



## Calculus and Analytical Geometry

<b>Course Code:</b>	MATH-101	<b>Semester:</b>	1 <sup>st</sup>
<b>Credit Hours:</b>	3+0	<b>Prerequisite Codes:</b>	NA
<b>Instructor:</b>	Dr. Naila Amir	<b>Class:</b>	BEE-12(ABC)
<b>Office:</b>	Room#306-A (Faculty Block)	<b>Telephone:</b>	051-90852355
<b>Lecture Days:</b>	Tues, Wed and Fri	<b>E-mail:</b>	<a href="mailto:naila.amir@seecs.edu.pk">naila.amir@seecs.edu.pk</a>
<b>Class Room:</b>	CR:07,08,09,14,15	<b>Consulting Hours:</b>	Monday, Thursday (10:00-13:00)
<b>Lab Engineer:</b>	NA	<b>Lab Engineer Email:</b>	NA
<b>Knowledge Group Head:</b>	Dr. Hina Munir Dutt	<b>Updates on LMS:</b>	After every lecture

### Course Description:

The course reviews the concepts of basic calculus; including Limits, continuity, differentiation and integration. A brief account of three dimensional geometry and complex numbers is also included as pre-calculus review. Stress is laid on applications of differentiation and integration to practical/engineering problems. Convergence/divergence of the sequence and series are included towards the end of the syllabus.

### Course Objectives:

The course objective is that its successful completion should develop understanding of the basic concepts of analytical geometry involving limits, continuity, differentiation and integration for solving the real world problems and analyzing the convergence/divergence of sequence and series.

### Course Learning Outcomes (CLOs):

At the end of the course the students will be able to:	PLO	BT Level*
CLO-1. Understand the concept of limit, continuity and derivative with its application to find extrema.	1	C-3
CLO-2. Understand integration and use it to compute areas, volumes and arc length.	1	C-3
CLO-3. Comprehend sequence, series and their convergence using miscellaneous tests.	2	C-3
* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain		

### Mapping of CLOs to Program Learning Outcomes

PLOs/CLOs	CLO1	CLO2	CLO3
PLO 1 (Engineering Knowledge)	√	√	
PLO 2 (Problem Analysis)			√
PLO 3 (Design/Development of Solutions)			
PLO 4 (Investigation)			
PLO 5 (Modern tool usage)			
PLO 6 (The Engineer and Society)			



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PLO 7 (Environment and Sustainability)			
PLO 8 (Ethics)			
PLO 9 (Individual and Team Work)			
PLO 10 (Communication)			
PLO 11 (Project Management)			
PLO 12 (Lifelong Learning)			

**Mapping of CLOs to Assessment Modules and Weightages (In accordance with NUST statutes)**

To be filled in at the end of the course.

Assessments/CLOs	CLO1	CLO2	CLO3
Assignments: 10-20% (Tentative)			
Mid Term Exam: 30-40% (Tentative)			
End Semester Exam: 50-60% (Tentative)			
Total : 100 %			

**Books:**

- Text Book:**
- Calculus and Analytic Geometry (9th Edition) by George B. Thomas, Jr. and Ross L. Finney.
  - Calculus (6th Edition) by Swokowski, Olinick and Pence

- Reference Books:**
- Calculus (3rd Edition) by Robert T. Smith & Roland B. Minton

Sr. No	Main Topics to be covered	Estimated Contact Hours
1	Review of vectors, scalars and vector products. Three dimensional coordinate system and equation of straight line and plane	3
2	Limits & continuity, techniques of finding limits	4
3	Techniques of differentiation, Tangent lines and rates of change	2
4	Extrema of functions, Rolle's and Mean value theorems, Concavity	5
5	Riemann sum, definite integrals and properties of integrals	3
6	Solids of revolution, volume of solids of revolution by Cylindrical shell & Cross section methods	4
7	Arc length, surface of revolution, Center of mass	3
8	Indeterminate forms and L Hospital rule, trigonometric integrals.	3
9	Improper Integrals	3
10	Convergence and divergence of sequences and series, positive term series, integral test	6
11	Basic comparison test, limit comparison test, the ratio and root tests, alternating series, absolute and conditional convergence	6



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12	Power series, Maclaurin and Taylor series	3
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**Tools / Software Requirement:**

Matlab /Maple/Mathematica could be used for visualizing the graphs.

**Grading Policy:**

<b>Quiz Policy:</b>	The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor's discretion. Grading for quizzes will be on a fixed scale of 0 to 10. A score of 10 indicates an exceptional attempt towards the answer and a score of 1 indicates your answer is entirely wrong but you made a reasonable effort towards the solution. Scores in between indicate very good (8-9), good (6-7), satisfactory (4-5), and poor (2-3) attempt. Failure to make a reasonable effort to answer a question scores a 0.
<b>Assignment Policy:</b>	In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.
<b>Plagiarism:</b>	SEECS maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECS plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action.