# Course Outline

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| **Course title: Business Calculus** | **Instructor name: Jun Albert Pardillo** |
| **Credit units: 3** | **Total hours: 54** |

## Course Description:

Business Calculus is a course designed for 2nd Year Business Students who want to develop their mathematical skills and apply them to real-world business problems. This course will introduce students to the fundamental concepts of calculus, including limits, derivatives, and integrals, and how they can be used to analyze and optimize business functions.  
  
Throughout the course, students will learn how to use calculus to solve problems related to business functions such as revenue, cost, profit, and demand. They will also learn how to use calculus to analyze and optimize business processes such as production, inventory, and pricing.  
  
In addition to theoretical concepts, this course will also provide practical applications of calculus in business. Students will work on case studies and real-world examples to develop their problem-solving skills and apply their knowledge to real-world scenarios.  
  
By the end of this course, students will have a solid understanding of calculus and its applications in business. They will be able to use calculus to analyze and optimize business functions and processes, and make informed decisions based on mathematical analysis. This course will prepare students for advanced courses in business and economics, as well as for careers in finance, accounting, and management.

## Course Learning Outcomes (CLOs)

* Understand and apply the fundamental concepts of calculus, including limits, derivatives, and integrals, in the context of business problems.
* Analyze and optimize business functions such as revenue, cost, profit, and demand using calculus.
* Utilize calculus to evaluate and enhance business processes including production, inventory, and pricing.
* Develop problem-solving skills through the application of calculus to case studies and real-world business scenarios.
* Prepare for advanced studies in business and economics and careers in finance, accounting, and management by applying mathematical analysis in decision-making processes.

## Topics / Modules and Intended Learning Outcomes

1. Introduction to Business Calculus and Limits

* Explain the concept of limits and their importance in calculus.
* Apply limits to understand the behavior of business functions near a point.

1. Derivatives and Their Application in Business

* Compute derivatives of functions relevant to business applications.
* Analyze business scenarios using the concept of marginal analysis through derivatives.

1. Integrals and Their Application in Business

* Understand the concept of integration and its application in calculating areas and volumes relevant to business problems.
* Apply integration to solve problems related to total cost, total revenue, and consumer surplus in business.

1. Optimization Techniques for Business

* Utilize calculus-based optimization techniques to make informed business decisions.
* Solve optimization problems related to production, inventory, and pricing to maximize profit or minimize cost.

1. Calculus in Business Economics

* Apply calculus to analyze economic concepts such as elasticity of demand and supply.
* Use calculus to evaluate economic models and theories relevant to business decision-making.

## Weekly Activities

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| **Week No.** | **Topic** | **Activity Description** | **Expected Output** | **Assessment Tools** |
| Week 1 | **Introduction to Business Calculus and Limits** | Lecture on the importance of limits in calculus and their foundational role in business calculus. Introduction to the concept of a limit and basic limit operations. | Understanding of limit concepts and ability to perform simple limit calculations. | Quiz on basic limit concepts and operations. |
| Week 2 | **Introduction to Business Calculus and Limits** | Interactive workshop on applying limits to business functions. Students will work in groups to analyze the behavior of business functions near a point using limits. | Group reports on the application of limits to business functions. | Group presentation and report submission. |
| Week 3-4 | **Derivatives and Their Application in Business** | Lectures and hands-on exercises on computing derivatives and their applications in marginal analysis for business decision-making. | Ability to compute derivatives and apply marginal analysis to business scenarios. | Homework assignments and a midterm exam covering derivatives and their applications. |
| Week 5-6 | **Integrals and Their Application in Business** | Introduction to integration and its application in business. Practical sessions on calculating total cost, total revenue, and consumer surplus. | Proficiency in applying integration to solve business-related problems. | Project work on integration applications in business scenarios. |
| Week 7-9 | **Optimization Techniques for Business** | Series of lectures and workshops on using calculus-based optimization techniques for business decision-making. Case studies on production, inventory, and pricing. | Ability to solve optimization problems and make informed business decisions. | Case study analysis and presentation. |
| Week 10-12 | **Calculus in Business Economics** | Exploration of economic concepts through calculus. Application of calculus to evaluate economic models and theories. | Understanding of how calculus is applied in economic models and decision-making. | Written assignments and group discussions on selected economic models. |
| Week 13-15 | **Review and Advanced Applications** | Review sessions covering all previously discussed topics. Introduction to advanced applications of calculus in business and economics. | Comprehensive understanding of course content and introduction to advanced topics. | Comprehensive exam and group project on advanced calculus applications in business. |
| Week 16-18 | **Final Project and Presentations** | Students will work on a final project applying calculus to a real-world business problem. The course will conclude with student presentations of their projects. | Final project report and presentation. | Final project evaluation based on report and presentation quality. |

## References

*Stewart, J. (2015). Calculus: Early transcendentals. Cengage Learning.*  
Link:

*Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. R. (2014). Thomas' calculus. Pearson.*  
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*Larson, R., & Edwards, B. H. (2017). Calculus. Cengage Learning.*  
Link:

*Hughes-Hallett, D., McCallum, W. G., & Gleason, A. M. (2013). Calculus: Single and multivariable. John Wiley & Sons.*  
Link:

*Sydsaeter, K., Hammond, P., Strom, A., & Carvajal, A. (2016). Essential mathematics for economic analysis. Pearson Education.*  
Link: