

Colin D. Gray

336-471-9817 | gray.d.colin@gmail.com

EDUCATION

California Institute of Technology (Caltech) – B.S. in Chemical Engineering (Process Systems), Pasadena CA Jun 2027

Overall GPA: 3.8/4.00

Relevant Coursework: Organic Chemistry, ChemE Thermodynamics, Python for ChemE, Cell Biology, Transport Phenomena (Junior Year)

EXPERIENCE

Independent Researcher (Self-Directed) – Machine Learning/Computational Combustion

Advised by Prof. Tarek Echekki (NC State University) - Remote

May 2025 – Present

- Built a novel reproducible Python/Cantera pipeline to simulate methane-air and gasoline surrogate combustion
- Generated and processed over 60 gigabytes of data regarding conditions across 400K ranges of temperatures and 0.5-40 atm
- Trained PyTorch regression models using LASSO and “gated heads” to reduce species in combustion mechanisms by up to 80%
- Automated evaluation of reduced mechanism performance, noting simulation speed increases of up to 400% and 90% accuracy

Teaching Assistant

Caltech - Pasadena CA

Jan 2024 – Present

- Head TA – SA16C Cooking Basics
- TA – ChE63a Chemical Engineering Thermodynamics

Chemistry Tutor

CalTutors - Remote

Oct 2024 – Present

- Provide one-on-one tutoring in AP/General/Organic Chemistry with a high tutee retention rate
- Create entire lessons based on homework sheets improving test scores by up to 50% for some students

Summer Research Fellow – Jet Fuel Autoignition

Caltech - Pasadena CA

Jun 2024 – Aug 2024

- Used Excel/MATLAB to investigate autoignition temperature (AIT) correlations in jet fuels and identified 7 paths to research
- Planned and conducted experiments verifying correlations between branches and compactness of molecules to AIT
- Analyzed industry standard and surrogate fuels using GC-MS data and AIChE DIPPR chemical database
- Presented data at two conferences, a seminar, weekly meetings with the lab group, and monthly meetings with Boeing

PROJECTS

2D Cold-flow Scramjet - Ansys Fluent/Workbench (In Progress)

Independent

Aug 2025 – Present

- Completed an Ansys Workbench CFD tutorial
- Currently researching dimension for geometry of a scramjet engine

Compartment/Dresser Fire - Pyrosim/FDS + Smokeview

Independent

Jun 2025 – Aug 2025

- Created an accurate model of my room in PyroSim, properly meshed to the extent of my computer to run in <12 hours
- Instrumented with thermocouples and visibility devices at 1.8m to investigate egress conditions during a fire
- Generated ceiling heat-flux maps to identify likely detector activation zones

CERTIFICATIONS

OSHA 10-Hour General Industry

CareerSafe - Remote

Jul 2025

Emergency Medical Responder (EMR)

American Red Cross – Los Angeles CA

Jun 2025

SKILLS

- | | |
|--|---|
| • Software: Python (NumPy, Pandas, PyTorch, Cantera) | • Microsoft Suite (Excel, Word, PowerPoint) |
| • Chemical Processing Plant Design (DWSIM) | • Computational Fluid Dynamics (FDS, Ansys) |