College of Arts and Science

Division of Mathematical Sciences

MA 130

**Applied Calculus**

*Fall, 2024, Syllabus and Assignment Schedule*

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| Instructor: | Dr. Kathy D. Pilger | Email: | Kpilger@bju.edu |
| Office: | Al 55 | Telephone: | 8035 |
| Office Hours: | 10 am daily others by appointment | Credit/Load: | 3/3 |
| Textbook: | *Calculus for Biology and Medicine,* 4th ed., ISBN: 978-0-13-407004-9 or 0-13-407004-6 |  |  |
| Calculator: | TI 83 Plus, TI 84 Plus |  |  |

# I welcome you to contact me outside of class, especially if you are having any difficulty with your classwork. Email is the best way to contact me or talk to me before or after class.

**Catalog Description:**

A calculator based applied Calculus course in one variable. Derivatives, integrals and their applications will be studied.

**Course Context:**

The faculty of the Division of Mathematical Sciences has developed five broad goals and has aligned these goals with the Bob Jones University Institutional Goals (IG) and the goals of the BJU Core (BJ).

**Context:** The faculty of the Division of Mathematical Sciences has developed four broad goals and has aligned these goals with the Bob Jones University Institutional Goals and BJ Core. The Division Goals (DG) are as follows:

The student will…

1. Understand the essential theory of mathematics … and appropriately apply the theory in solving problems.
2. Use critical-thinking/analytical skills to understand mathematical … problems and design solutions with the aid of appropriate tools.
3. Apply an understanding of how mathematics/computing can be used in service to Christ as tools to the examination of the world He created.
4. Construct a foundation upon which they, after graduation, can continue the development of their God-given abilities and the learning necessary for work and life.

**Course Goals (CG):**

1. Develop the basic mathematical and technical skills necessary to solve calculus-based problems. (DG 1, 2)
2. Gain an appreciation and understanding of the power of calculus as a tool to understand and deal with the world of change. (DG 1, 2)
3. Develop an understanding of the use and application of calculus to models developed for practical problems to enable the prediction of results and to allow for informed decision-making. (DG 1, 2, 3, 4)

**Course Objectives:** The student will be able to

1. Establish limits of functions and develop the definition of the derivative as a limit that describes rates of change and behavior of functional relationships. CG1, CG2 (Assessed by Test 1 and Project 1)
2. Determine the derivatives and integrals of functions in both theoretical and applied contexts. CG1, CG2, CG3 (Assessed by Test 2-4, Project 2)
3. Incorporate the appropriate use of technology to analyze problems connected to real life applications. CG3 (Assessed by Tests and Projects)
4. Communicate both the stated problem and its solution in a clear and efficient manner. CG2, CG3 (Assessed by Tests and Projects)

**Daily Class Expectations**

1. Bring your calculator to class every day (we will use it in class).
2. Work problems in class along with me (do not just copy what I write).
3. Seek help/clarification as soon as you are struggling (both in class and out of class).
4. Work the corresponding homework after each lecture. (Do not let it pile up before the test.)
5. Bring questions to class based on out of class work.

**Course Requirements and Expectations**

1. “Questions to Check Understanding” – Each covered section provides an ample list of questions you should do to evaluate whether you understand basic concepts. It is your responsibility to do at least 20 questions in each assignment. Do a variety of types of problems. If any question type is difficult for you, do more even if not assigned. Remember, it is your responsibility to learn the content. You determine how many problems you should do to guarantee full understanding.
2. Worked exercises should be **neat** and **well organized** with section numbers and page numbers appearing at the beginning of each new section. Work **down** the page in a single column. Exercises should be worked out in **detail** and should **include** the solution work and final answer for word problems written as a complete sentence. Always check your solution with the answer **in the back of the book** or **the solutions posted on Canvas.**
3. Personal study is one of the primary means by which students develop good mathematical habits. Personal study includes pre-reading (before the material is taught in class), note-taking, review, and practice.
4. **Calculator Modules** Your calculator must become your friend, so you need to know how to use it and what you can and cannot do with it. You will be asked to work through some simple calculator modules found at <https://education.ti.com/html/t3_free_courses/calculus84_online/index.html> . The modules will be listed with the associated section in the Tentative Course Schedule. Please work through these modules **before** coming to class the day the section will be covered.
5. DPP’s – “Daily Practice Problems” – Constant review is a key to learning mathematics well. A typical class day will begin with a DPP with two questions about material recently covered in class. Your goal each week is to earn four DPP points. Each question will be worth one point and you will have opportunity to answer six questions in a typical week to accumulate four DPP points for that week. Research indicates that constant review of mathematical content helps students remember the material, thus the reason for this little assessment.
6. Expect a series of announced or unannounced in-class quizzes. Quizzes measure a student’s understanding of and ability to use basic rules and skills just learned and measure retention of previously learned skills. Quizzes will typically be made up of short-answer, fill-in-the-blank, or multiple-choice questions. These will be graded without partial credit and will be closed book, in class.
7. Tests are to measure a student’s ability to perform multi-step problem-solving using rules and skills learned cumulatively to that point in the course. Tests will contain multi-part problems based on application (word problems), will be graded with partial credit as appropriate, closed book, and in class.
8. The Final Exam is to measure a student’s overall ability to apply calculus to different scenarios. The final exam will contain multi-part problems based on application (word problems) as well as skill testing questions, will be made up of multiple-choice and true/false questions, closed book, in class and machine gradable via GradeMaster.
9. Other assignments may include worldview discussion posts and personal reflections. **Worldview Discussions** are specifically designed to engage students in considering cultural and biblical issues that influence our understanding of mathematics and its place in our lives.
10. Two **projects** will assess your work in a group setting. You will work in a group of two or three to solve a practical problem that you could encounter in your future career.

**Assessments and Grading**

The following is a breakdown of how the final grade is calculated.

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| **Assignments** | **Point value per** **assignment** | **Total points per** **assignment type** |
| DPP’s (~10 weeks) | 4 | ~40 |
| Check Understanding Questions (4) | 10 | 40 |
| Discussion Posts (Canvas)(2) | 5 | 10 |
| Quizzes (~5) | 10 | ~50 |
| Projects (2) | 50 | 100 |
| Tests (4) | 100 | 400 |
| Final Exam | 150 | 150 |
| **Total** |  | **~790** |

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| **Scale:** |  |
| A | 90-100% |
| B | 80-90% |
| C | 70-80% |
| D | 60-70% |
| F | <60% |

## **COMPLIANCE WITH STUDENT HANDBOOK POLICIES IS EXPECTED IN THIS CLASS. INCLUDING:**

## **Cell Phones and Laptops**

Cell phones are not permitted to be out during class. Make sure they are muted and do not ring during class. You should have a pencil, paper, and your textbook out and ready to use in class. If for some reason you have a need of a laptop in class, such as use of an eBook for class, please see me and we will discuss this need.

## **Attendance**

Regular attendance is very important in this class. If you miss a class, you will be missing some essential information that will help you be more successful in your career. I will follow the BJU Attendance Policy that is set forth in your Student Handbook. For additional information, please see the current Bob Jones University Student Handbook. Naturally, if you are absent on a day when you have been informed in advance that work is due, then the late policy is (10% deduction for each calendar day late) and applies for that assignment regardless of the nature of the absence.

**Accommodations for students with disabilities:**

If you have a documented learning disability or if you are impaired in some way (auditory, visual, cognitive, neurological, or physical), please let your instructor know this within the first week of the course so that any necessary adjustments can be made before you get behind.

## **Academic Honesty and Integrity Policy**

Doing your own work brings glory to God. The claiming of someone else's work as your own is cheating and is a sin. All work done for this class needs to be your own. If information is taken from other sources, it always needs to be referenced and credit given where it is due. Since the goal of the assignments in this course is to learn to develop the skills covered NOT complete the tasks assigned, and since the use of AI to complete or jumpstart tasks defeats the goal of the assignments, you may not use generative AI tools (i.e. Chat GPT, Bing Chat, Google Bard, etc.) in this course for any assignment without the professor’s express permission.  Should an AI tool be used with permission, its use must be documented. I value academic integrity.  Therefore, I will take appropriate action if cheating or plagiarism occurs in this course. For additional information, please see the current Bob Jones University Student Handbook.

Copyright Policy (Fall, 2024, Pilger) as to this syllabus and all lectures. Students are prohibited from selling (or being paid for taking) notes during this course to or by any person or commercial form without the express written permission of the professor teaching the course. This syllabus is a guide to course goals and objectives, procedures, requirements, assignments and grading. The professor reserves the right to amend the syllabus when circumstances dictate.

**Tentative Schedule**

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| Date | Day | Class (Section in Text) | Questions to Check Understanding (Do at least 20 in each section) |
| 8/28 | W | Introduction |  |
| 8/30 | F | Calculator Skills: **Mod 1 all, 2.1, 2.3, 3.1, 3.2, 3.3, 4.2**  |  |
| 9/2 | M | **Labor Day** |  |
| 9/4 | W | Calculator Skills continued, 2.1 | **1.3** – 21-23, 39, 45 (use calculator to do these) |
| 9/6 | F | 2.2 (2.2.1 and 2.2.3) | **2.1**- 1, 3, 5, 9, 11, 23, 25 |
| 9/9 | M | 3.1/3.2 **Mod 6.2, 6.3** | **2.2** – 1-7 odd, 17-21 odd, 25-29 odd, 45-48, 53-56, 61-64, 73, 74, 79-85 odd |
| 9/11 | W | 3.2 **Mod 8.1, 8.2** | **3.1** – 1-15 odd, 16, 21-29 odd, 35, 37, 39-51 odd |
| 9/13 | F | 3.3 **Mod 7.1, 7.2** | **3.2** – 1-11 odd, 15 – 49 odd |
| 9/16 | M | 3.4 | **3.3** – 1-3, 5-7, 9-11, 13-15, 17-19, 21-23, 25, 27, 28, 29 |
| 9/18 | W | 3.5/3.6 | **3.4** – 1-20 |
| 9/20 | F | Review | **3.5** – 1-6 |
| 9/23 | M | **Test 1 – Ch. 2-3** |  |
| 9/25 | W | **REACH Seminars—No Classes** |  |
| 9/27 | F | 4.1/4.2 **Mod 10.1, 10.2, 10.3** |  |
| 9/30 | M | 4.3/4.4 **Mod 11.1, 11.2, 12.1** | **4.1** – 1-11, 17-22, 27, 28; **4.2** – 1-15, 23-40 |
| 10/2 | W | 4.5 | **4.3** – 1-30; 42-48, 55, 63-71, 84, 85; **4.4** – 1-10, 17-19, 25-29 odd, 37, 39, 41-43, 49-67, 71, 75, 79, 84, 85 |
| 10/4 | F | 4.6 | **4.5** – 1-20, 29, 31, 34, 36 |
| 10/7 | M | 4.7/4.8 | **4.6** – 1-11, 13-15, 17, 19, 23, 25 |
| 10/9 | W | 4.9 | **4.7** – 1-11; **4.8** – 1-30, 41-55, 65-69 |
| 10/11 | F | Review | **4.9** – 1-30, 60 |
| 10/14 | M | **Test 2 - Ch. 4** |  |
| 10/16 | W | 5.1 **Mod 13.1, 13.2, 13.3, 13.4** |  |
| 10/18 | F | 5.1 | **5.1** – 1-9, 13-25, 28, 35, 47, 48 |
| 10/21 | M | Fall Break |  |
| 10/23 | W | 5.2 |  |
| 10/25 | F | 5.3 | **5.2** – 1-9 |
| 10/28 |  M | 5.4 **Mod 14.1, 14.2** | **5.3** – 1-10, 22-30 |
| 10/30 | W | Review | **5.4** – 1-5 odd, 9, 11, 19 |
| 11/1 | F | **Test 3 – Ch. 5** |  |
| 11/4 | M | **Project 1 – Related Rates** |  |
| 11/6 | W |  |  |
| 11/8 | F | 6.1 **Mod 17.1, 17.2** |  |
| 11/11 | M | **Project 1 Due**6.2 **Mod 17.3, 18.1, 18.2, 18.3** | **6.1** – 1-4, 9-11, 37-39  |
| 11/13 | W | 6.2 | **6.2** – 1-6, 15-19 |
| 11/15 | F | 6.3 | **6.2** – 39 – 45, 97-103 |
| 11/18 | M | 6.3 | **6.3** – 1, 2, 11-13 |
| 11/20 | W | Review | **6.3** – 22-26, 41-44 |
| 11/22 | F | **Test 4 – Ch. 6** |  |
| 11/25-29 | M-F | **Thanksgiving Break** |  |
| 12/2 | M | 7.1 |  |
| 12/4 | W | 7.1 | **7.1** -1-8, 17-21, 43-49 |
| 12/6 | F | 7.2 |  |
| 12/9 | M | **Project 2- Integration** |  |
| 12/11 | W |  |  |
| 12/13 | F | **Project 2 Due** |  |
| 12/183:30 pm | W | **Final Exam** |  |