Department of Mathematics, Bennett University

Course Details for EMAT101L – Fall Semester 2018

<table>
<tr><td>Course Name:</td><td>Engineering Calculus</td><td colspan="3">Course Code:</td><td>EMAT101L</td></tr>
<tr><td>Department:</td><td>Mathematics</td><td colspan="3">Type:</td><td>Core</td></tr>
<tr><td>L-T-P Structure</td><td>3-1-0</td><td>Credits</td><td>4</td><td>Pre-requisite:</td><td>NA</td></tr>
<tr><td>Course Objectives</td><td colspan="5">Main Objectives of the course are:
CO1: To identify the convergence or divergence of a wide class of sequence/series.

CO2: To develop the fundamental ideas of the differential and integral calculus to functions of one variable.

CO3: To understand the concepts of the differential and integral calculus to functions of multivariable.

CO4: To develop the problem-solving skills related to limit, continuity, differentiation, integration etc. using some computational software packages.</td></tr>
<tr><td>Course Outcome</td><td colspan="5">At the end, students will be able to

1: Test the convergence and divergence of sequence and series.
2: Check the continuity, differentiability and integrability of functions in single and multi-variables.
3. Compute the area and volume of functions up to three-variables.
4. Approximate the smooth function with a polynomial.
5. Solve the problems using computational software packages.</td></tr>
<tr><td>Evaluation Policy</td><td colspan="5"><table>
<tr><th>Component of Course Evaluation</th><th>Percentage</th></tr>
<tr><td>Project/Assignment</td><td>5%+5%=10%</td></tr>
<tr><td>Online Quizzes</td><td>5%+5%=10%</td></tr>
<tr><td>Quizzes</td><td>10%+10%=20%</td></tr>
<tr><td>Mid Term</td><td>20%</td></tr>
<tr><td>End Term</td><td>40%</td></tr>
<tr><td>Total</td><td>100%</td></tr>
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S. No.	Course Contents	No. of Hours
1	The Real Number System, Archimedean Property, Convergence of a Sequence, Monotone Sequences, Cauchy Criterion, Bolzano-Weierstrass Theorem, Limit inferior and Limit Superior	**6**
2	Infinite Series, Convergence Tests and Alternating series	**4**
3	Limit, Continuity, Existence of Maxima, Intermediate Value Property	**4**
4	Differentiability, Rolle's Theorem, Mean Value Theorem	**3**
5	Convexity, Concavity, L'Hospital Rule, Fixed Point Iteration Method, Taylor's Theorem, Taylor Series, Power Series	**5**
6	Riemann Integration, Fundamental Theorems of Calculus, Riemann Sum	**3**
7	Improper Integrals, Beta-Gamma Functions, Differentiation under integration	**3**
8	Area between two curves; Polar Coordinates, Volumes by slicing, Washer and Shell Methods, Length of a plane curve, Areas of Surfaces of Revolution	**5**
9	Review of vectors, Calculus of Vector Valued Functions, Functions of Several Variables: limit, Continuity and Differentiability, Chain Rule, Directional Derivative, Gradient	**6**
10	Mixed Derivative Theorem, MVT, Extended MVT, Taylor's Theorem in Multiple Variables, Hessian, Maxima, Minima, Second Derivative Test, Lagrange Multiplier Method	**6**
11	Double Integrals, Change of Variable in a Double and Triple Integrals, Area of a Parametric Surface and surface integral	**5**
12	Surface Area, Surface Integrals, Line Integrals Green's Theorem and Applications	**4**
	Total Lectures	**54**
Special Instructions	1. Students must attend every class. They are expected to arrive on time for class. **2**. Please turn off cell phones when you enter the class. Your participation is essential.	
Text Book:	**1.** Maurice D. Weir and Joel Hass, "*Thomas' Calculus"*, 12th Edition, Pearson Education India, 2016. **2.** K. A. Ross, *"Elementary Analysis: The Theory of Calculus*", 2nd Edition, Springer, 2013.	
References:	**1.** S. R. Ghorpade and B. V. Limaye, "*An Introduction to Calculus and Real Analysis*", Springer India, 2006. **2.** James Stewart, "*Calculus*", 7th Edition, Brooks Cole Cengage Learning, 2012. **3.** Bartle and Shebert, "*Introduction to Real Analysis*", 4th Edition, Wiley, 2014. **4.** Erwin Kreyszig, "*Advanced Engineering Mathematics*", 10th edition, Wiley, 2010.	