



مركز الاعتماد
و ضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

**Course Name: Ordinary
Differential Equations II**

1	Course title	Ordinary Differential Equations II
2	Course number	(0331421)
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	3
4	Prerequisites/corequisites	(0301221)
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. Iryna

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.

Linear ordinary differential equations; existence and uniqueness theorems; infinite series solutions (Frobenius method); Bessel functions and Legendre Polynomials; Sturm-Liouville theory; Green's functions; linear systems with constant coefficients; non-linear differential equations and stability.

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

1. Solve some types of linear ordinary differential equations (ODEs). Write a mathematical proof of the existence and uniqueness theorem.
2. Use Frobenius method to find series solutions for some types of second order ODEs about regular singular points for the three cases. That is, whenever the different between the two exponents is not an integer, zero, or an integer.
3. Find series solutions for the Bessel and Legendre differential equations, and determine the properties of the Bessel functions and Legendre polynomials.
4. Study Green's functions and apply them for solving ODEs.
5. Find the solutions for some types of linear systems with constant coefficients.

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. Study Green's functions and apply them for solving ODEs.

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

- B1. Solve some types of linear ordinary differential equations (ODEs). Write a mathematical proof of the existence and uniqueness theorem.
- B2. Find the solutions for some types of linear systems with constant coefficients.

C. Subject- Specific Skills: Student is expected to

- C1. Use Frobenius method to find series solutions for some types of second order ODEs about regular singular points for the three cases. That is, whenever the different between the two exponents is not an integer, zero, or an integer.
- C2. Find series solutions for the Bessel and Legendre differential equations, and determine the properties of the Bessel functions and Legendre polynomials.

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

- D1. Derived a special function from a generating function.
- D2. Prove the properties of special functions by using generating functions.
- D3. Determine the number of zeros of solution of linear ODE.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Review of Linear ODE	1-2				
Non-Linear differential equations	3				
Existence and uniqueness theorems	4-5				
Further properties of Linear D.E.	6-7				
Series solutions	8-9				
Bessel functions	10-11				
Orthogonal polynomials	12				
Green's functions	13				
Linear systems with constant coefficients	14-15				

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 times. 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 the lectures without an excuse (of sickness or due to other insurmountable difficulty), then the student shall be barred from sitting for the final examination. Also he/she will get a failing grade in this course.
3. Medical certificates for excuses of exam absences should be introduced to the University Physician for authorization. These authorized certificates should also 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, where the student mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited, where University cheating regulations will be applied on any student who cheats in exams or on home works.

24. Required equipment:

Data Shows

25. References:

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

Introduction to Ordinary Differential Equations, A. L. Rabenstein.

B- Recommended books, materials, and media:

1. Elementary Differential Equations and Boundary Value Problems, W. Boyce & R. DiPrima.
2. Elementary Differential Equations, W. Watter.
3. Ordinary Differential Equations, E. Rainville & P. Bedient.
4. Special Functions for Scientists and Engineers, W. Bell.

26. Additional information:

Name of Course Coordinator: Dr. Iryna 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: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File