 1 | | | | |
| 2D Graphics and Plots | 2 | | | | |
| 3D Graphics and Plots | 2 | | | | |
| Equations I | 2 | | | | |
| Equations II | 3 | | | | |
| Training | 3 | | | | |
| Loops | 3 | | | | |
| Needs | 4 | | | | |
| Programming | 4 | | | | |
| Blocks | 4 | | | | |
| Training | 5 | | | | |
| Basic Commands: Calculus and DE | 5 | | | | |
| Basic Commands: Linear Algebra | 5 | | | | |
| Basic Commands: Number Theory | 6 | | | | |
| Basic Commands: Probability | 6 | | | | |
| Review for First Exam | 6 | | | | |
| Exam 1 | 7 | | | | |
| Distribution of Graded Exam 1 and Solution of the Exam | 7 | | | | |
| Basic Commands: Statistics | 7 | | | | |
| Training | 8 | | | | |
| Programming Activities : Basics | 8 | | | | |
| Programming Activities : Equation & Functions | 8 | | | | |
| Programming Activities : Coordinate Geometry | 9 | | | | |
| Programming Activities : Animation and 3D Plots | 9 | | | | |
| Programming Activities : Calculus | 9 | | | | |
| Programming Activities : Calculus | 10 | | | | |
| Programming Activities : DE | 10 | | | | |
| Programming Activities : Linear Algebra | 10 | | | | |
| Programming Activities : Linear Algebra | 11 | | | | |
| Programming Activities : Number Theory | 11 | | | | |
| Programming Activities : Number Theory | 11 | | | | |
| Programming Activities : Probability | 12 | | | | |
| Review for Second Exam | 12 | | | | |
| Exam 2 | 12 | | | | |
| Distribution of Graded Exam 2 and Solution of the Exam | 13 | | | | |
| Programming Activities : Statistics | 13 | | | | |
| Programming Activities: Statistics | 13 | | | | |
| Programming Activities : Statistics | 14 | | | | |
| Review for Final Exam | 14 | | | | |
| Final | 15 | | | | |

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:

| ILO/s | Learning Methods | Evaluation Methods | Related ILO/s to the program |
|-------|------------------|--------------------|------------------------------|
| | Lectures | Exam | |

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, computer Lap, Smart Board

25. References:

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

1- The Mathematica Book, 4th edition, S. Wolfram, Academic probation 1999.

B- Recommended books, materials, and media:

1- <http://www.ju.edu.jo/sites/academic/awada/default.aspx>

Lecture notes by Awad A.

2- Computer Science Introduction to Wolfram Mathematica, I. Kokkarinen, 2014.

3- Mathematica in Action, S. Wagon, 2015.

26. Additional information:

Name of Course Coordinator: Dr. Adnan Awad Signature: ----- Date: 9/2/2016

Head of curriculum committee/Department: Dr. Mufeed Azzam Signature: -----

Head of Department: Dr. Emad Abu Osba Signature: -----

Head of curriculum committee/Faculty: Dr. Salwaal Bdour Signature: -----

Dean: Dr. Shaher Almomani Signature: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File