## Calculus III - table of dependencies among topics

Note: Topics are listed according to sections in which they are covered in the textbook [Calculus (Early transcendentals) by J. Stewart, 8th Ed.]. Topic titles do not always coincide with the titles of the respective sections in the textbook.

| Section number | Topic | Uses material from section |
| :---: | :---: | :---: |
| 12.2 | Vectors: sum, difference; unit vectors; $\mathbf{i}, \mathbf{j}, \mathbf{k}$ | Review |
| 12.3 | Dot product; projections | Review |
| 12.4 | Cross product; making $\overrightarrow{\mathbf{c}} \perp \overrightarrow{\mathbf{a}}$ and $\overrightarrow{\mathbf{b}}$ | Review |
| 12.5(1) | Equations of lines | Review |
| 12.5(2) | Equations of planes | Review |
| 12.6(1) | Parametric equations of ellipses and hyperbolas | 10.1 (Calc II) |
| 12.6(2) | Cylindrical surfaces |  |
| 13.1 | Vector functions | 10.1 (Calc II) |
| 13.2 | Derivatives, integrals of vect. functions; tangent lines | $3.4{ }^{\text {T }}$ (Calc I), 13.1 |
| 13.3(1) | Arclength | 13.2 |
| 13.3(2) | Curvature | 12.4, 13.2 |
| 13.4 | Velocity and acceleration in motion on a curve | 12.2, 12.3, 12.4, 13.2, 13.3(1,2) |
| 14.1 | Function of several variables ${ }^{\text {a }}$ | 12.6(2) |
| 14.2 | Limits of functions of several variables |  |
| 14.3 | Partial derivatives | 14.2 |
| 14.4 | Tangent planes and linear approximations | 12.5(2), 14.3 |
| 14.5 | Chain Rule for functions of several variables | 14.3 |
| 14.6(1) | Directional derivative; level curves | 14.3, 14.5 |
| 14.6(2) | Gradient | 12.3, 14.3, 14.6(1) |

[^0]| Section number | Topic | Uses material from section |
| :---: | :---: | :---: |
| 14.7 | Maxima, minima, and saddle points | $12.3,14.6(1,2)$ |
| 14.8 | Conditional extrema and Lagrange multipliers | $12.2,12.6(1), 14.6(1,2)$ |
| 15.1 | Double integrals over rectangular regions | 14.1, 14.3 |
| 15.2 | Double integrals over general regions | 15.1 |
| 15.3 | Double integrals in polar coordinates | 10.3 (Calc II), 15.1, 15.2 |
| $15.5{ }^{\text {[3] }}$ | Applications of double integrals | 15.2, 15.3 |
| 15.6 | Triple integrals | 15.1, 15.2 |
| 15.7 | Triple integrals <br> in cylindrical coordinates | 12.6(2), 15.3, 15.6 |
| 15.8 | Triple integrals in spherical coordinates | 15.6 |
| 15.9 | Change of variables in multiple integrals; Jacobian | $12.4,14.3,14.4,15.3,15.8$ |
|  | Parametric surfaces and their area | 10.1 (Calc II), 12.4, 13.1, 13.2, 14.4, $15.2,15.5,15.8,15.9$ |
| 16.1 | Vector fields | 12.2 |
| 16.5 | Curl and divergence | 12.3, 12.4, 14.6(2), 16.1 |
| 16.2 | Line integrals | 10.1, $12.3,12.6(1), 13.3(1), 15.5$ |
| 16.3 | Fundamental Theorem of Calculus for line integrals | $\begin{gathered} 5.3^{19}(\text { Calc I }), \\ 14.5, \quad 14.6(2), \quad 16.1,16.5, \quad 16.2 \end{gathered}$ |
| 16.4 | Green's Theorem | $12.3,15.2,16.5,16.3$ |
| 16.7 | Surface integrals | $12.3,14.1,15.5,16.6,16.3$ |
| $16.8{ }^{\text {a }}$ | Stokes' Theorem | $12.3,12.4,16.5,16.3,16.4,16.7$ |
| 16.9 | Gauss' (Divergence) Theorem | $12.3,15.6,16.5,16.7$ |

[^1]
[^0]:    ${ }^{1}$ Good working knowledge of this material will be needed throughout this entire course.
    2 This material will be used in all sections in the remainder of the course.

[^1]:    ${ }^{3}$ Section 15.4 is skipped, since much of its material will be covered in 16.6.
    ${ }^{4}$ Here and after 16.1, sections will be covered in an order different than that in the textbook.
    ${ }^{5}$ This is the Fundamental Theorem of Calculus. This and the remaining sections of the course will generalize it to 2D and 3D.
    ${ }^{6}$ This section will be covered only briefly.

