Math 152 Syllabus: Spring 2015 (Stewart Early Transcendentals)

LSN	Section	Topic(s)	Lesson Objectives	Homework	Graded Event
1	5.1	Areas and Distances	Explain how to determine the area under a curve with rectangles. Explain how to increase accuracy using thinner rectangles Use sigma notation to express & calculate Riemann sums Understand whether the RHS or LHS is an over- or under-estimate Estimate distance travelled given velocity and time data	2, 5, 8, 13, 14-18, 25	
2	5.2	The Definite Integal	State & understand the definition of the "**DEFINITE INTEGRAL**" Express the relationship between the definite integral and Riemann sums Estimate definite integral given various areas relative to curves Use the **Midpoint Rule** to estimate definite integrals Understand & apply the properties of definite integrals	5, 6, 7, 8, 9, 11, 17, 18, 26, 34, 43, 47, 49, 52	
3	7.7	Approximate Integration	Use **SIMPSON'S RULE** to estimate definite integrals Know whether RHS/LHS/Trap/MP will be an over or under estimate based on slope and concavity Use the Trapezoid Rule to estimate definite integrals	1, 2, 10, 11, 30, 31, 37, 40, 43	
4	4.9	Antiderivatives	Calculate antiderivatives of a function as a family of functions Calculate antiderivatives of functions given in first column of table on page 345 Use antiderivatives & initial conditions to calculate: a) velocity from acceleration & b) position from velocity Given F'(x), graph the antiderivative, F(x) Given F'(x), identify the points of interest of F(x)	3, 5, 7, 8, 10, 11, 13, 14, 20, 23, 25, 29, 40, 41, 51, 52, 65, 75	
5	5.3	The Fundamental Theorem of Calculus	Explain the Fundamental Theorem of Calculus in the context of a real world scenario Apply the FTC to evaluate definite integrals	2,3,12,20-26, 29, 36, 37, 40, 43, 45, 46, 53, 54, 67, 68	**Derivative Review**
6	5.4	Indefinite Integrals and the Net Change Theorem	Compute "F(b) - F(a)" by applying the NET CHANGE THEOREM to F'(x) Explain the difference between indefinite and definite integrals	20, 21, 24, 28, 31, 49, 51-54, 58, 63, 64, 65, 66,70	**FSPA-1 FSQ-1 HWQ-1**
7	5.5	The Substitution Rule	Show how the SUBSTITUTION RULE for integration is related to the CHAIN RULE Recognize when to use the substitution rule Evaluate integrals using the substitution rule Recognize & apply properties of symmetric functions	3, 5, 7, 8, 9, 13, 18, 19, 22, 28, 33, 53, 59, 80, 82, 85, 86	
8	6.1	Areas Between Curves	Use integration to calculate the area between curves Recognize when to define a region as either a function of x or of y	1, 2, 3, 7, 8, 13, 29, 30	
9	6.2	Volumes	Calculate volumes using the disk & washer methods	1, 2, 5, 7, 10, 21, 23, 40, 41, 47, 69	**FSPA-2 FSQ-2**
10	6.3	Volumes	Calculate volumes using cylindrical shells Recognize whether the shell/disk/washer method is appropriate	2, 3, 5, 9, 13, 20, 37-42	
11	**GR #1**		**Demonstrate proficiency on material from sections 4.9, 5.1-5.5, 6.1-6.3, 7.7 & WeBWorK Set-1**		

12	**7.1**	Integration by Parts	Understand that Integration by Parts (IBP) is derived from reversing product rule derivatives Recognize when IBP is an appropriate for evaluating an integral Evaluate a given integral using IBP	3, 4-6, 12, 26, 66, 67	
13	**7.4**	Integration of Rational Functions by Partial Fractions	Divide a proper rational function into a sum of partial fractions. Use Calc-Tool to show equality of the two functions Using long division, reduce an improper rational function into the sum of a polynomial and a proper rational function Evaluate integrals by using partial fractions	1, 2, 7, 8, 12, 17, 19, 66	
14	**7.8**	Improper Integrals	Determine if an integral is improper (Type I or II) Evaluate an improper integral as a limit of proper integrals Determine convergence of an improper integral	1, 2, 5, 7, 13, 18, 28, 42, 68	
15	**6.4**	Work	Compute work done by a constant force Identify when an integral is required to calculate work Develop & evaluate an integral to determine the work done by lifting an object	3-5, 7, 9, 15, 17, 20, 30	
16			Develop & evaluate an integral to determine the work done by pumping liquids		**FSPA-3** **FSQ-3** **HWQ-2**
	6.5	Average Value of a Function	Use integration to calculate the average value of a function	2, 16-19, 21	
17	**8.3**	Applications to Physics and Engineering	Compute hydrostatic pressure & force at a specific depth	1, 3, 4, 7, 14, 15, 26	
18			Develop & evaluate a definite integrals to detremine hydrostatic forces		
19	**9.1** **9.2**	Modeling with Differential Equations / Direction Fields	Recognize what makes an equation a "differential equation" Develop the **general solution** and find **particular solution** to a differential equation by applying initial condition(s) Determine if a function is a solution to a differential equation Calculate & describe equilibrium solutions for differential equations Determine the nature of the solution using a slope field	9.1) 3-5, 9, 10, 14 9.2) 1, 2	**FSPA-4** **FSQ-4** **HWQ-3**
20	**9.3**	Separable Equations	Determine if a differential equation is separable Solve separable differential equations & apply initial conditions	2, 3, 5, 10, 11, 19, 21, 43, 45, 46	
21			Model and solve mixing problems using differential equations		
22	**9.4**	Models for Population Growth	Translate statements involving rates into differential equation models and solve model applying given conditions Formulate & solve population models using differential equations	3, 9, 10	
23	**11.1**	Sequences	Explain what it means for a **sequence** to converge or diverge Explain & compute the limit of a convergent sequence List terms of a sequence (including recursive sequences)	1, 3, 5, 9, 11, 15, 17, 25, 28, 65, 67	
24	**GR#2**		**Demonstrate proficiency on material from sections 7.1, 7.4, 7.8, 6.4, 6.5, 8.3, 9.1, 9.3, 9.4 & WeBWorK Set-2**		

25	FSE		Demonstrate Proficiency on Fundamental Integration Skills		FSE
26	11.2	Series	Understand the difference between a SERIES and a SEQUENCE Explain what it means for a series to converge or diverge Calculate the partial sum of a series Recognize a geometric series and compute the sums of both finite and infinite geometric series Model real world scenario using series Unerstand & apply the "Divergence Test"	1, 3, 4, 17, 27, 18, 28, 57, 69, 71	
27	11.7 11.3	Strategy for Testing Series: The Integral Test & Estimates	Identify appropriate convergence test for a given series Recognize when to use the **INTEGRAL TEST** to show convergence or divergence Know the definition of a **P-SERIES** and determine convergence	11.3) 1, 7, 15, 16, 27 11.7) 1-6	
28	11.4 11.5	The Comparison Tests/Alternating Series	Understand difference between **COMPARISON TEST** & **LIMIT COMPARISON TEST** Use **Comparison, Limit Comparison, & Alternating Series Tests** to prove convergence Understand convergence/divergence of a series as it relates to the behavior of the series "in the long run"	11.4) 1, 5, 7, 17, 28, 37 11.5) 1, 3, 9, 11, 23	**HWQ-4**
29	11.6	Absolute Convergence, Ratio and Root Tests	Explain **ABSOLUTE CONVERGENCE** of a series Recognize how and when to apply the **Ratio & Root Tests** Use Ratio and Root Tests to show convergence/divergence	1, 7, 8, 12, 19, 35	
30	11.8 11.9	Power Series / Representation of Functions as Power Series	Identify what makes a series a "power series" Calculate interval and radius of convergence for given series Develop POWER SERIES expansion for applicable functions Use differentiation, integration, and known power series to calculate power series expansions of given functions	11.8) 2, 5, 7, 10, 15, 33 11.9) 3, 5, 6, 7, 11, 13	
31	11.10	Taylor and Maclaurin Series	Calculate the coefficients for a power series expansion Understand that a Maclaurin series is a Taylor series centered at zero Develop a Taylor series expansion for a given function Describe the relationship between a **Taylor Series expansion**, and an **nth-degree Taylor poynomial** of a function	3, 7, 9, 13, 15, 17, 39, 44	
32	11.11	Applications of Taylor Polynomials	Develop polynomials to approximate difficult functions Use Taylor polynomials to estimate functions	5, 8, 13a, 23, 25, 31	
33	10.1	Curves Defined by Parametric Equations	Sketch a curve identified by parametric equations Find parametric equations for given Cartesian curves Find a Cartesian equation of a curve from parametric equations Describe the motion of a particle, given x = x(t) & y = y(t) Apply parametric equations to real world situations	2, 7, 9, 11, 14, 19, 20, 46a	
34	GR #3		**Demonstrate proficiency on material from sections 11.1-11.11 & WeBWorK Set-3**		

35	**8.1** **10.2**	Arc Length/Calculus with Parametic Curves	Calculate curve length from parametric or cartesian functions	8.1:) 3, 6, 7, 11, 19, 39 10.2) 1, 3, 5 , 13, 41, 45	
			Determine tangent lines to parametric curves		
36	**10.3**	Polar Coordinates	Describe points in two space using polar coordinates	3, 4, 6, 11, 12, 28, 33, 40	
			Convert between polar and cartesian coordinates		
			Sketch curves or regions in a plane given in polar coordinates		
			Recognize when polar coordinates are more useful than Cartesian coordinates		
37	**10.4**	Areas and Lengths in Polar Coordinates	Calculate areas enclosed by polar curves using polar coordinates	1,2,5,9,10,45,47	**HWQ-5**
			Calculate arc length of curves defined in polar coordinates		
38	**12.1** **12.2**	Three-Dimensional Coordinate Systems/Vectors	Explain how to locate points in three dimensions	12.1) 4,6,10,27,33,35,37 12.2) 3,5,17,19,24,25,30,31	**All projects due NLT 1 May @ 1530**
			Describe and sketch 3-D surfaces/regions from their equations		
			Determine distances in three dimensions		
			Describe a sphere based on its equation		
			Understand & apply vector addition, and scalar multiplication		
			Understand the difference between a vector and segment		
			Calculate vector magnitude & segment length		
			Explain the concept of basis vectors (**I ,j, k**) and unit vectors; calculate a unit vector in same direction of given vector		
			Determine component forces using vectors		
39	**12.3**	The Dot Product	Calculate the dot (scalar) product of two vectors	3,5,7,17,18,23,24,39,49,50	**BLOCK QUIZ**
			Use the dot product to calculate the angle between two vectors		
			Use the dot product to determine if two vectors are orthogonal		
			Calculate scalar projections and vector projections		
			Use dot product properties to solve work problems when the applied force is not in direction of distance travelled		
40	**12.4**	The Cross Product / Review	Calculate the cross product of two vectors. Understand that the cross-product is a vector	3,5,14,15,17,18,19,35,39	
			Use **a x b** to calculate an orthogonal vector to both **a** and **b**		
			Use the Cross Product to calculate torque		
FINAL					

*** WeBWorK (WW) sets are not graded; indicated WeBWork material will be covered on the HWQ**