

**Department of mathematics & Natural sciences**

**MAT 110: Differential Calculus & Coordinate Geometry (Mathematics I); Section: 03**

*“Pure mathematics is, in its way, the poetry of logical ideas” – Albert Einstein*

**Fall 2017**

**Class Routine**

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| --- | --- | --- |
| **Day** | **Class** | |
|  | Time | Room |
| **Sunday** | 11.00 – 12.20 |  |
| **Tuesday** | 11.00 – 12.20 |  |

**Consultation Schedule**

To be announced. Room0 UB 21506. I am also available by appointment.

**Instructor Information**

**Name:** Ms. Mehnaz Karim

**Background:** B.Sc. (Honors) Mathematics, University of Toronto, Canada; M. Sc. Applied Statistics & Operational Research, RMIT University, Australia

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**Rationale**

The study of this course helps to learn how things change. It provides a framework for modeling systems in which there is change, and a way to deduce the predictions of such models.

**Course Aims and Outcomes**

Content in this course will be adaptive, allowing students to achieve a certain concept before moving on to the next level.

**Course Contents**

**Differential Calculus:** Set, Limits, Continuity and differentiability, Differentiation, Increasing and decreasing, Maximum and minimum, Taylor’s and Maclaurin’s theorem, Indeterminate forms, Partial differentiation, Maxima and Minima for several variables, Lagrange multiplier.

**Co-ordinate Geometry:** Co-ordinate system, Transformation of co-ordinates, General equation of second degree, Pair of straight lines, Circle and its properties, Conics, Tangent and normal, Asymptotes and their applications.

**Learning Outcome**

This course is designed to provide science/ engineering students an intense foundational introduction to the fundamental concepts in mathematics. After completing this course a student will be beneﬁtted in the following ways:

* he/she will be able to recognise patterns and make conjectures;
* will be able to create, sketch, and interpret mathematical graphs, functions, domains ,ranges;
* will be able to develop his/her knowledge to solve mathematical problems
* he/she will be able to determine the role of mathematics as a logical, predictable system for expressing and relating quantities in analyzing and solving problems in the real world

**Reference Books:**

**1.** **Calculus (7th/8th/9th/10th Edition): Howard Anton.  
2. A Text Book on Coordinate geometry and Vector Analysis: Kosh Mohammad.  
3.** **Calculus ( 9th Edition ) by Thomas Finney**

**Marks Distribution**

|  |  |
| --- | --- |
| Attendance | 5 |
| Quiz (average of best 3 out of 4 will be taken into count) | 25 |
| Midterm | 20 |
| Final Exam | 50 |
| Total | 100 |

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| --- | --- |
| Attendance | Marks |
| 90% and above | 5 |
| 85% - 89% | 4 |
| 80% - 84% | 3 |
| 75% - 79% | 2 |
| 70% - 74% | 1 |
| Less than 70% | 0 |

**Administrative information**

* There will be **no makeup quizzes**.
* There will be **no makeup midterm** as well, unless any student *submits application* through the corresponding chair of the department at least *7 days before* the midterm’s scheduled date.
* No students will be allowed to sit for final exam if he/she misses 30% of the total classes.
* You are strongly encouraged to drop by my office to ask questions and discuss problems. If you are unable to meet with me during consultation hour, then I am available at other times by appointment.
* You will find other supporting documents at \\tsr\Fall\MNS\MZK\MAT 110

**Academic Integrity**

Each student in this course is expected to abide by the BRAC University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. Also refer to plagiarism policy that will be on the web.

You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e-mail, an e-mail attachment file, a diskette, or a hard copy.

If copying occurs, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the quizzes and assigned work at home. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor May you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

Lecture Delivery Plan:

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| --- | --- |
| **Lecture No.** | **Topics** |
|  | **Differential Calculus** |
| 1 | Sets and its related topics, Definition of function, Various types of functions,  Sketch the simple functions |
| 2 | Sketch of simple functions continues |
| 3 | Domain and ranges of a function with graph |
| 4 | Limit, Continuity of a function |
| 5 | Definition of derivative, Differentiability test **Quiz # 01** |
| 6 | First principle of derivatives, Techniques of differentiation |
| 7 | Increasing and decreasing function |
| 8 | Maxima and minima |
| 9 | Rolle’s Theorem, Mean-value Theorem **Quiz # 02** |
| 10 | Successive differentiation, Taylor’s Theorem and Maclaurin’s Theorem in finite  and infinite form |
| 11 | Leibnitz’s Theorem |
| 12 | Indeterminate form (L’ Hspital’s rule) |
| 13 | Partial derivatives |
| 14 | **Midterm Examination (tentative)** |
| 15 | Maxima and Minima for several variables |
| 16 | Lagrange multiplier |
|  | **Co-ordinate Geometry** |
| 17 | Co-ordinate system: Cartesian and polar **Quiz # 03** |
| 18 | Transformation of co-ordinates, Invariants theorem |
| 19 | The condition for which the general equation of second degree represents pair  of straight lines, Angle between the pair of straight lines |
| 20 | Pair of Straight Lines: Equation of bisectors **Quiz # 04** |
| 21 | Circle and its properties, Equation of Tangent and normal |
| 22 | Circle: Condition of tangency |
| 23 | General equation of Conics, Derive the equation of Ellipse and Hyperbola Parabola |
| 24 | Derive the equation of Parabola |
| 25 | Review |

**There will be changes in lecture plans, if necessary, according to the progress of the students.**