Teaching Plan: B.A. (Prog.) with Mathematics, Semester-8

DSC-8: Topics in Multivariate Calculus

Week 1: Definition and examples of function of two variables, Limits and continuity of functions of two variables.
[1]: Chapter 11 (Sections 11.1 [Example 1], and 11.2).
Week 2: Partial differentiation and partial derivatives as slope and rate (definitions only), Higher order partial derivatives.
[1]: Chapter 11 (Section 11.3).
Week 3: Tangent planes, Total differential, Differentiability, Chain rule for one independent variable.
[1]: Chapter 11 (Sections 11.4 [except Examples 2 and 3], and 11.5 [up to Example 5]).
Weeks 4 and 5: Extensions of the chain rule to two independent parameters, Directional derivatives, Gradient, Maximal and normal property of the gradient.
[1]: Chapter 11 (Section 11.5 [Examples 6 to 8], and 11.6 [up to Example 7]).
Week 6: Extrema of functions of two variables, Lagrange multipliers method for optimization problems with one constraint.
[1] Chapter 11 (Section 11.7 [up to Example 6], and Section 11.8 [Examples 1 and 2]).
Weeks 7 and 8: Double integration over rectangular regions, and nonrectangular regions, Double integrals in polar coordinates
[1]: Chapter 12 (Sections 12.1 to 12.3).
Week 9: Triple integral over a parallelepiped, and solid regions, Volume by triple integrals.
[1]: Chapter 12 (Section 12.5).
Week 10: Triple integration in cylindrical and spherical coordinates.
[1]: Chapter 12 (Section 12.7 [except Examples 3, and 6]).
Week 11: Jacobians: Change of variables in double and triple integrals.
[1]: Chapter 12 (Section 12.8 [except Example 5]).
Week 12: Line integrals, Applications of line integrals to mass and work, Fundamental theorem for line integrals, Conservative vector fields.
[1]: Chapter 13 (Sections 13.2, and 13.3).
Week 13: Green's theorem, Area as a line integral.
[1]: Chapter 13 (Section 13.4 [up to Example 3]).
Week 14: Surface integrals.
[1]: Chapter 13 (Section 13.5 [up to Example 3]).
Week 15: Stokes' theorem (statement only) and Gauss divergence theorem (statement only).
[1]: Chapter 13 (Sections 13.6 [up to Example 3], and 13.7 [up to Example 3]).

Note. For weeks 9 to 11, please refer to sections 12.4, 12.5, and 12.6 while using the Indian print.

Essential Reading
1. Strauss, Monty J., Bradley, Gerald L., & Smith, Karl J. (2007). Calculus (3rd ed.). Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). Delhi. Indian Reprint 2011.