



# BABCOCK UNIVERSITY

## COURSE OUTLINE

**SCHOOL: Science and Technology**

**DEPARTMENT: Basic Sciences**

**SEMESTER /SESSION: Second/2015/2016**

**COURSE CODE AND TITLE: MATH 302: Ordinary Differential Equations**

**DAY OF CLASS: Monday & Thursday**

**NO OF UNITS: 3**

**VENUE FOR CLASS: A008/D004**

**TEACHER'S: NAME: Ayinde, S.A**

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### **OUR VISION STATEMENT**

A first-class Seventh-day Adventist institution, building servant leaders for a better world

### **OUR MISSION STATEMENT**

Building leadership through Christian education; transforming lives, impacting society for positive change

To achieve our mission, we are committed to:

- Achieving excellence in our teaching, research program, and service delivery
- Imparting quality Christian education
- Instilling Christ-like character to the members of our Community

### **OUR CORE VALUES**

- Excellence -Our Culture
- Integrity -Our Promise
- Accountability -Our Moral
- Servant Leadership -Our Strength
- Team Spirit -Our Dignity
- Autonomy and Responsibility -Our Passion
- Adventist Heritage -Our Commitment

### **OUR PHILOSOPHY**

Babcock University's philosophy is anchored on the harmonious development of the intellectual, physical, social, and spiritual potentials of our students, inspiring stable and noble character needed for effective leadership and service in the society.

**CORPORATE IMAGE STATEMENT:** A center of excellence for character development and scholarship; a socially responsive, responsible, and accountable institution in matters of commitment and action.

### **COURSE DESCRIPTION:**

The course focuses on the nature and structure of ordinary differential equations and their solutions by considering various approaches like linear dependence, wronskian, reduction order, and variation of parameters. It also looks at series solutions of ordinary differential equations about ordinary and regular points. Some special functions are considered. Functions like Gamma, Bessel, Legendre and hyper geometric. Finally, Laplace transform is studied and then its application to solving initial value problem is thoroughly examined. These concepts being taught require painstaking care, for example series solution of ordinary differential equations requires carefulness. Care fullness may lead students to excel.

### **COURSE CONTENT:**

Ordinary differential equations: Linear dependence, wronskian, reduction order, variation of parameter. Series solution about ordinary and regular points. Special functions: Gamma, ,Beta, Bessel, Legendre, Hyper geometric. Laplace transform and applications to initial value problems.

### **COURSE OBJECTIVES:**

At the end of the course student should be able to:

- define and classify ordinary differential equations
- explain linear dependence and apply it to the solutions of ordinary differential equations,
- apply the methods of wronskian, reduction order and variation of parameters to determine the solutions of ordinary differential equations,
- obtain series solutions of different types of ordinary differential equations about ordinary and regular points,
- solve problems on special function and their applications,
- find Laplace transforms of different types of functions,
- determine inverse Laplace transforms of functions and
- solve initial value problems both for first and second orders ordinary differential equations by using Laplace transform.

### **REQUIRED TEXTBOOKS/JOURNALS:**

Diprima, Boyce, Elementary differential equations, John Wiley& Sons U.S.A. 2001  
Hale, Jack, K., Ordinary differential Equations, John Wiley& Sons New York, 1980.  
Ross, Shepley, L., Introduction to ordinary differential equations, John Wiley& Sons, Toronto. 1989.

### **COURSE REQUIREMENTS:**

**CLASS ATTENDANCE:** - "Every student is required to attend classes regularly and punctually, unless ill or prevented by some recognized emergency. Students who absent themselves from class for more than three weeks during the semester shall merit an F grade. Authorized leave of absence from campus does not excuse the student from classes, or relieve the student of the required course work'(BU Academic Bulletin 2012-2015 p.13).

**PARTICIPATION:** -Students are to actively engage in topic discussion and sharingof ideas in class.

**TARDINESS/CONDUCT OF STUDENTS IN CLASS:** - Lateness to class is unacceptable; students are not allowed to operate their cell phones, iPods and other electronic mobile gadgets during classes, except with the permission of the teacher. Eating and chewing off bubble gums and drinking (water exempted) is also not allowed except with the permission of the teacher. Very importantly, students are required to dress in compliance with the university dress code and wear their identity cards while in class.

**SHORT DEVOTIONALS/PRAYER:** - Spiritual nurture is a part of whole person development, and team spirit is our strength; thus, every student is required to participate in the devotional exercise and prayer in class.

**SUBMISSION OF ASSIGNMENT:** As the teacher wishes to receive the assignments with the regulations of the Academic Bulletin.

**LATE ASSIGNMENTS:** Assignments could be turned in earlier, but not later than the deadline set by the teacher.

**GUIDELINE FOR WRITTEN WORK:** Teacher should determine the guidelines.

**ACADEMIC INTEGRITY/HONESTY:**“Babcock University has a zero tolerance for any form of academic dishonesty. Morally and spiritually, the institution is committed to scholastic integrity. Consequently, both students and staff are to maintain high, ethical Christian levels of honesty. Transparent honest behavior is expected of every student in all spheres of life. Academic dishonesty include such things as plagiarism, unauthorized use of notes or textbooks on quizzes and examinations, copying or spying the test or paper of another student (formal or take-home), talking to another student during examinations. Academic matter would automatically result in a failing grade for the examination, and suspension, or outright dismissal from the university. Academic dishonesty issues are referred to SPEAM (Senate Panel on Examination and Academic Misconduct) who investigates and makes recommendations to Senate. Penalties for examination and academic misconduct are spelt out in the *student’s handbook* and in other regulations as published from time to time” (*BU Academic Bulletin 2012-2015 p.18*).

### **GRIEVANCE PROCEDURE**

“Students who believe that their academic rights have been infringed upon or that they have been unjustly treated with respect to their academic program are entitled to a fair and impartial consideration of their cases. They should do the following to effect a solution:

1. Present their case to the teacher(s) concerned
2. If necessary, discuss the problem with the Head of Department
3. If agreement is not reached at this level, submit the matter to the School Dean
4. Finally, ask for a review of the case by the Grievance Committee
5. A fee is charged for remarking of scripts. If a student’s grievance is upheld after an external examiner has remarked the script, the grade would be credited to the student. The lecturer will be given a letter of reprimand and will be asked to refund the fees to the student. If the student’s grievance is not sustained, the student will be given a letter of reprimand and the original grade retained” (*BU Academic Bulletin 2012-2015 p.18*).

**TEACHING/LEARNING METHODOLOGIES:** Teachers are to determine their strategies for teaching their students. However, interactive strategies are encouraged, and there should be integration of faith and BU core values in the learning process.

In adherence to Babcock University core value for course delivery, the following methodologies are adopted.

- Well-structured instructions
- White board & marker and projector
- Students- teacher interaction
- Direct Instruction.
- Guided Inquiry.
- Discourse.
- Cooperative Learning.
- Problem-based Learning.
- Visual Representations and Concrete Models.
- Assignments

### **COURSE ASSESSMENT/EVALUATION**

#### ***Continuous Assessment:***

Class Attendance:	5% }	}	=40%
Quizzes & Tests:	10% }		
Assignments:	10% }		
Mid-Semester Exam:	15% }		
Final Semester Exam:	60%		

### **GRADE SCALE**

Currently, the 5-point gradingsystemadoptedbythe University Senate translates as follows:

Grades	Marks- Quality	Range Points	Definition
A	80-100	5.00	Superior
B	60-79	4.00	Above Average
C	50-59	3.00	Average
D	45-49	2.00	Below Average
E	40-44	1.00	Pass
F	0-39	0.00	Fail

**INCOMPLETE GRADE:** An incomplete grade may only be assigned to a student upon request, due to an emergency situation that occurred within that semester, which prevented completion of an/some assignments, quizzes, or examination. Such a student would complete a contract form, obtainable from the Registrar, after agreement with the teacher. The form must be signed by the teacher, the student, the HOD, the dean, the Registrar, and the Senior Vice President (SVP) before contract begins. The original copy of the incomplete form will be sent to the Registrar with copies to the teacher, the student, the HOD, the dean, and the SVP. An incomplete grade(I) reverts to the existing grade if contract is not completed by the end of the following semester (including summer semester, except for examinations), (*BU Academic Bulletin 2012-2015 p. 20*).

## FURTHER READINGS:

### STUDENTS WITH DISABILITY

“Babcock University seeks to provide a conducive environment for optimal living and learning experience. While the university is working towards facilities that accommodate persons with disabilities, provisions will be made for students with disabilities under the following conditions. Students with disabilities are to:

- a. Report to Student Support Services for assessment, and obtain a clearance/recommendation at the commencement of the semester or as soon as disabling incidence occurs
- b. Show the clearance/recommendations to relevant university officials at the commencement of the semester or as soon as disabling incidence occurs
- c. Maintain ongoing contact with Student Support Services” (*BU Academic Bulletin 2012-2015 p. 20*).

### PROPOSED DAILY/WEEKLY OUTLINE OF SCHEDULE:

WEEK		TITLE	CLASS ACTIVITIES	ASSIGNMENTS DUE
1	Jan.,4	Devotion. Discussion of course outline and introduction.	Questions and answers.	
2	Jan.,11	ODE: definitions and classifications	Exercise	
3	Jan.,18	ODE: linear dependence and wronskian.	Exercise	
4	Jan., 25	ODE: reduction order	Exercise	
5	Feb.,1	ODE: variation of parameters.	Exercise	
6	Feb.,8	Series solutions of ODE	Exercise	
7	Feb.,15	Series solutions of ODE		
8	Feb.,22	Special functions: Gamma and Beta	Exercise	Write on the existence and uniqueness of solution of ODE.
9	Feb.,29	Special functions: Bessel, Legendre and Hyper geometric.	Exercise	
10	Mar.,7	Laplace transform of functions	Exercise	

11	Mar.,14	Laplace transform of functions	Exercise	
12	Mar.,21	Inverse Laplace transform and solution of initial value problems	Exercise	
13	Mar.,28	Applications of Laplace transform to the solution of initial value problems.	Exercise and Revision.	