

## DEPARTMENT OF MATHEMATICS SYLLABUS

Course # & Name: MAT 17A Calculus for Biology and Medicine (4 units)

Recommended Text(s) & Price: Neuhauser's "Calculus for Biology and Medicine" 2<sup>nd</sup> Edition (\$67.00 - \$133.00)

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Lecture(s)	Sections	Comments/Topics
1	1.1	Examples from optics and circular motion in a centrifuge / Preliminaries (algebra, trigonometry)
2	1.2	Use examples of pH; Gibbs free energy and equilibrium / Elementary functions
3	1.3	Graphing
4	2.1	Discrete models of exponential growth and decay
5	2.2	Sequences, limits
6	2.3	Biological examples of discrete models
7	3.1	Use only informal definition of a limit / Limits
8	3.2, 3.5	IVT – briefly, with just one example (roots of nonlinear eq.) / Continuity of functions and Intermediate Value Theorem
9	3.3, 3.4	Limits at infinity – briefly; important trig. Limits – briefly; without proof. Use Michaelis-Menten enzyme kinetics and sigmoidal curves / More Limits
10	4.1	Derivative / Definition and geometric meaning
11	4.1	Derivative / Derivative as a rate of change and differentiability
12	4.2	Power rule, basic rules of differentiation / no proof of the power rule; but a simple (quadratic) example

13	4.3	Product and quotient rules / Use Michaelis-Menten enzyme kinetics example
14	4.4	Chain rule
15	4.4	Implicit differentiation, higher derivatives
16	4.5, 4.6	Derivatives of exponential and trigonometric functions
17	4.7	Derivatives of inverse and logarithmic functions
18	4.8	Linear approximation
19	5.1	Extrema and Mean Value Theorem / MVT – briefly; no proofs
20	5.2	Monotonicity and concavity
21	5.3	Graphing / Use Michealis-Menten enzyme kinetics example; sigmoidal curves (allostery, cooperativity, Hill coefficients)
22	5.3, 5.5	Graphing, L'Hospital's Rule / more examples; L'Hospital's Rule – briefly; double-reciprocal (Lineweaver-Burke) plots
23	5.4	Optimization
24	5.7	Numerical differentiation / Use Matlab, computer
25	5.8	Antiderivative / Introduce solutions of initial value ODE problems
26	Web	“Research Project” / Project with the use of computers to be directed in discussion sections
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### Additional Notes:

This course covers Chapters 1 – 5: Limits and derivatives; Applications of differentiation in biology; Elements of discreet math (difference equations)