Book Recommendations

Course Overview

We will cover the following topics, in order:

1. vectors in $\mathbb{R}^2$ and their arithmetic (sums, scaling, subtraction);
2. coordinates and vectors in $\mathbb{R}^3$, distance in $\mathbb{R}^3$, standard representation of vectors and arithmetic;
3. graphing surfaces (planes, spheres, cylinders);
4. vector dot product, projections, cross product;
5. equations of lines in $\mathbb{R}^3$, parametric form of lines, symmetric form of lines, parametric equations;
6. planes in $\mathbb{R}^3$;
7. quadric surfaces;
8. vector-valued functions, limits of vector valued functions, continuity;
9. differentiation and integration of vector-valued functions, smooth curves;
10. unit tangent and principal unit normal vectors, arc length;
11. functions of several variables, limits, continuity;
12. partial derivatives;
13. tangent planes, approximations, differentiability, total differential;
14. chain rules, implicit function theorem;
15. directional derivatives, gradient;
16. extrema of functions of two variables;
17. lagrange multipliers;
18. double integrals(rectangular and polar), Fubini's theorem, surface area;
19. triple integrals;
20. cylindrical and spherical coordinates;
21. Jacobians, change of variables;
22. vector analysis (divergence, curl);
23. line integrals;
24. Green's theorem;
25. surface integrals;
26. Stoke's theorem;
27. Divergence theorem.

Book Recommendations

The books that I think are reasonably well written which cover most of what we need (the last one is just a nice book to have):

1. *Calculus*, James Stewart;
2. *Calculus*, Ron Larson and Bruce Edwards;
3. *How to Ace the Rest of Calculus*, Colin Adams, Abigail Thompson, and Joel Hass.