University of Bahrain
Quality Assurance
& Accreditation Center

| Course Syllabus Form | |
|---|---|
| **1. College** | Science |
| **2. Department** | Mathematics |
| **3. Program** | B.Sc. for Engineering and IT students only |
| **4. Course Code** | MATHS 101 |
| **5. Course Title** | Calculus 1 |
| **6. Course Credits** | 3 |
| **7. Pre–requisites** | None |
| **8. Course Web–pages** | `http://www.abdullaeid.net/MATHS101` |
| **9. Course Coordinator** | Dr. Muhannad Shahwan and Dr. Abdulla Eid |
| **10. Academic Year** | 2016/2017 |
| **11. Semester** | First |

**12. Course Description:** Algebra. Functions and graphs. Trigonometry. Conic sections. Limits and continuity. Derivatives and integrals. Applications of derivatives which include mean value theorem, extrema of functions and optimization. Definite integrals and the Fundamental Theorem of Calculus

**13. Textbook:**

- George Thomas Jr, Maurice Weir, and Joel Hass, *Thomas' Calculus Early Transcendentals*, 2008, 12th Edition, Pearson, ISBN-13: 978-1292021232

**14. References:**

1. James Stewart, *Calculus, Early Transcendentals*, 2012, 7th Edition, Brooks/Cole Cengage Learning, ISBN-13: 978-0538498876.
2. Robert Smith and Ronald Monton, *Calculus, Early Transcendentals*, 2011, 4th Edition, McGraw-Hill Education, ISBN-13: 978-0073532325.
3. Bill Briggs, Lyle Cochran, and Bernard Gillett, *Calculus: Early Transcendentals*, 2014, 2nd Edition, Pearson, ISBN-13: 978-0321947345
4. Michael Spivak, *Calculus*, 2008, 4th Edition, Publish, ISBN–13: 978-0914098911. **For "A+" students**

**15. Other Resources:**

- Khan Academy: `http://www.khanacademy.org/math/calculus/differential-calculus/`
- Calucluls resources: `http://www.calculus.org`
- A humorous approach to learning calculus (for those with a sense of humor only): Colin Adams, Abigail Thompson, Joel Hass *How to Ace Calculus: The Streetwise Guide*, 1998, 1st Edition, Times Books, ISBN–13: 978–0716731603

**16. Course Intended Learning Outcomes (CILOs):**

Students who successfully complete this course should be able to:

| | Mapping to PILOs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CILOs | a | b | c | d | e | f | g | h | i | j | k |
| 1. Recall some algebraic and transcendental functions and their properties | | | | | | | | | | | |
| 2. Evaluate limits of functions both geometrically and algebraically | | | | | | | | | | | |
| 3. Examine continuity of various types of functions at a point or on a set | | | | | | | | | | | |
| 4. Find derivatives of functions by using the definition | | | | | | | | | | | |
| 5. Use differentiation rules to find derivatives of explicit and implicit functions | | | | | | | | | | | |
| 6. Find slopes and equations of tangent and normal lines | | | | | | | | | | | |
| 7. Recognize the relation between differentiation and integration | | | | | | | | | | | |
| 8. Use the fundamental theorem of calculus to evaluate definite integrals | | | | | | | | | | | |
| 9. Evaluate integrals by using the substitution method | | | | | | | | | | | |
| 10. Employ differentiation to describe the behavior of functions | | | | | | | | | | | |
| 11. Use differentiation to sketch functions | | | | | | | | | | | |
| 12. Apply derivatives to solve real life problems such as optimization and related rates | | | | | | | | | | | |

**17. Course Assessment:**

| Assessment Type | Number | CILOs | Weight |
|---|---|---|---|
| Tests | 2 | Test 1: CILOs 1,2,3,4,5<br>Test 2: CILOS 5,6,7,8 | 50% |
| Online Homework | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11 | CILOs 1,2<br>CILOs 2,3<br>CILOs 1,2<br>CILOs 1,4,5<br>CILOs 1,5,6<br>CILOs 1,5,6<br>CILOs 1,5,6<br>CILOs 1,5,6<br>CILOs 7<br>CILOs 7,8<br>CILOs 9 | 10% |
| Final Exam | 1 | All CILOs | 40% |

**18. Assessments Details:**

| No | Assessment | Weight | Time | Date | Place | Material |
|---|---|---|---|---|---|---|
| 1 | Test 1 | 25% | 11: 30 AM – 12:30 PM | October 17, 2016 | See the announcement | Sections 2.2–2.5 |
| 2 | Test 2 | 25% | 11: 30 AM – 12:30 PM | November 28, 2016 | See the announcement | Sections 2.6–3.8 |
| 3 | Online Homework | 10% | See the homework rules | See the homework rules | See the homework rules | Sections 2.2–5.5 |
| 4 | Final Exam | 40% | 11:30 AM – 1:30 PM | January 14, 2017 | TBA | All sections |

**19. Course Instructor:**

| Section(s) | Instructor | Office | Online HW Course ID |
|---|---|---|---|
| 1, 2, 3, 4, 5, 6 | Dr. Muhannad Shahwan | S41–2101 | XL2F-W18F-801Y-4UI2 |
| 7, 8, 18, 19 | Dr. A.Salam Al-mannai | S41–2084 | XL2F-W18H-801Y-6UI2 |
| 9, 30 | Dr. Abdulla Eid | S41–2098 | XL2F-W18C-801Y-1UI2 |
| 10 | Dr. Haslinda Binti Ibrrahim | S41–2097 | XL2H-Q1JM-301Y-1UI2 |
| 11, 12, 25 | Dr. Ahmed Matar | S41–2135 | XL2H-L1Y6-701Y-5UI2 |
| 13, 14, 15, 24 | Dr. Ishtiaq Khan | S41–2046 | XL2F-W18J-801Y-8UI2 |
| 16, 17, 31 | Dr. A.aziz Lahji | S41–2138 | XL2F-W18K-801Y-9UI2 |
| 20, 21, 22 | Dr. Ali S Elfard | S41–2038 | XL2H-H16I-901Y-4UI2 |
| 23, 27 | MUHAMMAD HASNAIN | S41–2090 | XL2H-H16P-001Y-1UI2 |
| 26, 29 | MONITA BARUAH | S41–2053 | XL2H-L1Y7-701Y-6UI2 |
| 28, 32 | Dr. Mohammed Aiyub | S41–2042 | XL2F-W18I-801Y-7UI2 |

**20. Attendance Policy:**

Extracts from the University Bulletin regarding withdrawal and enforced withdrawal (Article 31):

A students absence from lectures or classes in excess of 25% of the total assigned session will result in an automatics withdrawal of the student from the course, regardless of the causes for his/her absence.

(a) A grade of (W) is given to a student who misses 25% or more of the total sessions assigned to the course if he/she presents a valid excuse for his/her absence.

(b) A grade of (WF) is given to a student who misses 25% or more, but with no valid excuse.

The classroom environment should be conductive to learning by all. This means, among other things, coming to class on time and prepared. Please no chit-chat talks during the class. Cell phones and all electronic devices should be turned off and put away during the class.

**21. Academic Plagiarism:**

All students are expected to follow the specific rules of academic honesty and plagiarism as per the regulation of professional conduct violations for University of Bahrain students, decision number 4/2006. Please refer the UoB website-Deanship of Students Affairs-Guidance Office.

Cheating is strictly prohibited and will result in serious consequences. In particular, cheating may result in an "F" for the course and be reported to deanship of students affairs. Using of any outside materials, looking at another student's exam or using cell phones might be consider as a cheating (whether or not you get benefit from it). For more information, refer to the student handbook (Article 75).

**22. Important Dates:**

- Sept 18, 2016: First day of the semester (Instruction begins).
- Sept 29, 2016: Last day to drop courses without a 'W' grade.
- November 13 – 17 , 2016: The mid semester break.
- Dec 8, 2016: Last day to withdraw with a 'W' grade.
- Jan 12, 2017: Last day of instruction.
- Jan 14, 2017: Final exam.

| **23. Weekly Breakdown:** | | | | | |
|---|---|---|---|---|---|
| **Week** | **Date** | **Topics Covered** | **CILOs** | **Teaching Method** | **Assessment** |
| 1 | 18.09.2016 | Limit of a function and limit laws. | 1,2 | Lecture and problem-solving | HW 1, Test 1, Final Exam |
| 2 | 25.09.2016 | One sided limits. | 1,2 | Lecture and problem-solving | HW 2, Test 1, Final Exam |
| 3 | 02.10.2016 | Continuity. | 3 | Lecture and problem-solving | HW 2, Test 1, Final Exam |
| 4 | 09.10.2016 | Limits involving infinity; asymptotes of graphs. | 1,2 | Lecture and problem-solving | HW 3, Test 1, Final Exam |
| 5 | 16.10.2016 | The derivative as a function. Differentiation rules. | 4,6 5,6 | Lecture and problem-solving | HW 4, Test 1, Final Exam |
| 6 | 23.10.2016 | Derivatives of trigonometric functions. The chain rule | 5,6 | Lecture and problem-solving | HW 4, HW5, Test 1, Final Exam |
| 7 | 30.10.2016 | Implicit Differentiation. | 5,6 | Lecture and problem-solving | HW 6, Test 2, Final Exam |
| 8 | 06.11.2016 | Derivatives of inverse functions and logarithms. Inverse trigonometric functions. | 1,5,6 | Lecture and problem-solving | HW 6, HW 7, Test 2, Final Exam |
| | 13.11.2016 | **Mid semester break** | | | |
| 9 | 20.11.2016 | Related Rates. Linearization and differentiatials. | 12 | Lecture and problem-solving | HW 8, Test 2, Final Exam |
| 10 | 27.11.2016 | Anti–derivatives. | 7 | Lecture and problem-solving | HW 9, Test 2, Final Exam |
| 11 | 04.12.2016 | Definite Integrals. The fundamental theorem of calculus. | 8 | Lecture and problem-solving | HW 10, Test 2, Final Exam |
| 12 | 11.12.2016 | Indefinite integral and substitution method. | 9 | Lecture and problem-solving | HW 11, Final Exam |
| 13 | 18.12.2016 | Substitution method and area between curves. Extreme values of functions. | 8,9,10 | Lecture and problem-solving | HW 10, Test 2, Final Exam |
| 14 | 25.12.2016 | Monotonic functions and 1st derivative test. Concavity and curve sketching. | 10,11 | Lecture and problem-solving | Final Exam |
| 15 | 01.01.2017 | Applied optimization. | 12 | Lecture and problem-solving | Final Exam |

| **23. Weekly Breakdown:** | | | | | |
|---|---|---|---|---|---|
| **Week** | **Date** | **Topics Covered** | **CILOs** | **Teaching Method** | **Assessment** |
| 16 | 08.01.2017 | **Revision**. | | Lecture and problem-solving | |

| **24. Course Weekly Examples and Problems:** | | | | | |
|---|---|---|---|---|---|
| **Week** | **Date** | **Section** | **Topics Covered** | **Examples** | **Problems** |
| 1 | 18.09.2016 | 2.2 | Limit of a function and limit laws | 5,6,7,9,10 | 11–42,63 |
| 2 | 25.09.2016 | 2.4 | One sided limits | 2 | 1–4, 11–18 |
| 3 | 02.10.2016 | 2.5 | Continuity | | 13–16, 25–28, 43–48, Handout 1 |
| 4 | 09.10.2016 | 2.6 | Limits involving infinity; asymptotes of graphs | 2,3,6 | 13–48 |
| 5 | 16.10.2016 | 3.2<br>3.3 | The derivative as a function<br>Differentiation rules | 1,2<br>1,3 | 1–12<br>1–54 |
| 6 | 23.10.2016 | 3.5<br><br>3.6 | Derivatives of trigonometric functions<br>The chain rule | 1–6<br><br>1–6 | 1–34, 55, 56<br><br>1–90 |
| 7 | 30.10.2016 | 3.7 | Implicit Differentiation | 1–5 | 1–40 |
| 8 | 06.11.2016 | 3.8<br><br>3.9 | Derivatives of inverse functions and logarithms<br>Inverse trigonometric functions | 3,5,6,7<br><br>2,3 | 11–96<br><br>21–42 |
| | 13.11.2016 | | **Mid semester break** | | |
| 9 | 20.11.2016 | 3.10<br>3.11 | Related Rates<br>Linearization and differentiatials | <br>1–3 | 3–12, 20,21<br>1–6 |
| 10 | 27.11.2016 | 4.8 | Anti–derivatives | 1,2,3,6 | 25–70, 91–113 |
| 11 | 04.12.2016 | 5.3<br>5.4 | Definite Integrals<br>The fundamental theorem of calculus | 2<br>2,3 | 9–14<br>1–34, 39–56 |
| 12 | 11.12.2016 | 5.5 | Indefinite integral and substitution method | 1–9 | 1–37, 43-66 |
| 13 | 18.12.2016 | 5.6<br><br>4.1 | Substitution method and area between curves<br>Extreme values of functions | 1,2<br><br>2,3 | 1–46<br><br>21–28, 45–52 |
| 14 | 25.12.2016 | 4.3<br><br>4.4 | Monotonic functions and 1st derivative test<br>Concavity and curve sketching | 1<br><br>7 | 19–24<br><br>9–22 |
| 15 | 01.01.2017 | 4.6 | Applied optimization | 1,2 | 1,2,4–8,11,12,29,30,33–36 |
| 16 | 08.01.2017 | | **Revision** | | |