Syllabus for Mathematics 150A Intermediate Analysis

Pre-requisites: Math 9ABC, Math 10AB, Math 144.
Text book: *Advanced Calculus* by Avner Friedman

Section One Sequences and Series (six lectures):

1. Limits of sequences. [A. F. Advanced Calculus 21-26]
2. Operations with limits. [26-31]
3. Monotone sequences. [31-35]
4. The Bolzano-Weierstrass Theorem. [35-38]
5. Series of numbers: criteria for convergence. [142-149]
6. Series of numbers: conditional and absolute convergence. [149-158]
7. Further discussion. [If there is time available.]

Section Two Continuous functions (six lectures):

1. Limits of functions. The algebra of limits. Continuous functions. [39-45]
2. Operations with continuous functions. [46-50]
3. Maxima and Minima. (Extreme Value Theorem) [50-53]
4. Intermediate Values. (Intermediate Value Theorem) [53-55]
5. Monotone functions and inverse functions. [55-61].
6. Further discussion. [If there is time available.]

Section Three Differentiable Functions (seven lectures)

1. The derivative (and key limits). [75-82]
2. Operations with differentiable functions. [82-85]
3. Inverse functions & Higher derivatives. [86-91]
4. The Mean Value Theorem. [91-95]
5. L'Hospital's Rule. [95-101] {Students need to be aware of where L'Hospital's Rule fits into the theory. Proof optional.}
6. Taylor's Theorem. [101-104]
7. Computation of extrema. [104-107]
8. Further discussion. [If there is time available.]

Section Four Integration (five lectures)

1. The Riemann integral. [108-116]
2. Properties of the Riemann integral. [116-120]
3. Examples of integrable functions. [120-126]
4. The Fundamental Theorem of Calculus. [126-130]