COURSE: Integral Calculus		
DEGREE: Bachelor in Applied Mathematics and Computing	YEAR: 2020	TERM: Spring

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
1	1	**Antiderivatives and the indefinite integral**. Linearity property. Antiderivative and initial value problem. The use of differentials. Relation to implicit differentiation. Techniques of integrations: Substitution method. Basic integrals, trigonometric integrals and inverse of trigonometric functions	X	X		5.3: EX 5—8; HW 1, 5, 8, 16, 19, 29, 33, 35, 44, 49, 51, 55, 56, 60, 63, 66, 71, 76, 83, 84, 86. Review: Substitution (including the change of variables formula –work only with **indefinite integrals**) 5.7 : EX 1–10; HW 11, 14, 16, 21, 23, 31, 35, 45, 53, 72, 82, 85–89, 93, 97	1,66	6,5
	2	Techniques of integrations: Integration by parts, the method of partial fractions	X	X		Integration by parts –work only with **indefinite integrals**. 7.1 : EX 1–3, 5, 6; HW 8–11, 13, 15, 16, 19, 20, 23, 26, 35, 36, 49–53, 67, 95. Partial fractions –work only with **indefinite integrals**. 7.5 : EX 1–6; HW 9, 11, 12, 17, 29, 33, 35, 49, 55, 57	1,66	
2	3	Trigonometric integrals and irrational expressions	X	X		Trigonometric integrals and trigonometric substitution –work only with **indefinite integrals**. 7.2 : EX 1–9; HW 3, 5, 7, 9, 11, 20, 31, 47, 50, 51, 53, 69. 7.3 : EX 1–6; HW 13(a)(b)(c), 14, 15–17, 19, 20, 29, 38, 50	1,66	6,5
	4	Application to first order linear differential equations: Separation of variables and Initial value problem. Other basic integrals and excercises	X	X		Solving differential equations by separation of variables. 9.1 : EX 2, 4, 5; HW 12, 13, 18, 19, 29, 30, 35, 66. 9.4 : HW 1, 3, 8	1,66	
	5	**The Riemann-Stieltjes integral**. Definition and existence of the integral. Properties of the integral. Change of variable	X	X		Special Assignment #1 from Rudin's Book	1,66	

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3	6	Fundamental theorem of Calculus (Part I and Part II)	X	X		Sec. 5.4. HW 1, 3, 4, 6, 8, 20, 23, 27, 29, 30—34, 39—43, 46, 48, 51, 55, 57, 59. Sec. 5.5. Preliminary Questions: 1—4. HW 1—3, 5, 6, 9, 12, 14—17, 19, 21, 23, 24, 26, 27, 31, 32, 34, 39—42, 43—45, 47, 52—54. Sec. 5.6. Preliminary Questions: 1—3. HW 1, 3, 5, 8, 9, 11, 12, 14, 17, 19, 23, 26, 29. Sec. 5.8. Preliminary Questions: 1—4. HW 1, 3—5, 7, 8, 10—12, 14, 16—18, 20—24, 26, 28, 30—32, 35—37, 39, 40, 42, 43, 46, 49, 50—56, 58, 60, 64—66, 69—74	1,66	6,5
4	7	Applications: Area, volume, density, average value	X	X		Integrals in geometry: volume, arc length, and surface area. 6.2 : EX 1–3; HW 1, 2, 3, 5, 6, 21. 6.3 : EX ; HW 23, 25, 29, 31, 32, 35, 36, 38, 41, 53, 63. 6.4 : EX 1–3; HW 5, 13, 20, 43, 49, 51, 54, 57. 7.1 : HW 70–72. 7.7 : EX 3. 8.2 : EX 1, 4, 5, 7; HW 7, 25, 27, 41, 52	1,66	6,5
	8	Applications: Center of mass, work and energy	X	X		Integrals in physics: work and energy. 6.5 : EX 1–3, HW 3, 5, 19, 20, 21, 25, 27, 39	1,66	
5	9	Remainder term of Taylor polynomial. Uniform convergence and integration	X	X			1,66	6,5
	10	Improper integrals	X	X		Improper integrals (including examples that require L'Hospital's rule). 7.7 : EX 1–4, 8–12; HW 1, 11, 13, 19, 21, 23, 25, 27, 29, 37, 47, 48, 60, 61, 63, 69, 71, 74, 101. 4.5 : EX 1–4, 6–10; HW 7, 8, 9, 13, 15, 16, 18, 39, 41, 43, 63(a), 67. 7.7 : EX 5; HW 29, 37, 60, 97	1,66	
6	11	Numerical integration	X		X	Lecture and Lab activity	1,66	6,5
	12	The trapezoid rule and Simpson's rule		X	X	Lab activity	1,66	
7	13	Review section: Strategies of integration		X		Selected Problems (7.6 Strategies of integration)	1,66	6,5
	14	**Midterm #1**					1,66	

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8	15	**Integration of vector value functions**. Curves in two- and three-dimensional real spaces	X	X		Chapter 12 (Chapter Review Exercises) 6, 9, 14, 16, 18, 21, 23, 28, 32, 33, 38, 39, 47, 49, 53, 56, 62, 63. Chapter 13 (Chapter Review Exercises) 1, 3—5, 8, 9, 11, 15, 16, 21, 29—34.	1,66	6,5
	16	Arc length. Area of surface of revolution	X	X		8.2 EX 1—7; 5, 10, 13, 16, 19, 22, 30, 32, 37, 44, 46, 52, 53, 62	1,66	
9	17	Probability and integration	X	X		8.1 EX 1—3; HW 3, 4, 8, 10, 11, 18, 24, 27—30	1,66	6,5
	18	Integrals depending on parameters. Differentiation of integrals. Some special functions (Laplace integrals and Gamma function)	X	X		7.7 HW 88—91, 101, 102	1,66	
10	19	**Integration in several variables**. Multiple integrals. Fubini's theorem	X	X			1,66	6,5
	20	Integration over non-rectangular regions	X	X		Sec. 15.2: 4, 8, 9, 17, 19, 22, 23, 24, 30, 31—33, 36, 37, 45, 47, 49, 51, 53, 60, 62.	1,66	
11	21	Mean value theorem. Application of multiple integrals	X	X			1,66	6,5
	22	Doble integrals. Area, volume and center of mass	X	X		Special Assignment #2 (list of problems)	1,66	
12	23	Doble integrals in polar coordinates. Surface area	X	X		See Problems from Sec. 15.4 below	1,66	6,5
	24	Triple integrals: Cylindrical and spherical coordinates	X	X		Sec. 15.4: 7, 8, 11, 13, 14, 17, 19, 20, 21, 22, 23, 27, 29, 31, 32, 39, 45, 47, 49, 50.	1,66	
13	25	Other applications (mass and center of mass)	X	X		Sec. 15.5: 23, 27, 33—35, 60, 61.	1,66	6,5
	26	Change of variables in multiple integrals	X	X		Sec. 15.6: 11—13, 15, 17, 18, 23, 30, 31, 39, 41, 43, 44	1,66	
14	27	Line Integrals. Green's Theorem		X		Sec. 16.2: 9, 10, 27—32, 60, 61, 65, 66. Sec. 16.3: 7—16, 19—21, 27, 29, 30. 17.1 (only Green's Th./ integration over curves): 3—10, 14—17, 19, 20, 25, 32, 33.	1,66	6,5
	28	**Midterm #2**					1,66	
	29						1,66	3,25
						Subtotal 1	**48**	**94**

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						Total 1 *(Hours of class plus student homework)*	**142**	
15		Tutorials, handing in, etc					3,6	-
16		Assessment					4	10
17								
18								
						Subtotal 2	**8**	**10**
						Total 2 *(Hours of class plus student homework)*	**18**	
TOTAL (*Maximun 160 horas*)							**160**	