

Introduction to the Seminar

This seminar will engage you, early in your educational career, as a researcher in a team research project that will result in a published paper. Completing actual research will help you understand how all the individual lecture courses and technique labs you have and will be taking will, in the end, come together in a usable, coherent manner. After all, we wouldn't expect students who want to be professional basketball players to take classes in the theory of basketball and participate in dunking and dribbling labs for years on end without ever actually playing a basketball game as a team member!

This seminar will immerse you, as a member of a research team, within an existing, double star research community-of-practice that consists of both professional and amateur astronomers as well as former seminar students who were bitten by the research bug and continued on with research projects after completing the seminar. Your team will prepare and submit a research proposal, manage your own research, write up your results, send your co-authored paper out for external review, and submit your final paper for publication in the *Journal of Double Star Observations*. Being a coauthor of a published research paper will boost your educational career with respect to admissions and scholarships. Over 300 seminar students have been coauthors of over 100 published papers.

We have learned, over the past decade, how to reliably produce student team papers and send them off for publication within the constraints of a half-semester seminar. We:

- Picked a student-friendly area of scientific research—double stars—that features a sizeable professional-amateur (pro-am) community-of-practice.
- Immerse student research teams within this supportive, pro-am community-of-practice.
- Form diverse teams with a wide range of student talents, backgrounds, and experience. Such variation, it should be noted, is also the norm within professional research teams.
- Encourage varying levels of participation; some students have more time than others. The same is true in professional research. Justice, with respect to the degree of participation, is handled by author order, as is the case with professional research teams.
- Have student teams take ownership of their projects and manage their own projects.
- Make sure that student teams plan their projects, make their proposals, and collect and analyze their data in a prompt manner, leaving ample time for writing and rewriting team papers and giving a final PowerPoint presentation.

ASTR 299 Student Learning Outcomes

Students who successfully complete the Astronomy Research Seminar at Cuesta College will have:

- Shown an understanding of the nature of scientific, astronomical and double star research
- Planned a team research project that will be completed during the seminar
- Gathered and analyzed double star observations
- Written a team research paper
- Incorporated an external reviewer's suggestions into a final paper submitted for publication
- Described the team's research findings in PowerPoint presentation

The Roles of the Student Researchers and Instructor Supervisor

The roles of the students in this seminar are somewhat different than usual classes. Students are:

- Regular online students for the first two weeks of the seminar as they develop an understanding of the nature of scientific, astronomical and double star research through textbook readings, online interactive videos, and short, objective quizzes
- Team research scientists for the last six weeks of the seminar

The role of the instructor in this seminar is also somewhat different than usual classes. The instructor:

- Records grades, answers student questions, etc., as in a regular online class
- However, the instructor is, primarily, a research supervisor that provides guidance to the student research teams, connects them with both professional and amateur astronomers outside of the seminar for assistance, and critically reviews their research every week

Meet Your Instructor / Research Supervisor

The first quarter century of Dr. Russell Genet's professional career was as an aerospace research and development supervisor or chief scientist at several government research labs. He started his career as, literally, a rocket scientist developing rocket guidance systems and, over the years, also supervised research and development related to spacecraft and aircraft. Russ learned, through decades of practical experience, how to help researchers formulate and manage their projects, avoid being overly ambitious or letting "mission creep" set in, and seeing their projects through to a timely conclusion, which usually included publication and presentation of their research results. He has applied what he learned in supervising professional researcher teams to supervising student research teams. For the last quarter century, Russ has pioneered the automation of telescopes and observatories, and has conducted research on the photometry of variable stars and astrometry of binary stars.

Throughout his career, Russ has taught classes or led research seminars at various institutions, worked with numerous students on their senior projects, master's thesis, and doctoral dissertations, organized dozens of conferences and workshops, written or edited some two dozen books, and authored or co-authored well over 100 scientific papers. He has given dozens of public talks and appeared on a number of television programs, including *The Perfect Stargazer*, a PBS one-hour special that featured his development, with Louis Boyd, of automated telescopes and robotic observatories. Russ has actively served in national and international organizations, including the International Astronomical Union and a term as the 52nd President of the Astronomical Society of the Pacific. His degrees are in Electrical Engineering (BS) and Astronomy (PhD). Russ is currently a Research Scholar in Residence at California Polytechnic State University, an Adjunct Professor of Astronomy at both Cuesta College (CA) and Leeward Community College (HI), and a Distinguished Visiting Professor of Astronomy at Concordia University Irvine. He is also the Principal Investigator for the National Science Foundation Grant *Student Research within Communities of Practice*.

Russ lives with his wife, Dr. Cheryl Genet (who teaches philosophy and world religions at Cuesta College), near Santa Margarita Lake. Russ' hobbies include amateur radio (radio station WO7G) and flying. A power-plane pilot for decades, Russ is currently leaning to fly gliders.

Communication

- It is preferred that if you have a question or concern or other communication that you email me at russmgenet@aol.com. I will answer your email as soon as possible, but at the minimum within 24 hours, Monday-Saturday.
- If you need to call me and speak personally, do not hesitate. I enjoy talking with student researchers. You can reach me at 805-438-3305. Call at any time. Leave a message if I don't answer and I'll call you back. I don't text.

Basic Course Information

ASTR 299 - Astronomy Research - provides practical experience in one area of astronomical research, and an understanding of the nature of scientific research. Students plan a research project, make observations, analyze results, and write a paper for publication. Transfer: CSU.

The required textbook is:

The *Small Telescope Astronomical Research Handbook* (Preliminary Edition). Genet, Johnson, Buchheim, and Harshaw. Collins Foundation Press. To order go to:

<http://www.collinsfoundationpress.org/CFPOrderAstronomy.htm>

Scroll down almost but not quite to the bottom of the page. Look for a gray box on the left-hand side with the words "Astronomy Research Seminar Text (STAR Handbook)." Click on "Add to Cart" on the right-hand side of this box and check out. Be sure to enter your zip code where requested. The book price is \$19.95 plus \$5.00 shipping and a \$1.50 California Sales Tax for a total of \$26.45. The softbound textbook is 8.5x11 inches, and is 119 pages.

This course will begin on Monday June 12 and end on Friday August 4 (8 weeks)

What to Expect

- The seminar is fully on line. There are no required in-person meetings, although you will be given a couple of completely voluntary opportunities to meet with your instructor and at least some of your fellow researchers in person at Cuesta College.
- The first two weeks are individual learning with readings from the textbook, interactive videos, and short objective quizzes. Once you complete these assignments, you will be certified as a researcher.
- The last six weeks are devoted to your team's research project. Most all of your work will be as a team member, although there is some individual preparation (textbook chapters, videos, and quizzes) to prepare you to participate in the team's work
- Each team will meet with me online once each week during the last six weeks
- Students within a team will meet with each other online as required
- My online office hours are open for individual, team, or partial team consultation
- The seminar will conclude with an online symposium, open to the public, where each team will describe their research results in a short PowerPoint presentation

Technology Requirements

You will need to have a **Cuesta e-mail account and access to the World Wide Web.**

Please see below for more detailed computer and internet specs.

Computer Requirements

Computer and technical requirements can be found at:

http://www.cuesta.edu/academics/distance/faqs_technical.html

Accessing Canvas/Course Website

All of the information you will need to access this course on Canvas, learn how to navigate Canvas, and access assistance if you are having problems, can be found on the Cuesta website Distance Education page:

<https://cuesta.edu/academics/distance/index.html>

DSPS Assistance

I am happy to work closely with you and the DSPS to make this as rich a learning experience as possible for all!

Disable Students and Program Services at <https://cuesta.edu/student/student-services/dsps/index.html>

College and Course Policies

College and Course Policies may be found at:

https://www.cuesta.edu/academics/documents/catalog/catalog_2014-15/4policies_catalog_2014-15.pdf

Cuesta waitlist procedure and instructions:

https://www.cuesta.edu/student/documents/admissions_records/waitlistguide.pdf