

# Marin Academy Research Collaborative

Marin Academy supports student interests in many ways. Our science program allows students to follow interests and questions in a manner that fosters independence and healthy risk taking while offering support along the way.



**MARIN**  
**ACADEMY**  
50 YEARS

## Program Overview

The Marin Academy Research Collaborative (MARC) program is specifically designed to engage a diverse group of students in cutting-edge science and engineering research that is characteristic of college-level courses. This two-year, multidisciplinary program provides the opportunity for interested students to identify their particular skills and interests, partner with the larger scientific community to pursue a research project of their own design, and complete a rigorous college-level curriculum. Students generate a novel research question, conduct a rigorous literature review, collaborate with content-area experts, develop hypotheses, collect and analyze data, and learn how to publicly present, as well as publish their work.

Throughout this process students will:

- Collaborate with the professional scientific community
- Build knowledge & develop mastery in a chosen field
- Think critically to frame and test novel questions and hypotheses
- Communicate complex scientific ideas effectively
- Develop professional skills necessary for a successful scientific career
- Take academic risks and navigate challenges
- Make new discoveries

Students may choose a topic from engineering and computer sciences, physical sciences, life sciences, social sciences, or psychology that piques their curiosity. Students collaborate with content-area experts and with the guidance and support of the MARC Coordinator, identify an outside mentor to help with their research project. The MARC program is unlike any other offered at Marin Academy, beginning during the fall of 11th grade and ending during the spring of 12th grade. The MARC Independent Research electives are offered pass/fail and students work independently toward their own set of goals. While MARC students are required to demonstrate a high degree of autonomy, initiative, and time management, classes are held during the week and students share their ongoing research with each other and mentor students new to the program.

Students also are expected to spend time working with their outside mentor during the school year and/or take part in a summer science research internship program.

## Vision Statement

The MARC program seeks to inspire a passion for research and discovery and promote enthusiasm, exploration and academic excellence in an evolving global and scientific/technological community.

## Eligibility Requirements

Due to the unique demands of the MARC program, only a limited number of students can be admitted. Students must be entering 11th grade and be in good academic standing, have taken Biology and Chemistry, and be concurrently enrolled in Physics during 11th or 12th grade to be eligible to apply. Applicants are required to submit three short essays, two letters of recommendation from teachers or mentors, and have the approval of their academic counselor. While not required, previous enrollment in the optional MARC Elective: Exploring Experimental Design is encouraged. Concurrent enrollment in a science course related to area of interest during 11th grade and Statistics during 12th grade also are recommended. The MARC Independent Research electives are offered pass/fail and therefore do not receive A–G designation by the University of California or count towards a student's overall GPA.

Students enrolled in the MARC Independent Research I elective must successfully complete all major assignments including, but not limited to: finding a mentor, writing a project proposal, and presenting a poster to the extended Marin Academy community to earn a final passing grade at the end of junior year and continue on to the MARC Independent Research II elective. Students also must demonstrate a growth mindset and an ability to work independently by the end of junior year to continue in the program. Students enrolled in the MARC Independent Research II elective are required to work on their MARC project for their Senior Project requirement, prepare a major research paper at the conclusion of their research project, and deliver a formal seminar presentation at the MARC Wildcat Colloquium.

Students enrolled in either of the MARC Independent Research electives will be placed on programmatic probation if they receive a set of grades or comments at the end of any formal marking period that are indicative of difficulty meeting with success in the MARC program. If a MARC student is placed on programmatic probation, they and their parents or guardians will meet with the MARC Coordinator and Academic Dean to review the specific terms of the probation, which are determined on a case-by-case basis. If a student fails to meet the terms of the probation at the end of the designated time period, they will be separated from the MARC program unless, after consultation with the MARC Coordinator and Academic Dean, the Head of School decides otherwise.

## Important Dates

February 13, 2023: Informational Meeting for Students  
February 17, 2023: Applications Available  
February 22, 2023 @ 7pm [Zoom]: Informational Meeting for Students & Parents  
March 28, 2023: Applications Due  
April 25, 2023: Applicant Interviews  
May 5, 2023: Applicants Notified

### MARC Coordinator

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Webpage:

<https://www.ma.org/why-ma/signature-programs/marin-academy-research-collaborative> MARC

Blog: <https://sites.google.com/ma.org/main-marc-website/home>

*For best viewing experience, please open links using your Chrome or Safari browser.*

## List of Courses

### Fall Electives

*Please note that courses only will be offered if there is sufficient enrollment.*

#### **MARC Elective: Exploring Experimental Design (SCI 600)**

*This course is considered a “D: Laboratory Science Elective” by the University of California.*

Exploring Experimental Design is a semester-long introductory course that focuses on research design, hypothesis testing, and basic laboratory and field skills. The instructional component of the course will focus on research methods and practices including, but not limited to literature reviews; research question and hypothesis generation; experimental design; data analysis; and scientific writing. This course is designed to allow you to work with your peers as you develop the skills and mindset to solve novel problems. The class may include visits by research scientists and field trips to local universities and research facilities. Students will be exposed to a wide range of research fields (e.g., engineering and computer sciences, physical sciences, life sciences, social sciences, psychology) and have the opportunity to conduct “hands-on” research in our own MARC Research Lab in the Science and Innovation Center. If you are considering applying to the MARC program, this course will give you an insight into the skills, process, challenges, and rewards involved in scientific research.

### Yearlong Electives

*Please note these courses only are available to students enrolled in the MARC program. Also note that these courses are mandatory for MARC program students.*

#### **MARC Elective: Independent Research I - Honors (SCI 610)**

*Open to juniors enrolled in the MARC program; Prerequisites: Biology, Chemistry, MARC application; Recommended: Additional science course related to the area of interest, Exploring Experimental Design. Note: This course is offered pass/fail and therefore does not receive A–G designation by the University of California.*

This year-long elective will focus on advanced research design, data collection, and research ethics. The hands-on component will be geared toward the design and execution of a project idea for investigation by the student, and hopefully, lead to the execution of a novel research project. Time will also be spent on the establishment of connections between students and professional scientist mentors who will assist in the guidance of students as they perform their research. Students are expected to be self-motivated and collaborate with scientists on long term projects. This elective provides the students with an individualized opportunity to pursue the research question of their choosing. Students will have both the MARC Coordinator and an outside expert advising them during the school year. Students are encouraged to spend time working with their outside mentor during the school year or taking part in a summer science research internship program. Enrollment in this course is a two-year commitment and will continue through senior year.

#### **MARC Elective: Independent Research II - Honors (SCI 620)**

*Open to seniors enrolled in the MARC program; Prerequisites: Biology, Chemistry, Independent Research I; Recommended: Statistics. Note: This course is offered pass/fail and therefore does not receive A–G designation by the University of California.*

This year-long elective will focus on advanced research skills, data analysis, mentoring skills, and scientific communication. During senior year, students will complete the research projects they began in Independent Research I. In addition, they will take on mentorship roles for those students just entering the program.

The culmination of this program will require that students write their own research papers and prepare presentation materials. Students may enter the senior level contests appropriate to their area of study, such as the Siemens Competition or the Intel Science Talent Search, or they may present at relevant conferences or science fairs. Students will also present their findings to the extended MA Community. Students are expected to be self-motivated and collaborate with scientists on long-term projects.



## Information for Parents of Prospective MARC Students

### **Q: My child is interested in science. Should they consider the MARC program?**

**A:** The MA science department offers many amazing opportunities for all students to explore science in an authentic way inside and outside the classroom. The MARC program is not for every student and requires a great passion for research and commitment to the ups and downs of the investigative process.

### **Q: Which types of students perform best in this program?**

**A:** Any student can be successful in this program if they are willing to prioritize MARC as a time commitment. Students should have a deep interest in a particular field of science and be innately motivated. Due to the nature of the program the most successful students will be those who have or develop a growth mindset and skills in cooperative learning, independent organization and responsibility, and flexible and creative thinking.

### **Q: When do students apply to the MARC program?**

**A:** In order to be accepted into the MARC program, students must apply in the spring semester of their 10th grade year.

### **Q: In which disciplines can a student complete research?**

**A:** Students can choose a topic from engineering and computer sciences, physical sciences, life sciences, social sciences, or psychology.

### **Q: What should a 10th grader who is preparing to enter the MARC program in 11th grade expect within the first few months of the program and throughout the next two years?**

**A:** Generally, the first year will be geared towards reading scientific literature, formulating a question and hypothesis, mentor outreach, and designing an experiment. Students will be working towards connecting with mentors to conduct their own novel research. The program will culminate with the student writing a manuscript and possibly submitting it to a scientific peer-reviewed journal, as well as a presentation of their findings at the MARC Wildcat Colloquium. Students also may enter senior level contests appropriate to their area of study, such as the Siemens Competition, the Intel Science Talent Search, or they may present at appropriate academic conferences or science fairs.

### **Q: What are the 11<sup>th</sup>-grade course objectives?**

**A:** Students will learn how to critically and scientifically think, write, and speak. They will learn how to conduct a scientific literature search, identify and select an area of interest in which to complete a scientific study, and learn to network and communicate with members of the scientific community. Students enrolled in the MARC Independent Research I elective must demonstrate an ability to work independently and complete all assignments successfully to earn a final passing grade at the end of junior year and be eligible to continue on to the MARC Independent Research II elective.

**Q: What are the 12<sup>th</sup>-grade course objectives?**

**A:** This year-long elective will focus on advanced research skills, data analysis, mentoring, and scientific communication. During 12th grade, students will complete the research projects they began in Independent Research I. The culmination of this program will require that students write their own research papers and present their findings to the broader MA community during the MARC Wildcat Colloquium. Students may enter senior level contests appropriate to their area of study, such as the Siemens Competition, the Intel Science Talent Search, or they may present at appropriate academic conferences or science fairs. Seniors also must commit to their MARC project being the focus of their senior project.

**Q: What does collaboration look like in the MARC program?**

**A:** During the first semester of the MARC Independent Research I elective, students will work in teams on select assignments that pertain to the general research process (e.g., debates in research ethics, reading and understanding scientific publications, peer-review process) to build a uniform foundational understanding. Then, the focus of their second semester will be to branch into directions that are specific to their chosen areas of research. During this time, and until the end of their senior year, students will model the structure of a research group. Specifically, students will share resources and ideas and lean on each other for feedback that will help enhance their overall communication and project management abilities.

**Q: Does my child need to double in science to participate in the MARC Program?**

**A:** Yes, students in the MARC program will need to double in science either their junior or senior year to complete their MA science requirements. Students are required to complete three years of laboratory science including 9th grade Biology, 10th grade Chemistry, and one year of Physics (Physics with Algebra and Trigonometry, Advanced Physics with Calculus, Electrical Engineering and Computer Science, or Astrophysics). Physics may be taken in either the junior or senior year. Students also are strongly encouraged to enroll in a science course related to their area of interest during junior year and take statistics during their senior year.

**Q: Is this program widely recognized by college admission boards?**

**A:** The MARC Independent Research electives are offered pass/fail and therefore do not receive A–G designation by the University of California or count towards a student's overall GPA. However, most colleges look favorably on students who have remained committed to a course of study completed at an extremely in-depth level of comprehension.

**Q: How does enrollment in the MARC program affect my child's ability to participate in semester abroad programs, co-curricular activities, or work after school?**

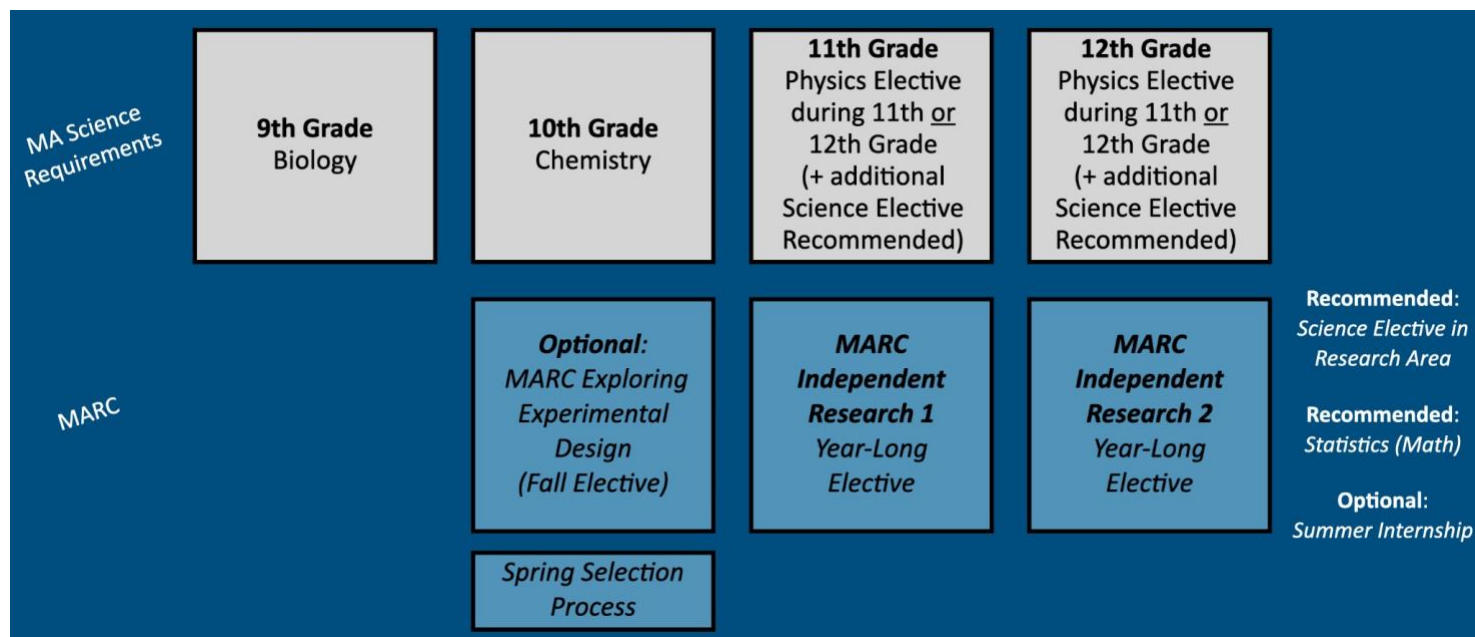
**A:** Students often participate in co-curricular activities and hold after school jobs, but because enrollment in the MARC program is a two-year commitment, students will most likely not be able to participate in study abroad programs during the school year (considered only under very particular circumstances and with approval from the MARC Coordinator, Academic Dean, and the student's advisor). Students also should expect to spend 6 to 8 hours per week inside and outside of the classroom working on their MARC projects and must commit to their MARC project being the focus of their senior project.

**Q: If my child has additional questions about the MARC program, how can they get more information?**

**A:** Students can contact Amy Strauss ([astrauss@ma.org](mailto:astrauss@ma.org)) for more information about the MARC Program or other science research opportunities at Marin Academy.

# MARIN ACADEMY RESEARCH COLLABORATIVE

## MARC Pathway



"It has been my honor to work with and mentor students through the MARC program, an elite science research pathway MA has created. The caliber of students increases each year and the faculty is so committed and inspiring, constantly stretching themselves to offer their students the best and most cutting edge experiments and amazing opportunities for independent research."

Kegan Donlan, Mentor