JINDAL GLOBAL BUSINESS SCHOOL
INDIA'S FIRST MULTI-DISCIPLINARY GLOBAL BUSINESS SCHOOL

O.P. Jindal Global University
A Private University Promoting Public Service
NAAC Accreditation - 'A' Grade

Jindal Global Business School
Course Outline

Course Title	Calculus for Business Analytics
Core or Elective	Elective
Program and Batch	BBA-2023, BBA-BA-2023, BBA-FB-2023, BBA-FM-2023
Semester & Academic Year	Fall 2026
Credits	3
Discipline/Area	IS & Analytics
Name of the Faculty Member/Course Instructor	Dr. Rajni
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Contact Details of Support Staff	jgbs-eo@jgu.edu.in
Faculty Member's Open Office Day/s & Time	TBA

Introduction to the Course

In today's data-driven business environment, organizations rely on analytical tools to understand trends, evaluate performance, and make better decisions. Calculus provides an important mathematical foundation for many of the techniques used in business analytics, economics, and finance. This course introduces both the theoretical concepts of calculus and their applications in business-related problems.

The course begins with the study of functions and graphing, which help represent relationships between business variables such as cost, revenue, demand, and profit. By learning how to visualize these relationships using graphs, students develop a clearer understanding of how business outcomes change when inputs vary. Students will then explore key concepts such as limits and rates of change, which explain how small changes in variables affect business outcomes. A major focus of the course is differential calculus, which is widely used to analyze marginal changes and optimize business decisions.

The course also introduces optimization techniques used to determine maximum profit, minimum cost, or optimal production levels. Through theoretical explanations and practical business examples, students will

develop a strong conceptual understanding of how calculus supports analytical thinking and decision-making in modern business environments.

Course Learning Objectives

At the end of the course, students should be able to

1. CLO1- Understand the concept of function, differentiate between linear and non-linear functions and graph them using the knowledge of curve sketching.
2. CLO2- Understand the concept of average rates of change, differentiation, and rules of differentiation.
3. CLO3- Understand the business problems of maximum-minimum and use differential calculus to solve them.
4. CLO4- Understand exponential and logarithmic functions and their applications in business models.
5. CLO5- Understand the concept of anti-differentiation, i.e., integral calculus and apply it to solve business problems.

Programme Competency Goals

BBA Programme Competency Goals (PCGs)		**BBA Programme Learning Objectives (PLOs)**
		Students will be able to
1	**Responsible Global Citizenship:** Ability to understand the interplay between local and global issues and to act with sensitivity towards ethical and social issues	1. Understand local business issues
		2. Understand global business issues
		3. Demonstrate sensitivity towards ethical issues
		4. Demonstrate sensitivity towards social issues
2	**Effective communication:** Ability to effectively exchange ideas and information	5. Present their ideas with clarity
		6. Write in a coherent manner
		7. Use technology for communication
3	**Critical Thinking:** Ability to identify, analyze business problems and propose effective solutions	8. Identify main issues of business problems
		9. Examine information from different sources
		10. Draw inferences from analysis
4	**Teamwork:** Ability to work and contribute effectively in group -settings	11. Understand the factors to work effectively in groups
		12. Contribute effectively in groups

PLO-PCG Assessments Mapping Matrix

Program Learning Objectives (PLOs)	**Program Competency Goals (PCGs)**	**Course Assessment Item**
This course helps you to develop the following Program Learning Outcomes:	This course helps you to develop the following Program Competency Goals:	This learning outcome will be assessed in the following items
PLO5 PLO9 PLO10	PCG2 PCG3	A1
PLO6 PLO7	PCG2 PCG3	A2, A3
PLO5 PLO6 PLO8 PLO10	PCG2 PCG3	A4

Evaluation Schema
The course grade will be determined based on:

Assessment Task	**Weightage (Percentage)**	**Nature (Individual/Group)**	**Week of Assessment**	**PLOs to be Assessed**
A1 Class Participation	10%	Individual	Throughout the course duration	PLO5, PLO9, PLO10
A2 Quiz	30%	Individual	6th Week and 12th Week	PLO6, PLO7
A3 Assignment	30%	Individual	13th Week	PLO6, PLO7
A4 Endterm Examination	30%	Individual	In the JGU Examination period/week	PLO5, PLO6 PLO8, PLO10

Description of Assessments:
A1 Class Participation- This shall be evaluated based on student participation in classroom discussions.

A2 Quiz- There shall be 2 in-class MCQ based quiz of 40 minutes each. The quiz shall be closed book. It shall be based on the concepts learned in course until that period.

A3 Assignment- One assignment shall be provided to the students.

A4 End term examination- The end term examination will be of **30 marks of 1.5 hours duration**. This will be an invigilated exam according to the mode, modalities and process as decided by CoE.

Rubrics for Assessments
NA

Teaching Method
The course will have a class discussion approach with questions and answers sessions. Here the onus of learning will be with the student, and the instructor will be a facilitator. Instead of learning 'what to do', the problems from business related field will also be used as examples to introduce the need for different tools of mathematical calculus. The key to learning this way is to see many examples and many situations and learn inductively from the different experiences of students.

Textbook / Other Readings
Textbook:

1. Calculus and Its Applications, by David J. Ellenbogen, Marvin Bittinger, and Scott J. Surgent. (Tenth Edition)
2. Calculus For Business, Economics, and the Social and Life Sciences, by Laurence D. Hoffmann and Gerald L. Bradley.

Session Plan

Session Details	**Topics**	**PLOs Covered**
Session 1	Introduction to Calculus and its applications	PLO5
Objective of the session	At the end of this session, you will learn • Introduction to course overview and course policies • Background of Calculus, and some examples from business scenario where it's used.	
Subtopics to be covered	Concept of calculus, terminologies associated with it. Types of calculus. Examples of Business applications of calculus such as epidemiological modeling	
Readings	NA	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 2	Graphs and Equations	PLO7
Objective of the session	At the end of this session, you will learn • Use of graphs as an essential aspect of calculus • Graphing of equations	
Subtopics to be covered	Calculus understood from graphs, graphing of equations and mathematical models.	

Readings	Calculus and Its Applications: Chapter R.1	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 3	Functions and Models	PLO5
Objective of the session	At the end of this session, you will learn • Identifying functions • Finding function values • Piecewise functions	
Subtopics to be covered	Plotting functions and identifying them, finding values of piecewise functions	
Readings	Calculus and Its Applications: Chapter R.2	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 4	Domain and Range	PLO5 PLO8
Objective of the session	At the end of this session, you will learn • Finding domain and range • Applications of Finding domain and range in Business	
Subtopics to be covered	Set Notation, Interval notation, domain and range	
Readings	Calculus and Its Applications: Chapter R.3	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 5	Slope and Linear functions	PLO5 PLO8
Objective of the session	At the end of this session, you will learn • Horizontal and Vertical Lines • Direct Variation • The slope-intercept equation: y=mx+b • Application of slope • Application of linear function	
Subtopics to be covered	Meaning of slope, straight line, point-slope equations, linear function, nonlinear functions	
Readings	Calculus and Its Applications: Chapter R.4	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	

Session 6	Nonlinear functions	PLO5 PLO10
Objective of the session	At the end of this session, you will learn • Quadratic functions • Algebraic–Graphical Connection • Polynomial functions • Rational functions • Applications of Nonlinear functions • Supply and Demand functions.	
Subtopics to be covered	Quadratic formula, graphics of quadratic equations, absolute-value functions, square-root functions, equilibrium point	
Readings	Calculus and Its Applications: Chapter R.5	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 7	Mathematical modeling and Curve fitting	PLO10
Objective of the session	At the end of this session, you will learn • Fitting functions to data • Linear model • Quadratic Model • Polynomial models	
Subtopics to be covered	Function fitting, graphics of linear and nonlinear functions	
Readings	Calculus and Its Applications: Chapter R.6	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 8	Guest Lecture	PLO10
Objective of the session	To understand relevance of calculus in Business	
Subtopics to be covered	NA	
Readings	NA	
Case Title & Number	NA	
Pedagogy	Class discussion	
Session 9	Limits and Continuity	PLO10
Objective of the session	At the end of this session, you will learn • Limits: A Numerical and Graphical Approach. • Algebraic Limits and Continuity	

	• Application of limits in Business Problems	
Subtopics to be covered	Limits, limits involving infinity, algebraic limits, limit properties, examples of business problems	
Readings	Calculus and Its Applications: Chapter 1.1 and 1.2	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 10	Average rates of change	PLO10
Objective of the session	At the end of this session, you will learn • Definition of average rate of change • Business Problems of average rate of change • Difference Quotients as Average Rates of Change	
Subtopics to be covered	Concept of rate of change	
Readings	Calculus and Its Applications: Chapter 1.3	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 11	Revision Session for Session 1-10	PLO5
Objective of the session	At the end of this session, you will learn • Use of graphs as an essential aspect of calculus • Graphing of equations • Quiz-1	
Subtopics to be covered	Revision	
Readings	Calculus and Its Applications: Chapter R.1 to 1.3	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 12	Differentiation Techniques: I	PLO10
Objective of the session	At the end of this session, you will learn • Differentiation Using Limits of Difference Quotients • Differentiation using Limits. • Differentiation Rules	
Subtopics to be covered	Leibniz Notation, Power rule, constant rule, sum and difference	
Readings	Calculus and Its Applications: Chapter 1.4 and 1.5	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT	

	presentation and White board.	
Session 13	Differentiation Techniques: II	PLO10
Objective of the session	At the end of this session, you will learn • Product of functions and its differentiation • Use the Quotient Rule to differentiate the average cost, revenue, and profit functions.	
Subtopics to be covered	Product and Quotient Rule, the chain rule	
Readings	Calculus and Its Applications: Chapter 1.6	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 14	Chain rule and Higher order derivatives	PLO8 PLO10
Objective of the session	At the end of this session you will learn • Composition of functions. • Chain rule of differentiation • Second and higher order derivatives • Business examples	
Subtopics to be covered	Composition of functions, extended chain rule	
Readings	Calculus and Its Applications: Chapter 1.7 and 1.8	
Case Title & Number		
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 15	Midterm Week	PLO6
Objective of the session	Midterm Exam	
Subtopics to be covered	All till session 14	
Readings	All till session 14	
Case Title & Number	NA	
Pedagogy	NA	
Session 16	Midterm Week	PLO6
Objective of the session	Midterm Exam	
Subtopics to be covered	All till session 14	
Readings	All till session 14	
Case Title & Number	NA	
Pedagogy	NA	

Session 17	First Derivative Test	PLO10
Objective of the session	At the end of this session, you will learn • Using First Derivatives to Find Maximum and Minimum Values and Sketch Graphs • First derivative test	
Subtopics to be covered	Increasing and decreasing functions, Critical Values, Finding Relative Maximum and Minimum Values	
Readings	Calculus and Its Applications: Chapter 2.1	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 18	Second Derivative Test	PLO10
Objective of the session	At the end of this session, you will learn • Using Second Derivatives to Find Maximum and Minimum Values and Sketch Graphs • Classifying Relative Extrema Using Second Derivatives • Points of Inflection • Second Derivative Test	
Subtopics to be covered	Concavity: Increasing and Decreasing Derivatives, Curve Sketching	
Readings	Calculus and Its Applications: Chapter 2.2	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 19	Application of Derivatives	PLO10
Objective of the session	At the end of this session, you will learn • Using Derivatives to Find Absolute Maximum and Minimum Values • Maximum–Minimum Problems; Business and Economics Applications	
Subtopics to be covered	Absolute Maximum and Minimum Values, Finding Absolute Maximum and Minimum Values over Closed Intervals, Maximizing Revenue, Minimizing Cost.	
Readings	Calculus and Its Applications: Chapter 2.4 and 2.5	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	

Session 20	Marginals and differentials	PLO8 PLO10
Objective of the session	At the end of this session, you will learn • Concept of Marginals • Additional Optimization problems	
Subtopics to be covered	Marginal examples from Business, Optimization	
Readings	Calculus and Its Applications: Chapter 2.6	
Case Title & Number		
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 21	Exponential and Logarithmic functions	PLO8 PLO10
Objective of the session	At the end of this session, you will learn • Exponential Functions • Logarithmic Functions • Applications: Uninhibited and Limited Growth Models • Applications: Decay • The Derivatives of a^x and $\log_a x$ • An Economics Application: Elasticity of Demand	
Subtopics to be covered	Exponential, logarithmic functions	
Readings	Calculus and Its Applications: Chapter 3.1 to 3.6	
Case Title & Number		
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 22	Guest Lecture	PLO8
Objective of the session	To understand the importance of Calculus in day to day working of business operations	
Subtopics to be covered	TBD	
Readings	NA	
Case Title & Number	NA	
Pedagogy	Class Discussion	
Session 23	Introduction to Integral Calculus	PLO10
Objective of the session	At the end of this session, you will learn • Antidifferentiation • Antiderivatives as Areas • Area and Definite Integrals	
Subtopics to be covered	Concept of Integration, and Area under the curve	
Readings	Calculus and Its Applications: Chapter 4.1 to 4.3	

Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 24	Properties of Integration	PLO10
Objective of the session	At the end of this session, you will learn • Properties of Definite Integrals • Solving Integrals using properties of Definite Integrals	
Subtopics to be covered	Additive Property, Area bound under the curve	
Readings	Calculus and Its Applications: Chapter 4.4	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 25	Integration Techniques	PLO10
Objective of the session	At the end of this session, you will learn • Integration Techniques: Substitution • Integration Techniques: Integration by Parts • Quiz-2	
Subtopics to be covered	Substitution techniques and integration by parts	
Readings	Calculus and Its Applications: Chapter 4.5 and 4.6	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 26	Applications to Business and Economics: Integral Calculus	PLO8 PLO10
Objective of the session	At the end of this session, you will learn • Business Applications of Integration • Economical Applications of Integration	
Subtopics to be covered	Consumer Surplus, Producer surplus	
Readings	Calculus and Its Applications: Chapter 5.1	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 27	Applications of Integration	PLO8 PLO10
Objective of the session	At the end of this session, you will learn • Application of Integration in Social Science • Application of Integration in Life	

Subtopics to be covered	Integration in real life scenarios.	
Readings	Calculus and Its Applications: Chapter 5.2	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 28	Improper Integrals and their applications	PLO8 PLO10
Objective of the session	At the end of this session, you will learn • Meaning of improper integral, • Difference between Proper and Improper Integrals • Solving Improper integrals. • Continuous probability • Present Value of a Perpetual Income Flow	
Subtopics to be covered	Improper integrals, Probability density functions: Uniform, exponential, Normal density functions, expected value of a random variable	
Readings	Calculus and Its Applications: Chapter 5.3 to 5.5	
Case Title & Number	NA	
Pedagogy	Class discussion and Q&A Session with the help of PPT presentation and White board.	
Session 29	Reading & Revision Week/ Examination Week*	
Objective of the session	NA	
Subtopics to be covered	NA	
Readings	NA	
Case Title & Number	NA	
Pedagogy	NA	
Session 30	Reading & Revision Week/ Examination Week*	
Objective of the session	NA	
Subtopics to be covered	NA	
Readings	NA	
Case Title & Number	NA	
Pedagogy	NA	

*Elective Endterm Examinations may take place in the last week of classes.

Disability Support

JGU endeavours to make all its courses accessible to students. The Disability Support Committee (DSC) has identified conditions that could hinder a student's overall wellbeing. These include physical and mobility-related

difficulties, visual impairment, hearing impairment, mental health conditions, and intellectual/learning difficulties, e.g., dyslexia and dyscalculia. Students with any known disability needing academic and other support are required to register with the Disability Support Committee (DSC) by following the procedure specified at **https://jgu.edu.in/disability-support-committee/**

Students who need support may register any time during the semester up until a month before the end semester exam begins. Those students who wish to continue receiving support from the previous semester, must re-register within the first month of a semester. Last-minute registrations and support might not be possible as sufficient time is required to make the arrangements for support.

The DSC maintains strict confidentiality about the identity of the student and the nature of their disability and the same is requested from faculty members and staff as well. The DSC takes a strong stance against in-class and out-of-class references made about a student's disability without their consent and disrespectful comments referring to a student's disability.

All general queries are to be addressed to **disabilitysupportcommittee@jgu.edu.in**

Disclaimer: This course outline including assessments, mode, nature and weightage of assessments, sessions, sequence of sessions and/or readings may be revised during the semester if such need arises.