

## Syllabus. Single Variable Differential Calculus.

*J. Stewart, Single Variable Essential Calculus, Early Transcendentals.*

- Functions, composition of functions, inverse functions, exponential and logarithmic functions.
- Tangent and velocity problems.
- The limit of a function, properties of the limit, calculating limits.
- The precise definition of a limit.
- Continuity.
- Limits at infinity: horizontal asymptotes.
- Derivatives and rates of change.
- The derivative as a function.
- Derivatives of polynomials and exponential functions.
- The product and quotient rules.
- Derivatives of trigonometric functions.
- The chain rule.
- Implicit differentiation.
- Derivatives of logarithmic functions.
- Rates of change in the natural and social sciences, exponential growth and decay.
- Related rates.
- Linear approximation and differentials.
- Hyperbolic functions.
- Maximum and minimum values.
- The mean value theorem.
- How derivatives affect the shape of a graph.
- Indeterminate forms and L'Hospital's rule.

- Summary of curve sketching.
- Optimization problems.
- Newton's method.