

JPL Origins and Habitability Lab (OHL) Internship Details

If you are going to email us about internships, read this first!

This document describes the responsibilities and contains statements of mentors in the OHL, so that you can get an idea of what to expect by joining the group under a particular mentor. Please also read the [OHL Code of Conduct](#) for more information about group policies and expectations.

General info:

There are two JPL research scientist Principal Investigators (PI's) in the OHL who can serve as your primary intern mentor: Laurie Barge and Jessica Weber. As an intern you will have one of these scientists as your primary mentor; and you will also have a co-mentor, who may also be a postdoc within the group. Each mentor leads different grants / projects and has specialized research interests, and has different mentoring philosophies and styles. So on our end we choose interns that are in line with our plans and current funding; and on your end you should choose the mentor who is a best fit for your personality, work preferences, and science interests.

Here is how we want students to contact the OHL regarding an internship:

1. After reading through the OHL website, research the mentors individually (an online search of their names should reveal their JPL and other websites with more information about their research; as well as their publications that you can download). Also, finish reading this document that describes our individual mentoring philosophies / strategies.
2. Choose which mentor you wish to contact, and **email them individually with a customized email**. Please, do not email all of us with general internship requests.
 - a. If you want to contact one of the postdoc mentors, you must additionally contact either Laurie or Jessica (the same email is fine); since the PI's manage funding for the lab.
3. Tips for your email:
 - a. Introduce yourself and say where you are currently enrolled
 - b. Attach an up to date CV that demonstrates your interest in astrobiology / in the research you are contacting us about
 - c. Describe your interest in JPL, the OHL, and working with this specific mentor
 - i. Demonstrate that you have done due diligence searching the mentor online and reading their websites (e.g., you may refer to specific funded projects or papers).
 - ii. Don't forget to tell us why you want to be part of the OHL!
 - d. Describe what exactly you are looking for (summer internship, a MS or PhD committee member, a career conversation..)

Then, we will try to get back to you promptly. But if you don't hear back within 2 or 3 weeks, it is fine to email us again and give a nudge (it's not you, we are just very busy).

Please note however, at the OHL we are very oversubscribed with student requests, and **often choose our interns a year or more in advance**. So please do not be discouraged if we have no spots available in a given time frame, and feel free to reach out again next year. It is always good practice to also be reaching out to other scientists (at JPL and outside) at the same time as you are contacting us, to maximize your chances of connecting with someone who might have an opportunity for you. We are also generally happy to chat regarding career advice even if we don't have an internship opportunity at the moment.

Responsibilities of all OHL mentors:

A mentor is the direct research supervisor of a student or postdoc; in the OHL there are various people who may serve as informal mentors but your primary mentor has certain responsibilities. These include: the mentor will make themselves reasonably available to advise the mentee and answer questions; the mentor will clearly relay their expectations for performance to the mentee and will inform the mentee if expectations aren't being met; and the mentor will act in the mentee's best interest and make reasonable effort to help them achieve their research and career goals. The mentor will also give the mentee our OHL new personnel checklist on their first day which will kick start the new person on various tasks including meeting with others in the group, taking lab trainings, and joining group and lab meeting.

However the details of mentoring style and philosophy will vary among mentors, so we advise reading the mentor details below, and asking more about this when you have your first conversation with your preferred mentor upon applying to the OHL.

Individual mentor statements are on the following pages.

Dr. Laurie Barge, JPL Research Scientist

I value improving diversity and inclusivity of our profession as well as doing excellent scientific research. Thus, I welcome applications from students who are seeking their first astrobiology or NASA experience, as long as you are willing to work hard and contribute to the group. I try to maintain a mix of institutions and student levels / types in my intern cohort, because all students bring valuable perspectives and experiences. For example I seek a balance of undergrads / MS / PhD students; R1, minority serving institutions (MSI), community colleges; summer vs. year round interns. In principle I do not offer unpaid or volunteer internships unless in special circumstances because I do not believe that research experience should be biased toward those that can afford to work for free.

Students' work should focus on the process of science such as doing lab work / being part of a lab group, learning how to use the scientific method to solve research questions, and learning how to write papers and give presentations. The focus is on students getting to co-author or first-author papers about their work, as well as getting the student closer to their particular career goals. I try to customize each intern's experience to give them the skills and connections they will need to seek the career they desire, so it is best to be open with me about your goals. It is the PI's responsibility to fund the work; I will not ask you to write proposals, though you can learn about proposals during your internship if you wish.

My students generally do chemistry projects that are lab focused. This usually means about half time is running experiments, and the other half is data analysis / writing / literature review. We will meet around once every two weeks; students make slides for each meeting about their progress and we go over the next plan; I also ask for a weekly email update. I ask that my students practice giving presentations at our group meeting, and when their work gets to a certain point I would like them to attend / present at a conference. As a PI of the group my schedule is tight: I have many responsibilities and also travel a lot for work. So while I care deeply about my students' career development and will use my position to provide you with opportunities and support, I am a more hands-off mentor on the day to day level and I trust that you will manage your tasks. I mesh well with students who have good organizational skills like being able to manage their schedule and keep track of action items / deadlines, without me needing to micro manage. I also value when my students make the effort to interact with others in the group, to help maintain a collaborative and welcoming environment for the OHL. All OHL students also spend time managing an instrument and helping with general lab tasks as needed.

My students work on projects about various aspects of origin of life and / or habitability; the specific research topics I have funded at any given point are detailed on my website. Students are welcome to find a specific interest within my published work or funded grants, or I have many ideas and can suggest projects. But I will favor projects that are in my expertise and that relate to my grants, since it is my responsibility to make sure your research can ultimately be publishable. So for best results in finding a mutually agreeable project, I suggest that students be willing to join what I already have funded and what I'm interested in, and if you bring an independent idea be open to some modification. In recent years my students have published seven intern first-author papers and over a dozen intern co-author papers, with more in prep; and these have greatly strengthened their resumes for grad school and postdoc applications.

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Dr. Jessica Weber, JPL Research Scientist

Mentoring philosophy: For me, it is critical that all interns have a safe and enjoyable experience at the OHL. I think that in order to achieve this, communication is critical. I work closely with my interns to develop laboratory procedures and experimental set ups for their projects. For this reason, I think being open to feedback about my mentoring and continuing to evolve my mentorship style and process is important to creating the best lab environment I can. I was head safety officer in my PhD and manage many of the safety practices in the OHL so this is something I am passionate about. However, this safety goes beyond just lab safety – students should feel personally comfortable within the lab group. I value a diverse lab group and believe that a diverse and inclusive research group comes up with the most unique ideas and research. I also believe the internships should be customized to the student and their goals within my research portfolio. Overall, I have a high focus on publishing as this is beneficial to a variety of science careers. My responsibility as a mentor includes making sure the research is publishable and meets the students' goals. Securing research funding is also my responsibility as a mentor and, while students can be involved with helping prepare research proposals, they will never be asked to write proposals on their own.

What to Expect: My background is in experimental chemistry research and the majority of projects I lead have a strong laboratory component researching different topics related to the origin of life, prebiotic chemistry, and habitability. As such, there is a heavy focus on chemical experimentation, reaction and reactor development, and use of different spectroscopic techniques. Often, this work requires part time access to JPL, however some of the work (literature searches, data analysis, writing) can be done remotely.

I have either weekly or biweekly meetings with my interns where we discuss research progress and planning, future directions, data analysis, and career advice. I am additionally, working in lab often myself. When I am on lab, I keep my office door open and try to be available for questions. In addition, it is important to me that students feel ownership over their projects within a collaborative environment. Students should expect to participate in presenting at group meeting and literature club.

The lab space is shared and is very collaborative. Everyone is expected to work together to maintain a safe and clean space for us to work. Students are expected to manage one instrument as their “lab role”, and helping with general lab management (e.g., leading a service visit for instruments, participating in lab cleanup and inventory).

Project Choice: Students are welcome to find a specific interest within my published work or funded grants, or I have many ideas and can suggest projects based on your goals / interests. I am very open to discussions about research and to providing project advice and input. However, for this research to move forward successfully I need to be able to advise your research project. I will choose projects that the OHL can facilitate and I have expertise in. I also heavily prioritize publishable work, which will benefit the lab and the intern. Overall, I am open to discussing new projects and can be very flexible in research topic and recommend interested interns have the same attitude.

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Dr. Bonnie Teece, JPL Postdoctoral Fellow

I discovered science late. As a child, I thought science was only for a certain kind of person. I had an alternate pathway into university, including attending TAFE (a kind of Australian community college) and taking bridging courses to help me develop the skills I needed. I then began my Arts degree, majoring in English literature, wanting to do a PhD in science fiction. I later found astrobiology and added a science degree to my arts degree. But, when I started science, I struggled, without taking any high school maths or science subject; for years, I felt lost and isolated, and I didn't understand what was happening. My experience underscores every facet of the way I mentor and facilitate learning.

If you work with me, we will meet at least weekly and be in regular contact. I will work with you to ensure you have the skills you need for the work we will do, including working through the appropriate scientific literature and learning the instruments and techniques needed to answer scientific questions. As a geologist, I primarily favour exploratory research, which requires continuous modification to protocols and plans, adaptability is a highly desired skill. I also place a strong emphasis on scientific communication due to my background in the arts and my work as a science communicator. My goal as a mentor is to equip students to think critically about subjects in a number of disciplines: the goal of lifelong learning is to challenge students to explore different modes of learning.

I expect my students to be willing to grow and develop new skills, and to commit to developing (with mentoring) time management and data organization skills. I also expect regular communication about all aspects of a project. I often give feedback about experimental procedures, projects and writing skills, so any prospective student should be open to receiving polite and constructive feedback. We will also prioritise writing scientific papers as a necessary element of academic development. Much of scientific knowledge acquisition occurs during these writing phases. As such, I expect my students to often be writing and always be reading appropriate literature, and will help guide them to find the most relevant research. I also welcome feedback on my mentoring style and often check in with my students to ensure their needs are met.

My work combines field and laboratory studies, and students who work with me can expect to develop a thorough grounding in geological contextual work to understand planetary processes and how they may affect the reliability of biosignatures (signs of life). The work I do is a combination of palaeontology, geology, and organic geochemistry and is firmly grounded in understanding alteration of biosignatures. My research primarily looks at hydrothermal analogs of Mars, Enceladus or Europa, and has examined samples from the very ancient Earth (3.5 billion years ago) to a range of land based and deep ocean hydrothermal environments. I also research geoscience/astrobiology education and look at methods to improve equity in this field; primarily, this work has examined the use of virtual field trips or online education as ways to make education more accessible. If you work with me, we will also work with either Laurie or Jessica as the laboratory PIs, and I have experience mentoring students with both PIs. I have complementary expertise to both PIs, so our students often combine some elements or either Jessica's or Laurie's expertise with my own.

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Dr. Katherine Dzurilla, JPL Postdoctoral Fellow

I really want students to be well set up for their career goals and obtain the skills needed for their own professional development. Research within the OHL covers a broad range of topics, and includes applications to various interdisciplinary fields. I encourage students to explore opportunities and learn about other research areas that interest them when possible. Many skills obtained during a student's time in the OHL can be transferrable to a range of professions, and my personal goal as a mentor is to help tailor the internship to provide relevant experience to the long-term goals of the student. A positive outcome I seek for students is to come out of the internship with a better understanding of their own science interests and career goals, whether those interest are relevant to astrobiology or not.

The OHL is made up of a diverse group of people and I seek to work with interns who desire to be a part of an inclusive team environment. The collaborative nature of the OHL is a great opportunity to grow and learn from others in the lab, and I find that students who are excited to dive into new topics and are willing to learn new skills, regardless of previous experience, are more likely to succeed.

What to Expect:

Interns can expect to meet at least 1 hour weekly to discuss data, weekly goals, and general career advice. During these weekly meetings, expectations of both myself and the students are discussed early and often to ensure all parties are happy with project progress and are clear on expectations. In addition to project tasks, students will also be expected to present at group meetings and the astrobiology lit club. As the OHL brings in students from a wide range of fields and experience levels, interns can be expected to be an active member of the team. This includes teaching and learning skills from others in the lab, keeping a clean lab space, and helping out with lab maintenance tasks.

Research Area and Projects:

My research focuses on laboratory simulations of ocean worlds and early Earth environments. I like answering questions about mineral/organic interactions of prebiotic relevance and how these would change in different planetary environments. Therefore, most projects I am involved in require benchtop lab work and various analytical techniques (such as NMR). Additionally, while interpreting results from experimentation is critical, understanding the "why" behind experimental design choices and controls I feel is equally as important. In addition to lab work, students can also expect to spend a significant amount of time conducting literature reviews on their given project. Scientific reading is a transferable skill that has great applications both in scientific fields and industry. From an internship experience, one can expect to gain laboratory skills, a general understanding of experimental design, and the ability to conduct and organize a topical lit review. Students are not required to have prior experience in these skills, and I enjoy working with students who are new to the field of astrobiology.

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Dr. Osama Alian, JPL Postdoctoral Fellow

For much of my life, science was a thing I'd see in a documentary on TV or read about in a textbook and until well into college, I never quite imagined that I'd be able to do it as an actual career. For every one of me, there are countless others sharing the same curiosities and unsure of how to turn them into satisfying projects. My mentoring philosophy stems from that experience, where exposure to the process of science and its many nuanced facets is just as important as the science itself. It provides a rich landscape within which to find a passionate cluster of questions to answer, maybe even building a career on top of it. This comes from my own challenges transitioning from a student learning about science to thinking about and doing it. While the two are interlinked, they are enhanced by conversations, experiments, literature readings and a nurturing environment catalyzing all of those. My prime objective is to facilitate this hands-on learning. Success means not only confidence and competence in doing the science but translating it into presentations and published works that communicate it to the wider scientific community and general audience.

My experience is multidisciplinary, ranging from biomedical to engineering and field research across vastly different topics. For my PhD, I specialized in studying deep-sea hydrothermal vents in terms of their mineralogy and microbiology towards informing us on questions of habitability and life detection. Currently, my work in the OHL is focused on simulating these hydrothermal systems under controlled lab conditions so that we can experiment with the combinations of factors possibly contributing to the origin of life. This involves a significant amount of optimization, validation and analysis of chemical recipes, and high-pressure reactor design / configuration that simulate growth of hydrothermal vent chimneys. To analyze our data, we primarily use a combination of NMR, Raman, IC, and ICP-OES instruments with a slew of additional analyses possible depending on the question at hand underlying abiotic production of key prebiotic molecules during hydrothermal vent formation. Because my work now spans both the prebiotic potential and the habitability / ecology of hydrothermal vents, I am interested in a wide-range of topics contributing to the astrobiological understanding of these systems as testing grounds and analogs for protometabolism, biosignatures, life-detection and the potential habitability of the Martian subsurface and Ocean Worlds. Students are encouraged to suggest project ideas along those themes, and I am open to exploring new directions.

I'm regularly in the lab for experiments or checking on students, in addition to scheduled biweekly meetings with lab members to assess progress, answer questions or discuss future directions experimentally. This time is also a vehicle to help students think through their academic and career goals, and how I / we as a lab can help in achieving those goals. I believe in students leading their ideas and work, and so I emphasize gradually build student independence over time, resulting in confident scientists. I expect students to present in literature club and group meetings, including how they've remedied errors or troubleshot experiments. Supervision is shared with laboratory PI's, and all of us in the lab possess complementary experiences and ideas that strengthen our team.

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