

**KING SAUD UNIVERSITY  
DEANSHIP OF COMMON FIRST YEAR  
BASIC SCIENCES DEPARTMENT**

**SYLLABUS AND CONTENTS OF MATH 101 (1447 H)**

**Course Name:** Differential Calculus

**Credit Hours:** 3 hours

**Course Number:** Math 101

**Actual Hours:** 5 hours

**Prerequisite:** ---

**Semester:**

**First Semester**

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**Office:** 2443 "Learning Resources Centre"

**Textbook:**

Differential Calculus, Fourth Edition, 2019

**Authors:**

Ibraheem Alolyan, Nasser Bin Turki, Tahsin Ghazal, Obaid Al-Gahtani and Khaled Khashan

**References:**

- Swokowski, E, W; Olinick, M; Penece, D. Calculus, Sixth Edition, PWS Publishing Company, 1994.
- Larson, R & Edwards, R. **Calculus**, Tenth Edition, Cengage Learning, 2014.
- Anton, H; Bivens, I & Davis, S. **Calculus Early Transcendentals**, Ninth Edition, Wily & Sons, 2009.

### Evaluation:

The evaluation of the students will be continuous during the course and depends on the following:

|                                    |           |
|------------------------------------|-----------|
| Mid Term Exam                      | 25        |
| Activities + Tutorial (Class work) | (2+13=15) |
| Two Home works(Paper)              | 10        |
| Final Exam                         | 50        |

### تعليمات مهمة:

1. يحتسب الغياب منذ اليوم الأول من الفصل الدراسي إلى آخر يوم قبل الاختبارات النهائية.
2. في حالة تأخر الطالب عن 5 دقائق، يسجل متأخرًا.
3. يتم احتساب كل مرتين تأخير، بمرة واحدة غياب.
4. يحرم الطالب من المقرر إذا تجاوزت غيابه 25% من ساعات الحضور.

### Course Schedule and Contents:

| Chapter     | Weeks | Section                              | Lecture "Teacher"                                                                                                           | Exercises                        |
|-------------|-------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|             | 1     | أسبوع تعريفى                         |                                                                                                                             |                                  |
| Chapter One | 2-5   | 1.1 Sets of Numbers and Inequalities | Example: (1.1.1), (1.1.2),<br>Exercise: (7)                                                                                 | 1,3,5,6,16,19,23                 |
|             |       | 1.2 Functions                        | Example: (1.1.4) (except c, d),<br>Example: (1.2.3), (1.2.4), (1.2.5), (1.2.10),<br>Exercise: (20,59)                       | 14,17,19,23,26,48,54,57,58,63,67 |
|             |       | 1.3 Inverse Functions                | Related Problem:(2)<br>Example: (1.3.4), (1.3.5)<br>Exercise: ((1,2,3),38)<br><b>Remark page 31 (<math>a \neq 0</math>)</b> | 9,13,15,16,33,41,42              |

|                                                    |       |                                                        |                                                                                                                                                                                                   |                                            |
|----------------------------------------------------|-------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
|                                                    |       | <b>1.4</b> Trigonometric Functions and Their Inverses  | Example: (1.4.1), (1.4.2), (1.4.3), (1.4.4), (1.4.5), (1.4.6), (1.4.7), (1.4.8), (1.4.9), and (1.4.10)                                                                                            | 2,4,5,8,9,12,14,16,17,18,21,27,29,37,44,52 |
| <b>Chapter Two</b><br><b>Limits and Continuity</b> | 6-9   | <b>2.1</b> Definition of Limit                         | Example: (2.1.1), (2.1.2)<br>Exercise (from 12 to 17)                                                                                                                                             | 2,3,8,10                                   |
|                                                    |       | <b>2.2</b> Limits Laws                                 | Example: (2.2.3), (2.2.5), (2.2.6(except {d})), (2.2.7 {a}), (2.2.8), (2.2.9), (2.2.11) (except f),<br>Related Problem: (6 {d, f})<br>Exercise (73)<br>Example: (2.2.12)<br><b>Remark page 90</b> | 7,11,13,26,29,30,41,49,54,55,63,66,75      |
|                                                    |       | <b>2.3</b> Limits Involving Infinity                   | Example: (2.3.1), (2.3.5),<br>Example: (2.3.8), (2.3.9)<br>Exercise (8, 9), 24,53)                                                                                                                | 19,20,25,45,48                             |
|                                                    |       | <b>2.4</b> Continuity of Functions                     | Example: (2.4.1), (2.4.2), (2.4.4),<br><b>Remark page 131</b><br>Example: (2.4.6), (2.4.8), (2.4.11)<br>Exercise (28)                                                                             | 1,5,7,12,18,29,30,32,34,40,58              |
|                                                    |       |                                                        |                                                                                                                                                                                                   |                                            |
| <b>Chapter Three</b><br><b>Differentiation</b>     | 10-13 | <b>3.1</b> The Derivative and the Tangent Line Problem | Example: (3.1.4), (3.1.6), (3.1.7), (3.1.8),<br>Example: (3.1.9) ( <b>Use Remark page 153</b> )<br>Exercise: (30)                                                                                 | 2,6,8,10,13,15,21,23                       |
|                                                    |       | <b>3.2</b> Differentiation Rules                       | Example: (3.2.1 {a, b, c}), (3.2.2 {b, c}),<br><b>Use Remark page 166(give an example)</b><br>Example: (3.2.3 {b}), (3.2.4) (b), (3.2.5)<br>Exercise: (44)                                        | 1,4,5,14,16,17,23,24,29,41                 |
|                                                    |       | <b>3.3</b> Derivatives of Trigonometric functions      | Example: (3.3.1), (3.3.2), (3.3.3), (3.3.5)                                                                                                                                                       | 1,5,7,10,11,13,16,19,20,21,23              |
|                                                    |       | <b>3.4</b> The Chain rule                              | Example: (3.4.2),<br>Exercise: (20)<br>Example: (3.4.6) (a, c),                                                                                                                                   | 2,5,6,8,11,12,15,16,19,29,34,38,47         |
|                                                    |       | <b>3.5</b> Implicit Differentiation                    | Example: (3.5.1), (3.5.2)                                                                                                                                                                         | 1,2,3,4,5,8,9,12,13,14,19,20,23,26         |

|                                                                 |       |                                                |                                                                                                         |                                                            |
|-----------------------------------------------------------------|-------|------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|                                                                 |       | <b>3.6</b> Higher Order Derivatives            | Example: (3.6.1)<br>Related Problem: (2,3)<br>Example: (3.6.7)                                          | 1,4,6,7,10,12,13,14,16,18,19,22,23,26,27,29,32,34,35,37,38 |
|                                                                 |       | <b>3.7</b> The Derivative of Inverse Functions | Example: (3.7.2)<br><br>Exercise: (14)                                                                  | 6,7,11,15,16,17,23                                         |
| <b>Chapter Four<br/>Applications<br/>of<br/>Differentiation</b> | 13-15 | <b>4.1</b> Extrema of Functions                | Example: (4.1.1), (4.1.4 except {g}), (4.1.5)<br><br>Exercise: (24)                                     | 1-4,6,7,11,16,17                                           |
|                                                                 |       | <b>4.2</b> The Mean Value Theorem              | Example: (4.2.1), (4.2.4)<br><br>Exercise: (1,2)                                                        | 6,7,21,24,26                                               |
|                                                                 |       | <b>4.3</b> Increasing and Decreasing Functions | Example: (4.3.3), (4.3.4)<br>Related Problem: (3 {a})<br>Example: (4.3.6)<br>Exercise: (4,5)            | 1,3,7,11,13,15,26,38                                       |
|                                                                 |       | <b>4.4</b> Concavity                           | Example: (4.4.1), (4.4.2), (4.4.5), (4.4.6)<br>Related Problem: (2 {a})<br><br>Exercise: (5 to 9), (47) | 12,25,28,36,48                                             |
|                                                                 |       | <b>4.5</b> Curve sketching                     | Example: (4.5.1), (4.5.2)<br><br>Exercise: (3)                                                          | 4,5,19                                                     |