Zachary Raup

Data Scientist

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Websites

GitHub Portfolio: https://zraup.github.io/Zachary-Raup/
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Education

Kutztown University of Pennsylvania (KU) — Kutztown, PA
B.S. in Physics — January 2021 - December 2022
Overall GPA: 3.92 — Summa Cum Laude

University of Cincinnati (UC) — Cincinnati, OH
B.S. in Sport Administration — August 2016 - April 2019
Overall GPA: 3.86 — Magma Cum Laude

Certifications

- **Data Scientist Associate** (DataCamp, Oct 2024)

- **Data Analyst Associate** (DataCamp, Sep 2024)

- **Python Data Associate** (DataCamp, Sep 2024)

- **SQL Associate** (DataCamp, Sep 2024)

Projects *(Available on GitHub)*

- **Predicting Diabetes Using Machine Learning | Comparison of Classification Models**
  Developed and evaluated machine learning models—Logistic Regression, KNN, Decision Tree, Random Forest, and SVM—to predict diabetes status. Key insights revealed glucose, BMI, DPF, and age as critical features. Logistic Regression offered stability and interpretability, while KNN achieved the highest test accuracy, making it suitable for large-scale screenings. GridSearchCV optimization enhanced model performance, underscoring the value of hyperparameter tuning in predictive healthcare analytics.

  *Skills: **Python** (scikit-learn), Feature Engineering, Model Evaluation, Hyperparameter Tuning, Data Visualization)*

- **Utilizing MCMC in Python to Explore the Parameter Space of an Exoplanet Transit**
  Utilized MCMC in Python to model exoplanet transits, fitting CRCAO photometry data with the batman package to estimate parameters like planet radius and transit timing, and presented findings at the 241st AAS meeting.

  *Skills: **Python** (pandas, matplotlib, numpy, emcee, & batman)*

- **Insights into Dog Behavior: Analyzing Dognition Data with MySQL**
  Analyzed trends in canine behavior using MySQL queries on the Dognition database, refining data management and analytical skills as part of Duke University's 'Managing Big Data with MySQL' course.

  *Skills: **MySQL**, Writing Queries, Data Cleaning, and Big Data*

- **Interactive Animation of Museum Visitor Paths and Hourly Room Traffic in Tableau**
  Created an interactive animation in Tableau to visualize museum visitor paths and hourly room traffic, showcasing data visualization techniques learned in DataCamp's 'Data Visualization in Tableau' course.

  Skills: ***Tableau***, *Data Visualization & Analysis*

Research Experience

- **Astronomy Researcher | NSF IRES Grant**
  University of Southern Queensland   Toowoomba, QLD, Australia
  Dr. Rob Wittenmyer   May 2022 – August 2022

  - Construct, align, and focus a low- resolution spectrograph that collects spectral data of high mass stars at the Mt. Kent Observatory (Australia).
  - Predicting future transit times of exoplanets by writing **python** programs that analyze and reduce photometry data from TESS and Mt Kent Observatory to accurately update their current t0 and period value.

- **Astrophysics Researcher | KURF Grant**
  Kutztown University   Kutztown, PA
  Dr. Phillip Reed   October 2021 – March 2023

  - Writing **python** programs that model and fit the transit and radial velocities of star systems w/an exoplanet or binary star and determining the mass and radius of the transiting object using data collected from C. R. Chambliss Astronomical Observatory (CRCAO) and the Transiting Exoplanet Survey Satellite (TESS).
  - Collecting spectroscopy & photometry data of potential exoplanets using the 0.61m telescope at CRCAO. Performing maintenance on the telescope to keep the instruments running optimally displaying **problem solving** and **critical thinking** skills.

Professional Experience

- **DSM- Firmenich Biomedical**   Exton, PA
  Senior Manufacturing Tech   Sept 2024 - Present
  Manufacturing Tech II   April 2024 - Aug 2024
  Manufacturing Tech I   March 2023 - March 2024

  Engineered and constructed G-Code programs for CNC lathe machines that **manufacture** bio-absorbable polymer surgical screws using GMP techniques.

- **Weis Markets Distribution Center**   Milton, PA
  Warehouse Associate   May 2018 - January 2021
  Assembling orders and packed items to be transported to regional stores.

- **Selinsgrove Area School District**   Selinsgrove, PA
  Athletics Intern   January 2019 - June 2019
  Game manager during all home sporting events, reviewed the team schedules prior to each week to ensure each game had correct information (field, referees, buses, etc.).

- **University of Cincinnati**   Cincinnati, OH
  Ticket Sales Associate   August 2018 - December 2018
  Responded to inbound sales calls, responded to inquiries and provided information and/or follow up materials as requested.

Programming and Software

- **Python:** Since 2021
  Proficient in data analysis, modeling, and visualization using pandas, matplotlib, scikit-learn, and emcee.

- **MySQL/PostgreSQL:** Since 2024
  Skilled in complex querying, database design, and data cleaning for big data analytics.

- **Git:** Since 2024
  Proficient in version control, managing code repositories, and collaboration in software development projects.

- **Tableau:** Since 2024
  Experienced in creating interactive dashboards and visualizations for data insights.

- **Microsoft Power BI:** Since 2024
  Basic proficiency in data-driven visualizations and interactive reporting for decision-making.

- **AstroImageJ:** Since 2021
  Specialized in photometry data analysis for astrophysics research applications.

- **Microsoft Office:** Since 2012
  Advanced in Excel, Word, and PowerPoint for data management and reporting.

- **MATLAB:** Since 2022
  Proficient in numerical analysis and simulation for scientific research.

- **LaTEX:** Since 2023
  Skilled in professional formatting for research papers and technical documentation.

Publications

- Jack S., Raup, Z., et al (2024). Migration and Evolution of Eccentric Planets (MEEP) I: Nine Newly Confirmed Hot Jupiter from the TESS Mission. arXiv:2401.05923

Conference Presentations

- **Raup, Z** & Reed, P (2023). Follow-up Observations Toward the Confirmation of TESS Transiting Exoplanet Candidates TOI-3645, TOI- 3660, and TOI-4153. 241st American Astronomical Society. Seattle, WA

- **Raup, Z** & Reed, P (2022). Follow-up Observations of TESS Transiting Exoplanet Candidate TOI 3645.01. 42nd Central Pennsylvania Consortium Astronomers' Meeting. Gettysburg College. Gettysburg, PA

Leadership & Volunteering

- **DSM - Firmenich Safety Committee** Exton, PA
  Member March 2024 - Present
  Planning and implementing safety procedures at the DSM Biomedical Site.

- **DSM - Firmenich Spill Response Team** Exton, PA
  Member September 2023 - Present
  Responsible for responding to chemical spills and carrying out the safety contingency plan at the DSM Biomedical Site.

- **Society of Physics Students**   Kutztown, PA
Student Member   August 2021 - December 2022
Student outreach through club organised events, organise and participate in physics and science challenges, promoting research opportunities within the Physical Sciences Department.

- **Community Outreach Planetarium Shows**   Kutztown, PA
Volunteer   Fall 2022 - Fall 2023
Organize local community events through the planetarium by hosting laser light shows and having public telescope viewings of Saturn and Jupiter.

- **Bearcat Buddies**   Cincinnati, OH
Volunteer   August 2017 - December 2017
Engaged in tutoring at the Cincinnati Public Schools (Elementary level), providing educational support and guidance to enhance students' academic achievements.

Awards & Scholarships

- Chambliss Student Academic Achievement Award   Kutztown University
Silver Medal   April 2023

- Roy W. Hamme Memorial Award   Kutztown University
Highest achieving student in Physical Sciences   Fall 2022 - Spring 2023

- KURF Grant   Kutztown University
Kutztown University Undergraduate Research Funds   December 2022

- National Science Foundation International Research Experience for Students Grant   Kutztown University
Research Advisor: Dr. Phillip Reed   May 2022 – August 2022

- Dean's List   Kutztown University
                                                                                      Spring 21 – Fall 22

- Dean's List   University of Cincinnati
                                                                                   Spring 17 – Spring 19

Professional Memberships

- Sigma Pi Sigma, Honor Physics Student Society   April 2023 - Present

- Society of Physics Students (SPS)   September 2021 - December 2022

- American Astronomical Society (AAS)   September 2022 - Present

- National Society of Collegiate Scholars   January 2017 - May 2019