"Design of Engineering Marvels" - Ever wonder how machines like the Perseverance Mars Rover, Tesla cars, renewable power sources, and F1 racecars were engineered to achieve such impressive performance? Learn the basics of how complex engineering systems are designed, modeled, simulated, built, and tested. Topics include block diagrams, numerical modeling, electric motors, and the engineering design process. Examples will be given from all of the systems mentioned above! Prereq: familiarity with free body diagrams helpful but not required.

0-5 introduce myself and the class
5-15 engineering design process
- Functional requirements
- Modeling and simulation and architecture
- Detail design and manufacturing
- Testing and validation

15-25 modeling
- FBDs
- Equations of motion
- Block diagrams
- Numerical simulation

25-35 detail design
- CAD
- FEA
- CFD
- Interference checks
- Materials
- Manufacturing

35-45 validation
- Data collection
- Analysis
- Statistical significance
- Closing the loop on requirements

45-50 summary