# Colin D. Gray

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## 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

**Summer Research Fellow – Jet Fuel Autoignition**
Explosion Dynamics Laboratory - 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

**Teaching Assistant**
Caltech - *Pasadena CA* Jan 2024 – Present

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

**Summer Intern – Drug Discovery Research**
Chen Group - Wake Forest School of Medicine - *Winston-Salem NC* Jun 2022 – Aug 2022

- Researched cholesterol regulation of glutamine receptors (mGluRs) using multiple biochemical assays
- Imaged cells using advanced microscopy (TIRF, confocal microscopy) and processed images using ImageJ and Excel

## 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)
- Chemical Processing Plant Design (DWSIM)
- Microsoft Suite (Excel, Word, PowerPoint)
- Computational Fluid Dynamics (FDS, Ansys)

Read more about my projects on my portfolio! At the link above or at this QR code ->