# ME 401
# Systems and Applications

*Semester:* Spring 2026
*LLM:* Anthropic, Sonnet 4.5

## PRIMARY QUESTION

I am working to leverage generative AI for the purpose of exploring python as a means to automate engineering analysis automation

## INITIAL THOUGHTS

I want to be very clear with the LLM about my goals and intended outcomes, so I need to provide clear context. I will then ask that it start with a counter prompt of clarifying questions so that I know what to expect and can compare the artifact to a clear line of inputs and context

## PROMPT

1) I have two Python modules for Rankine cycle analysis that I need to run and generate report-quality outputs:
Module 1: rankine cycle.py - OOP class that calculates thermodynamic states and performance for steam power cycles using CoolProp. Has methods for state calculations, performance metrics, and T-S/P-V diagram generation.
Module 2: rankine optimization.py - Optimization script that uses scipy.optimize (SLSQP and Differential Evolution) to find optimal cycle parameters (boiler pressure/temp, condenser pressure) that maximize thermal efficiency with realistic constraints (superheat, turbine exit quality). I need you to create a Python run script that:
1. Provides a clean command-line interface to run different analysis modes: * Single cycle analysis (user specifies parameters) * Optimized cycle analysis (runs optimization, displays results) * Parametric study (sweep one parameter, plot efficiency vs that parameter) * Comparison mode (compare 2-3 different cycle configurations side-by-side)
2. Add a comment section at the end suggesting future tools (like React, Streamlit, GUI frameworks) that could enhance this into a more interactive application. start with clarifying questions

2) no, it should be assumed that dependencies are handled command line arguments should be emphasized
critical parameters for sweep: boiler pressure / temp, and condenser pressure, one parameter at a time, with a resolution of 50 points as a default
do not save plots or tables, just generate for consideration,
no summary reports need to be generated. I will do that manually
for comparison, focus initially on pressure, temperature configurations
don't worry about errors, I will validate thermodynamic possibility explicitly later
for future exploration comment, keep it very concise with a list of organized topics to encourage exploration

**RESULTS**

After the clarifying question and trimming the initial prompt considerably, this generated a workable first step for me. It is not quite as clean as I would like, but it get me to a good point I can iterate from and uses many concepts that will be valuable for me.

**OUTPUT**

**Helpful.** –
The provided script is high quality and also includes example bash script to run the code through the command line. The organization is excellent though I will need to go through and do a lot of commenting to understand each specific functionality

**Unhelpful.** –
This interaction and artifact are both useful and will provide me with a meaningful way to proceed with my ability to automate analysis

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This memo is designed for use by the Wada Research Group to develop ethical and efficient engineering education strategies and technologies.