

	<b>Independent University, Bangladesh</b>			
	Department of Physical Sciences			
	Semester	Course code	Course Title	Section
Spring 2016	MAT 102	Introduction to Linear Algebra and Calculus	02	

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### Course objectives

MAT 102 is a mandatory course for the students who want to graduate from the department of Electrical and Electronic Engineering. Completion of this course fulfills three credit of foundation level numeracy requirement. The course contains basic concepts of Calculus and introductory linear Algebra. This is a prerequisite course to begin with engineering mathematics.

**Instructional Format p/w:** 2×1½ - hours lectures  
**Lecture Time and Place:** M,W: 13:40-15:10, Rm: BC 5013

**Textbook:** All students should buy

Thomas, G.B., Finney R.L. and Weir, M.D (2005), Calculus and Analytic Geometry (9th edition), Addition-Wesley Publishing Company.

### Recommended Reference:

Howard Anton, Irl Bivens and Stephen Davis (2012), Calculus (10<sup>th</sup> edition), John Wiley and Sons.

### Evaluation criteria

Homework will be assigned weekly. Students are not required to hand those back for grading but completing the given homework is essential for understanding the material and performing satisfactorily on examinations.

### **The weighting scheme is as follows:**

Class attendance: 5%  
Two Class tests (CT): 35% (15%+20%)  
Mid-term test (MT): 20%  
Final test (FT): 40%

### **Rules and regulations**

- Students are required to attend classes on time and to take well-organized notes.
- If a student misses or fails to attend a class, it is his/her sole responsibility to obtain missing information (for examples, change of exam dates, omit/add some topics, lecture notes, new home works etc).
- For a test, no extensions or alternative times are possible and also there is no word for make-up.
- For any unavoidable circumstances, test will be strictly held on the next lecture.
- No extra work will be given to improve the grade.
- Students are required to show matured behaviour in class. For examples, cellular phones will be shut off during class lectures and examinations. Eating, drinking, chewing gum, reading newspapers, socialization and sleeping are not permitted in class.
- **Any kinds of cheating in class are strictly prohibited and may result in a failing grade 'F' for the course.**

### **Grading scales**

Above 85%: A  
81% - 85%: A-  
76% - 80%: B+  
71% - 75%: B  
66% - 70%: B-  
61% - 65%: C+  
56% - 60%: C  
51% - 55%: C-  
45% - 50%: D+  
40% - 45%: D  
Below 40%: F

## Course Plan

<b>Lecture #</b>	<b>Topics</b>	<b>Text/Reference</b>
Lecture 1	Function, domain, range, graphs of common functions (constant function, linear function, quadratic function, cubic function, absolute value function, square root function)	Thomas, G.B., Finney R.L. and Weir Chapter 1, pp.17-21 HW: Ex: 1-6, 13-24, p.25
Lecture 2	Graphs of exponential function and logarithmic function, piecewise defined functions, even function, odd function, combination of functions, composition of functions, shifting graphs	Thomas, G.B., Finney R.L. and Weir Chapter 1, pp.22-24, pp.27-28 HW: Ex: 27-38, p.25 Ex: 43-46, p.26 Ex: 1-36, pp.32-33
Lecture 3	Graphs of trigonometric functions  Limit concept, limit laws	Thomas, G.B., Finney R.L. and Weir Chapter 1, p.37, pp.39-40  Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.54-64 HW: Ex: 1-30, p.65
Lecture 4	Limit continued, limit from graph  Application of limit - Continuity	Thomas, G.B., Finney R.L. and Weir Chapter 2, Ex:1-4, pp.57-58  Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.87-91 HW: 1-8, p.95
Lecture 5	Review	Lecture 1 - Lecture 4
<b>Lecture 6</b>	<b>Class Test 1(15%)</b>	<b>Topic: Lecture 1 - Lecture 4</b>
Lecture 7	Differentiation Derivative of a function	Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.109-112

	Rules of differentiation	HW: Ex: 1-6, p.117  Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.121-128 HW: Ex: 1-38, p.129
Lecture 8	Differentiation of trigonometric functions  The chain rule	Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.146-148 HW: Ex: 1-24, p.152  Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.154-158 HW: Ex: 1-8, p.160
Lecture 9	Implicit differentiation  Logarithm differentiation, higher order differentiation	Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.164-167 HW: Ex:19-32, p.170  Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.128-129 Ex: 31-34, p.129
Lecture 10	Application of differentiations: Rates of change  Equation of tangent line and normal line	Thomas, G.B., Finney R.L. and Weir Chapter 2, pp.131-136 HW: Ex: 1-8, pp.139-140  Lecture sheets, pp.1-3 Thomas, G.B., Finney R.L. and Weir Chapter 2 HW: Ex: 47-56, p.4
Lecture 11	Extreme values (maxima and minima) of a function	Thomas, G.B., Finney R.L. and Weir Chapter 3, pp.189-194

		HW: Ex: 1-28, pp.195-196
Lecture 12	Review	Lecture 7 - Lecture 11
<b>Lecture 13</b>	<b>Mid-term test (20%)</b>	<b>Topic: Lecture 7 - Lecture 11</b>
Lecture 14	Integration, indefinite integrals, rules of integration, integration of trigonometric functions	Thomas, G.B., Finney R.L. and Weir Chapter 4, pp.275-280 HW: Ex: 1-58, pp.280-281
Lecture 15	Integration by substitution	Thomas, G.B., Finney R.L. and Weir Chapter 4, pp.290-296 HW: Ex: 1-46, pp.296-297
Lecture 16	Integration by parts, definite integration	Thomas, G.B., Finney R.L. and Weir Chapter 7, pp.562-567 HW: Ex: 1-24, p.567
<b>Lecture 17</b>	<b>Class test 2 (20%)</b>	<b>Topic: Lecture 14 - Lecture 16</b>
Lecture 18	Properties of definite integral, application of integration, area under a curve	Thomas, G.B., Finney R.L. and Weir Chapter 4, pp.323-328 HW: Ex: 19-26, p.331
Lecture 19	Initial value problem  Average value of a function	Thomas, G.B., Finney R.L. and Weir Chapter 4, pp.282-285 HW: Ex:1-22, p.288  Thomas, G.B., Finney R.L. and Weir Chapter 4, pp.328-329 HW: Ex:27-32, p.331
Lecture 20	Concept of a matrix, order of a matrix, types of matrices (row matrix, column matrix, rectangular matrix, square matrix, diagonal matrix, unit matrix, triangular matrix, null matrix, transpose of a matrix), matrix algebra	Lecture sheets pp.1-9

	(addition, subtraction, multiplication of a matrix by scalar, multiplication of matrices), related problems	
Lecture 21	Solving linear systems using matrices Gauss Jordan method	Lecture sheets pp.10-24
Lecture 22	Cramer's rule to solve linear equations	Lecture sheets pp.25-33
Lecture 23	Inverse method to solve linear equations	Lecture sheets pp.34-42
Lecture 24	Review for <b>Final test (40%)</b>	<b>Topic:</b> Differentiation Lecture 7 - Lecture 9  Integration Lecture 14 - Lecture 16  Matrix Algebra Lecture 20 - Lecture 23

**Final test** - Date will be followed from the IUB Green Booklet