W363 covers the following materials

1. Optimization of a functional. Calculus of variations (Chap 6, Marion and Thornton); Proof of Euler’s equation based on discretized view (supplemented); Simple application of Euler’s equation by examples.

2. Lagrangian Dynamics. Degrees of freedom, Lagrangian, Hamilton’s principle, re-study of most previous “simple” systems but now based on Lagrangian formalism, more complicated examples.

3. Constraints and Lagrangian multipliers. Introduction of the concept of Lagrangian multipliers; different types of constraints; Euler’s equation with constraints; force of constraints.


5. Hamiltonian dynamics. Transformation of dynamic variables; definition of the Hamiltonian; proof of the equivalence between Hamiltonian dynamics and Lagrangian dynamics. Previous examples, but now solved with Hamiltonian formalism.


7. Loaded string problem. Loaded string and the “guessed” normal modes; concept of Fourier series; normal modes and the displacement pattern.
