

ISHAN F. GHOSH-COUTINHO

CURRICULUM VITAE*

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Education	B.S. IN ASTRONOMY, University of Washington (UW)	2024
	B.A. Minor in Drama: Design for Performance, (UW)	2024
Research Experience	UNDERGRADUATE RESEARCHER (UW Massive Star Group & DiRAC Institute)	2020 – Present
	Supervisor: Prof. James R.A. Davenport, Prof. Emily M. Levesque, Dr. Trevor Dorn-Wallenstein (Published: Ghosh-Coutinho et al. 2023 , 2024 (expected)) (Conference Proceedings: Ghosh-Coutinho et al. 2023 , 2024 (accepted))	
	30" TELESCOPE OPERATOR (Manashtash Ridge Observatory)	2023 – Present
	Supervisor: Prof. Oliver Fraser (University of Washington)	
Publications & Conference Proceedings	PUBLICATION: PHOTOMETRIC CLASSIFICATION OF EVOLVED MASSIVE STARS: SPECTROSCOPIC VERIFICATION AND VALIDATION	
	Ishan Ghosh-Coutinho , Trevor Dorn-Wallenstein, Emily Levesque, & James Davenport. Research Notes of the American Astronomical Society (November 2023)	
	IPOSTER: PHOTOMETRIC CLASSIFICATION OF EVOLVED MASSIVE STARS: HIGH-RESOLUTION SPECTROSCOPIC VALIDATION	
	Ishan Ghosh-Coutinho , Trevor Dorn-Wallenstein, Emily Levesque, & James Davenport. Bulletin of the American Astronomical Society, (January 2023)	
Honors & Awards	IPOSTER: CENSUS OF VARIABILITY OF LUMINOUS BLUE STARS IN GAIA AND ZTF	
	Ishan Ghosh-Coutinho , James Davenport, Emily Levesque, & Trevor Dorn-Wallenstein. Bulletin of the American Astronomical Society, (Accepted January 2024)	
	DEANS LIST (UW)	2023
	INVITED PANELIST, PANEL ON UNDERGRADUATE RESEARCH IN PHYS. AND ASTRO. (UW)	2023
	CHAMBLISS AWARD RUNNER UP, AMERICAN ASTRONOMICAL SOCIETY 241, (AAS)	2023
	ASUW SENATE, SENATOR PARLIAMENTARIAN (UW)	2023
Successful Observing Proposals	2022 DiRAC SUMMER RESEARCH PRIZE (DiRAC)	2022
	Manastash Ridge Observatory 30", Telescopes (12 full nights) - Certified Observer	2023 – Present
	Multiband variable star photometry with Evora. P-I: I. Ghosh-Coutinho	
	APO 0.5-m ARCSAT (4 Half Nights) - Trained Observer	2023
	Observing variable massive stars identified from ZTF for the Astro 480 course. P-I: S. Tuttle	
	APO 3.5-m (3 half nights) - Trained Observer	2021
	Co-observing massive stars with the echelle spectrograph. P-I: T. Dorn-Wallenstein	

*A live copy of my CV is available at the flowing link: <https://ifgc.github.io/images/CV.pdf>

Employment	COMMITTEE CHAIR Associated Students of the University of Washington (ASUW), Senate Committee for Resolution Follow Up, Seattle, WA	October 2023 - Present
Employment	GRADER University of Washington, Department of Astronomy, Seattle, WA	Jan 2024 - Present
Speaking & Conference Experience	Contributed Talk, Mary Gates Undergraduate Research Symposium (Planned) Contributed Talk, Astronomy on Tap (Planned) Contributed iPoster, 243rd Meeting of the American Astronomical Society, iPoster Invited Talk, Battle Point Astronomical Association Invited Panelist, Panel on Undergraduate Research in Physics and Astronomy Attendee, Dark Universe Science Center & Institute for Nuclear Theory, Cosmic Intersections Invited Speaker, Pacific Science Center 2023 Eclipse & Meet a Scientist Day Contributed Science Talk, Astro Fest Contributed Structural Talk, Astro Fest Contributed Talk, Mary Gates Undergraduate Research Symposium Contributed iPoster, 241st Meeting of the American Astronomical Society Contributed Talk, Mary Gates Undergraduate Research Symposium Contributed Talk, Mary Gates Undergraduate Research Symposium	2024 2024 2024 2023 2023 2023 2023 2023 2023 2023 2023 2022 2021
Technical Skills	Programming Languages: Python, SQL/ADQL, Java, Other: Unix Shell, IRAF, SAO DS9, L ^A T _E X, PhotUtils, PyMC, Emcee, Adobe Suite, Visual Basic for Applications (VBA) Observing Skills: Proposing, planning, and carrying out optical spectroscopic and photometric observations, Survey & time-domain data retrieval and analysis; machine learning methods (regression & classification); Languages: English, Hindi, Bengali (Spoken), French	
Service & Outreach	UW SEXUAL-ORIENTATION AND GENDER MINORITIES IN ASTRONOMY, FOUNDER & CO-CHAIR (UW) PLANETARIUM PRESENTER, 50+ SHOWS AND EVENTS AND COUNTING (UW) SCHOOL OF DRAMA, COSTUME DESIGNER - <i>Airness</i> (UW) SCHOOL OF DRAMA, ASSISTANT COSTUME DESIGNER - <i>The Moors</i> & MISC. (UW) UW ASTRO UNDERGRADUATE VOLUNTEER COORDINATOR & UNDERGRADUATE OUTREACH SITE LEAD FOR PACIFIC SCIENCE CENTER OUTREACH EVENT ASUW SENATOR, CHAIR OF COMMITTEE FOR RESOLUTION FOLLOW UP ASUW SENATOR, COMMITTEE FOR SENATE STEERING ASUW SENATE'S LIASON TO UW OFFICE OF GOVERNMENT RELATIONS, COMMITTEE ON LEGISLATIVE STEERING ASUW SENATOR, MEMBER OF COMMITTEE FOR RESOLUTION FOLLOW UP ASUW PRESIDENT'S LIAISON TO UW TRI-CAMPUS COMMITTEE ON PREPAREDNESS OVERSIGHT FIRST WASHINGTON, PNW DISTRICT CONTROL SYSTEMS ADVISOR FIRST WASHINGTON, PNW DISTRICT ROBOT INSPECTOR ASUW SENATE'S LIAISON TO THE HUSKY UNION BUILDING, BOARD OF REPS. ASUW SENATOR, MEMBER OF ON CAMPUS COMMITTEE VOLUNTEER GAME MASTER, PEN AND PAPER GAMING ASSOCIATION FIRST WASHINGTON, MENTOR TO FRC TEAM 8248 CHAINLYNX	2023 – Present 2021 – Present 2024 – Present 2023 – 2024 2023 2023 – Present 2023 – Present 2023 – Present 2022 – Present 2022 – Present 2022 – Present 2022 – Present 2021 – Present 2020 – 2021 2020 – 2021 2020 – Present 2019 – Present
Teaching & Mentoring	MENTOR FOR LINCOLN HIGH SCHOOL CTE PROGRAMS & FIRST ROBOTICS COMPETITION TEAM 8248, CHAINLYNX	2019 – Present

· Mentored >60 students in skills such as effective design strategies, control systems design and programming. Taught students effective scientific and engineering problem-solving, programming, and troubleshooting. Guided students through the design and design review processes. Guided students through team management, leadership soft skills, curriculum development and peer mentoring. Provided students with networking opportunities.

ANNUAL DATA SCIENCE FOR HIGHSCHOOLERS WORKSHOP 2022–Present
 · Taught students basic use of Jupyter Notebooks, python, github, APIs, to pull data and analysis through various packages such as pandas, scipy, matplotlib, etc. Introduced students to basic data science concepts and bayesian statistics.

JOURNAL CLUB FOR HIGHSCHOOLERS 2022,2023
 · Created a program for high school students that used a combination of **astrobites** and presentations to simplify astronomy and astrophysics papers whose titles students found interesting and selected. There have been 14 such Journal Clubs.

HIGH SCHOOL TUTOR 2020–Present
 · Helped >20 high school students work through assignments and concepts related to science, engineering, history, and math.

PEER TUTOR & MENTOR 2022-2023
 · Helped 7 students work through assignments and concepts in lower-division physics, astronomy and math coursework and gave advice on how to approach upper-division coursework and research and college life as a whole.

Notable Astronomy Courses

19. ASTRO 499: UNDERGRADUATE RESEARCH (CAPSTONE CLASS) 33 Credits between Winter 2021 and Spring 2024
 Credit for working on various research projects, talks, and publications.
18. ASTR 581 TECHNIQUES IN OPTICAL ASTRONOMY (Permission Pending) Spring 2024
 Theory and practice of obtaining optical data. Astronomical photoelectric photometers, spectrographs, interferometers, CCDs, and infrared equipment. Data-reduction techniques with emphasis on statistical analysis using digital computers. Observations with MRO thirty-inch telescope.
17. ASTRO 597 OR 598: GRADUATE MACHINE LEARNING (Planned) Spring 2024
 Builds on combining theoretical background with hands-on work on examples of data analysis with modern astronomical datasets towards learning modern computational techniques.
16. ASTRO 419: EXOPLANETS (Planned) Spring 2024
 Exoplanet properties, discovery, and habitability. Examines the science involved in the search for Earth-like planets and life beyond our Solar System. Topics include: exoplanet environments, modelling exoplanet planetary systems, planetary habitability, detection, and properties of exoplanets.
15. ASTRO 531: STELLAR INTERIORS (Permission Pending) Spring 2024
 Physical laws governing the temperature, pressure, and mass distribution in stars. Equation of state, opacity, nuclear energy generation, computational methods. Models of main sequence stars and star formation.
14. ASTRO 507: GRADUATE PHYSICAL FOUNDATIONS OF ASTROPHYSICS Winter 2024
 Introduction to astronomical hydrodynamics and magnetohydrodynamics, basic theorems and application to stellar and interstellar magnetic fields. Introduction to plasma physics and waves in a plasma.
13. ASTRO 519: GRADUATE RADIATIVE PROCESSES IN ASTROPHYSICS Winter 2024
 Theory and applications of astrophysical radiation processes: transfer theory; thermal radiation; theory of radiation fields and radiation from moving charges; bremsstrahlung; synchrotron; Compton scattering; plasma effects. (Will count for Phys 322 completion)
12. ASTRO 421: STELLAR OBSERVATIONS AND THEORY (Planned) Winter 2024
 Observations and theory of the atmospheres, chemical composition, internal structure, energy sources, and evolutionary history of stars.

11. ASTRO 423: HIGH-ENERGY ASTROPHYSICS Autumn 2024
High-energy phenomena in the universe. Includes supernova, pulsars, neutron stars, x-ray and gamma-ray sources, black holes, cosmic rays, quasi stellar objects, active galactic nuclei, diffuse background radiations. Radiative emission, absorption processes, and models derived from observational data.
10. ASTRO 481: ASTRONOMICAL OBSERVATION (CAPSTONE) Summer 2023
Theory and practice of obtaining optical data at a telescope. Preparation and operation of a telescope, obtaining data with a CCD and subsequent data analysis for completion of a self-guided research project.
9. ASTRO 480: ASTRONOMICAL DATA ANALYSIS (CAPSTONE) Spring 2023
Hands-on experience with electronic imaging devices (CCDs) and software for image reduction and analysis. Introduction to operating systems, reduction software, and statistical analysis with applications to CCD photometry.
8. ASTRO 513: COSMOLOGY AND PARTICLE ASTROPHYSICS Spring 2023
Big bang cosmology; relativistic world models and classical tests; background radiation; cosmological implications of nucleosynthesis; baryogenesis; inflation; galaxy and large-scale structure formation; quasars; intergalactic medium; dark matter.
7. ASTRO 324: ASTROSTATISTICS AND MACHINE LEARNING IN ASTRONOMY Spring 2023
Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure and evolution of galaxies.
6. ASTRO 497 (ASTR 511 CROSSLIST, CAPSTONE): GRADUATE GALACTIC STRUCTURE Winter 2023
Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure and evolution of galaxies.
5. ASTRO 300: PROGRAMMING FOR ASTRONOMICAL APPLICATIONS Winter 2023
Introduction to programming needed for astronomical applications: Linux operating systems, Python, SQL/ADQL.
4. ASTRO 321: THE SOLAR SYSTEM Spring 2022
Solar system; planetary atmospheres, surfaces and interiors, the moon, comets. The solar wind and interplanetary medium. Formation of the solar system.
3. ASTRO 323: EXTRAGALACTIC ASTRONOMY AND COSMOLOGY Winter 2021
Galaxies, optical and radio morphology and properties. Clusters of galaxies, radio sources, and quasars. Observational cosmology.
2. ASTRO 322: THE CONTENTS OF OUR GALAXY Autumn 2021
Basic properties of stars, stellar systems, interstellar dust and gas, and the structure of our galaxy.
1. ASTRO 192: PRE-MAJOR IN ASTRONOMY RESEARCH SEMINAR Autumn 2020
Pre-MAP is for UW students without experience in programming and/or scientific research who are traditionally underrepresented in astronomy and allows them to learn astronomical research techniques and apply them to research projects conducted in small groups. These projects involve the use of cutting-edge facilities and/or data available to UW astronomers.

Notable Physics Courses

11. PHYS 324: QUANTUM MECHANICS I Autumn 2023
Introduction to nonrelativistic quantum mechanics: need for quantum theory, Schrodinger equation, operators, angular momentum, the hydrogen atom, identical particles, and the periodic table.
10. PHYS 322: ELECTROMAGNETISM II Winter 2023
Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics. (Course requirement completion contingent on Astro 519)
9. PHYS 321: ELECTROMAGNETISM I Autumn 2023
Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics.

8. PHYS 228: MATHEMATICAL PHYSICS II Winter 2023
Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Develops and applies computational methods, both analytic and numerical.
7. PHYS 225: INTRODUCTION TO QUANTUM MECHANICS Winter 2023
Introduces spin and applications in nuclear magnetic resonance. Emphasizes two-state systems.
6. PHYS 227: MATHEMATICAL PHYSICS I Winter 2023
Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Develops and applies computational methods, both analytic and numerical.
5. PHYS 294: INTRODUCTION TO RESEARCH: FRONTIERS OF PHYSICS Winter 2023
Provides a survey of contemporary research in experimental and theoretical physics, with an emphasis on subfields seeing revolutionary changes in understanding.
4. PHYS 224: THERMAL PHYSICS Spring 2022
Introduces heat, thermodynamics, elementary kinetic theory, and statistical physics.
3. PHYS 123: WAVES, LIGHT, AND HEAT Spring 2022
Explores oscillatory motion, electromagnetic waves, optics, waves in matter, fluids, thermodynamics, and related experiments for physical science and engineering majors. Lecture, laboratory, and tutorial components.
2. PHYS 122: ELECTROMAGNETISM Autumn 2022
The basic principles of electromagnetism and experiments in these topics for physical science and engineering majors. Lecture, laboratory, and tutorial components.
1. PHYS 121: MECHANICS AP 2020
Concepts such as kinematics; Newton's laws of motion, work, energy, and power; systems of particles and linear momentum; rotation; oscillations; and gravitation. Hands-on laboratory work and in-class activities to investigate phenomena and use calculus to solve problems.