Topics for ME 433 – Student Input

- Physical Engines
  - Swap an engine
  - Disassemble an engine
  - Familiarity with engine components and their functions
- Dynamometer testing
  - Types of dynamometers
  - Experimental setup
  - Data collection and equipment
  - Analyzing data
- Predicting engine performance from design parameters
- Engine management
  - Hardware
  - Primary inputs
  - Calibration/tuning strategies
  - Extra features/capabilities
- Vehicle simulation
  - Road load modeling
  - Acceleration modeling
  - Track modeling
- Choosing engine size for vehicle application
- Fuel delivery
  - Carburetor vs. fuel injection
  - Port vs. direct fuel injection
  - Premix vs. diffusion (how gasoline and diesel engines are different)
- Intake and Exhaust
  - Natural aspiration vs. forced induction (turbochargers, superchargers, etc.)
  - Simulating intake and exhaust flow
  - Effects of intake and exhaust system changes to engine parameters
- Fuels
  - Types of fuel
  - Combustion implications
  - Environmental implications
  - Synthetic and carbon-zero fuels
  - Hydrogen ICE
- Drivetrain
  - Engine layout
  - Engine location
  - Transmission types
  - Differentials
- Hybrid Systems
  - Start/Stop
  - Parallel hybrid
  - Series hybrid
- Material science
- Temperature control
- Reliability
- Noise, Vibration, Harshness (NVH)
- Power delivery characteristics
- Exhaust and emissions
  - Equilibrium modeling
  - Kinetic modeling
  - Aftertreatment systems

- Guest lectures