**Title**:          Calculus I

**Credit**:         4-0-4

**Textbook**:    Calculus (Early Transcendental) by J. Stewart, 8th edition, Brooks/Cole, 2015.

**Description**: To introduce the student to the basic concepts and methods of Calculus, topics include:
- Limits, continuity and differentiability of functions of a single variable (exponential, logarithmic, trigonometric and inverse trigonometric functions.)
- Applications: related rates, local linear approximation, differentials, hyperbolic functions, curve sketching and applied optimization problems.

**Learning Outcome:**

Upon successful completion of this course, a student should be able to:
1. Compute various types of limits of functions.
2. Apply the precise definition of a limit to some simple functions.
3. Determine the region of continuity and types of discontinuity of a function.
4. Apply the intermediate value theorem to locate zeros of functions.
5. Compute the slope of a curve at a point and the rate at which a function changes.
6. Calculate derivatives of different types of functions (exponential, logarithmic, trigonometric and inverse trigonometric functions) by using derivative rules.
7. Use differentials to estimate errors.
8. Differentiate the hyperbolic functions.
9. Find extreme values of functions.
10. Sketch and analyze the graphs of various types of functions.
11. Apply Newton's method to approximate zeros of functions.
12. Solve single variable optimization problems using derivatives.
13. Recover some basic functions from their derivatives.

**King Fahd University of Petroleum and Minerals**
**Department of Mathematics and Statistics**
**Math 101 Syllabus (Term 162)**
**Coordinator: Dr. Said Algarni**

**Grading Policy:**

| | | |
|---|---|---|
| **Exam I** A common multiple choice exam | **Material:** (2.1-2.8) **Date**: Sunday, March 12, 2017 **Time: TBA** **Place: TBA** | 25% (100 points) |
| **Exam II** A common multiple choice exam | **Material:** (3.1-3.10) **Date**: Wednesday, April 19, 2017 **Time: TBA** **Place: TBA** | 25% (100 points) |
| **Final Exam** A comprehensive common multiple choice exam | **Material:** (Comprehensive) **Date**: Monday, June 5, 2017 **Time:** 9:00 PM **Place: TBA** | 35% (140 points) |
| **Class Work** | **i) Online Homework:** Online homework is provided through Blackboard | 5% (20 points) |
| | **ii) Class Activities:** They are based on quizzes, class tests, or other class activities determined by the instructor. Any quiz or test under class activity should be of written type and not of multiple-choice type. The average x (out of 40) of class activities of the sections taught by the same instructor should be in the interval [28, 30]. | 10% (40 points) |
| **Passing Grade** | A student must score at least 50% (200 points) to pass the course. | |

**Exam Questions**:

The questions of the common exams are based on the examples, homework problems, recitation problems and the exercises of the textbook.

**Missing Exam I or Exam II:**

No makeup exam will be given under any circumstance. When a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula, which depends on his performance in the non-missing exam and in the final exam.

**Attendance:**

Attendance is a University Requirement. A DN grade will be awarded to any student who accumulates 12 unexcused absences (8 unexcused absences for Monday-Wednesday's lecture format).

**Academic Integrity:** All KFUPM policies regarding ethics apply to this course.

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| Week | Dates | Sec. | Topics |
|------|-------|------|--------|
| 1 | Feb. 5 – 9 | 2.1 | The Tangent Problem (Example 1). |
| | | 2.2 | The Limit of a Function. |
| 2 | Feb. 12 – 16 | 2.3 | Calculating Limits Using the Limit Laws |
| | | 2.4 | The Precise Definition of a Limit (**Examples: 1 and 2**) |
| 3 | Feb. 19 – 23 | 2.5 | Continuity |
| 4 | Feb. 26 – March 2 | 2.6 | Limits at Infinity; Horizontal Asymptotes |
| | | 2.7 | Derivative and Rates of Change |
| 5 | March 5 - 9 | 2.8 | The Derivative as a Function |
| | | 3.1 | Derivatives of Polynomials and Exponential Functions |
| **Exam I: March 12** (2.1- 2.8) | | |
| 6 | March 12 -16 | 3.2 | The Product and Quotient Rules |
| | | 3.3 | Derivatives of Trigonometric Functions |
| 7 | March 19 -23 | 3.4 | The Chain Rule |
| | | 3.5 | Implicit Differentiation  + **Exercise # 77** |
| 8 | March 26 –30 | 3.6 | Derivatives of Logarithmic Functions |
| | | 3.7 | Rates of Change (**Example 1**) |
| **April 2 – 6 Midterm Break** | | |
| 9 | April 9 - 13 | 3.9 | Related Rates |
| | | 3.10 | Linear Approximations and Differentials |
| **Exam II: April 19**  (3.1- 3.10) | | |
| 10 | April 16 - 20 | 3.10 | Continued |
| | | 3.11 | Hyperbolic Functions (**Examples:  1 and 2**) |
| 11 | April 23 - 27 | 4.1 | Maximum and Minimum Values |
| | | 4.2 | The Mean Value Theorem |
| 12 | April 30 – May 4 | 4.2 | Continued |
| | | 4.3 | How Derivatives Affect the Shape of a Graph |
| 13 | May 7- 11 | 4.4 | Indeterminate Forms and L'Hospital's Rule |
| | | 4.5 | Summary of Curve Sketching |
| 14 | May 14- 18 | 4.5 | Continued |
| | | 4.7 | Optimization Problems |
| 15 | May 21 - 25 | 4.8 | Newton's Method |
| | | 4.9 | Antiderivatives |
| **Final Exam**: **June 5 (Comprehensive)** | | |

# King Fahd University of Petroleum and Minerals
## Department of Mathematics and Statistics
## Math 101 Syllabus (Term 162)
Recitation problems & some suggested problems

| Section | Recitation Problems | Suggested Problems | CAS* |
|---|---|---|---|
| 2.2 | 6, 12, 18, 36, 40, 44 | 9, 11 17, 35, 37, 39, 41 | - |
| 2.3 | 12, 18, 22, 24, 26, 32, 51, 54 | 1, 9, 11, 17, 21, 25, 29, 53 | - |
| 2.4 | 2, 14, 18, 22 | 3, 5, 13, 17, 21 | - |
| 2.5 | 6, 12, 16, 20, 24, 34, 36, 40, 42, 46 | 3, 7, 13, 15, 17, 19, 21, 23, 29, 31, 35, 43, 45, 47, 49 | 34 |
| 2.6 | 6, 10, 14, 18, 24, 28, 36, 42, 50 | 3, 7, 13, 15, 17, 19, 25, 35, 39, 41, 49 | 45 |
| 2.7 | 6, 10, 14, 22, 28, 36, 38 | 7, 9, 13, 21, 23, 25, 29, 35, 39 | - |
| 2.8 | 2, 4, 8, 24, 28, 50, 62 | 1, 3, 9, 25, 29, 41, 49, 61 | 55 |
| 3.1 | 10, 24, 38, 50, 56, 70, 72 | 9, 23, 35, 37, 49, 55, 59, 61, 69, 71, 73, 75, 81 | 47, 60 |
| 3.2 | 6,10, 20, 30, 32, 42, 46, 48, 52(d) | 5, 9, 11, 23, 29, 31, 41,43, 49, 51, 53 | 38 |
| 3.3 | 6, 12, 22, 44, 52 | 3, 11, 23, 43, 49, 51 | - |
| 3.4 | 18, 26, 42, 50, 54, 62, 78 | 19, 25, 39, 53, 59, 61, 77 | - |
| 3.5 | 6, 14, 20, 22, 30, 58, 74(a), 78 | 7, 11, 15, 17, 21, 29, 57, 75, 77 | - |
| 3.6 | 12, 16, 18, 32, 34, 42, 48, 54 | 3, 9, 19, 31, 33, 41, 49, 53 | - |
| 3.7 | 2, 8 | 1, 3, 5, 9 | - |
| 3.9 | 4, 6, 12, 48 | 3, 7, 13, 19, 31 | - |
| 3.10 | 6, 16, 24, 28, 34 | 5, 17, 25, 27, 35 | 5 |
| 3.11 | 10, 20, 30, 46 | 7, 9, 21, 31, 57 | - |
| 4.1 | 10, 12, 28, 30, 34, 36, 42, 54 | 3, 5, 9, 11, 27, 33, 35, 39,55, 57 | - |
| 4.2 | 4, 8, 12, 16, 20, 26 | 3, 7, 9, 13, 15, 19, 25, 33 | - |
| 4.3 | 14, 18, 20, 24, 36, 52 | 11, 13, 17, 21, 23, 25, 31, 35, 53, 57 | 62 |
| 4.4 | 12, 14, 48, 52, 64 | 13, 15, 23, 25, 33, 47, 53, 57, 87 | 72 |
| 4.5 | 30, 44, 62, 72 | 19, 33, 37, 63, 71 | - |
| 4.7 | 2, 6, 14, 32 | 3, 5, 15, 23, 29, 31 | - |
| 4.8 | 8, 12, 22 | 7, 11, 17 | - |
| 4.9 | 6, 12, 20, 38, 44, 54, 62 | 7, 15, 19, 35, 37, 41, 51, 59 | - |

**\* CAS** problems require the use of a technology tool (e.g., graphing calculators or a computer). You are encouraged to do these problems in order to enhance your understanding of the concepts involved.