MASTER OF ENVIRONMENTAL DATA SCIENCE
CAPSTONE PROJECTS:
REQUEST FOR PROPOSALS 2022-2023

OBJECTIVES
Bren School Capstone Projects help clients solve a pressing environmental problem facing their organization with a data-driven solution. Serving as the Master of Environmental Data Science (MEDS) thesis, Capstone Projects are five-month collaborations between a client and a team of highly dedicated MEDS students. Projects give businesses, government agencies, NGOs, and other organizations the opportunity to have a group of talented students tackle their environmental data problem and make meaningful and actionable data science contributions.

The Bren School encourages creative, interdisciplinary proposals that leverage data science and analysis coupled with understanding of environmental science and project management skills. Throughout the project, clients receive high-quality data science work that is approximately equivalent to one full-time employee engaged for five months.

This work helps students develop skills in project management, team-oriented data science, design and implementation, data processing/analysis/manipulation, reproducible workflows, quality assurance, interface development e.g., data visualization, technical documentation, and effective stakeholder communication. The projects also serve to expand both parties’ professional networks by connecting future and current environmental data science leaders.

DESIRABLE PROJECT ATTRIBUTES
- **Product-Oriented**, Capstone Projects prepare students to produce meaningful data science solutions to today’s environmental problems. To this end, projects should yield a computational/domain science product with a strong statistics or analytical component and align with student and faculty interest.
- **Data-Driven**, Projects must provide an existing dataset and/or model for students to analyze, process, or manipulate; projects that require data collection or fieldwork will not be considered.
- **Clearly Defined**, Proposals should present a clear scope definition and specific tasks that are attainable by the approximate equivalent of one full-time employee within a five-month period.
• **Funding Support.** External funding for the project (e.g., for software, commercial data, travel, or supplies) is one of several factors considered in project selection. If the proposal requires substantial resources, the client will need to include a clear commitment of financial support for the proposed project.

• **Collaborative, Yet Flexible.** A spirit of trust and collaboration by all parties is expected; client involvement should support students while allowing them to develop their own ideas and approaches.

**PROJECT REQUIREMENTS**

A successful Capstone Project proposal will meet the following criteria:

• Represent a significant environmental problem that requires the group to produce a solution.

• Focus on a clear computational/domain science question with a strong statistics or analytical component.

• Provide a direct link to access the complete dataset(s) and/or model.

• Match the interests, expertise and capabilities of students and faculty.

• Present a feasible project scope, given student experience and availability (must propose a manageable scope of work for a group of 3-4 master’s students spending about 25% of their time during two academic quarters, or five months).

• Provide adequate financial support for data processing or software essential to the project.

• Support and prioritize open and professional communication among all parties; proposals should outline a clear client point of contact.

Projects that cannot be completed by May - June 2023 are not feasible and will not be considered.

**SUBMITTING A PROPOSAL**

The Bren School invites any agency, company, organization, or individual facing an environmental data challenge to submit a proposal for a MEDS Capstone Project proposal. Past clients of Bren master’s projects have included local, state, and federal agencies; corporations; think tanks; non-profits and NGOs.

Proposals will be reviewed during Fall Quarter (October – November) by the Bren School Capstone Project Committee. The Committee will evaluate proposals on the criteria outlined in the Project Requirements section above. Approximately 8-10 Capstone Project proposals will be selected for 2022-2023.

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Given that projects must align with student interest to be selected, clients are encouraged to work with current MEDS faculty and/or students on proposal development. Project proposals are limited to three pages (excluding references, budget and justification, and client letter of support).

**PROPOSAL FORMAT & CONTENT**

Project proposals are limited to three pages (excluding references, budget and justification, and client letter of support).

**Title**, descriptive of the environmental data science problem to be solved.

**Name and contact information (email, phone, and affiliation) of the proposer(s)**. Proposers may be clients, faculty and/or Bren students. If you have worked actively with a faculty member or student(s) to write the proposal, please list them as co-authors. If more than two Bren students contribute to the proposal, the client and/or students must select two primary student authors. If the proposal is selected, the two primary student authors will have the option to be guaranteed membership in the group.

**Client, including name, email, phone, and affiliation**. The client is the primary representative from the client organization and the main point of contact for students. All clients listed on the proposal will be notified at the end of Fall Quarter (December 2022) regarding the status of the proposal. If you would prefer to limit notification of the proposal status to specific individuals, please note this in your proposal.

**Proposed Project** (3 pages):

a. **Objectives**. What is the science problem with a strong environmental data component that requires a group solution? Focus on one concrete and achievable objective.

b. **Significance**. What is the context for this work? Why is this work important? Who is the target audience/client? Which other people (besides the client) would benefit from the results of this work?

c. **Background**. In general, how did the problem arise? What has been done to date, if known.

d. **Equity**. Does the proposed project have the potential to address environmental justice issues? If so, please elaborate in this section. The US Environmental Protection Agency defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. This goal will be achieved when everyone enjoys: (1) the same degree of protection from environmental and health hazards, and (2) equal access to the decision-making process to have a healthy
environment in which to live, learn, and work." If your project does not directly address environmental justice or equity issues, please acknowledge this in the Equity section of the proposal.

e. **Data.** Describe the available data to address this problem and provide a direct link to access the complete dataset(s) and/or model. Data should be immediately available upon project start. If data access and/or type require specialized training, the client is expected to train students within the first two weeks of project beginning. Any projects requiring additional data collection including, but not limited to, field work and surveys, will not be feasible due to project time constraints. Proposals without a direct link to complete data will not be considered.

f. **Computational tools & needs.** Please elaborate on any expected computational needs and tools relevant to the project. This should include programming languages (e.g. R, Python, SQL), computational tools (e.g. machine learning, cloud computing), and software (e.g. ESRI ArcGIS, Google Earth Engine, Microsoft Excel). If the project deliverable is a hosted web application, the client must demonstrate their (or their organizations’) willingness and ability to provide long term support post-project completion, including application troubleshooting, deployment, and maintenance if the application is expected to be in production post-graduation. If the client is able to provide specific computational resources, they should be included in the Client Letter of Support (see below).

  g. **Possible approaches.** Briefly describe likely approaches that may be used to address the project objectives. One task for the students in a group project is to more fully develop the approaches that will best meet the project objectives, but suggestions from the client are useful in focusing early work.

  h. **Deliverables.** What are the specific products that the client expects from the project, in addition to the design plan, technical documentation, and oral presentations?

  i. **Audience.** Who is the audience for the deliverable(s)? How will the audience interact with and use the final product? Please be as specific as possible.

**SUPPORTING MATERIALS** (not counted toward 3-page limit):

a. **Citations.** Due to the scientific and technical nature of many interdisciplinary environmental problems, authors are encouraged to include citations to support their proposal.

b. **Budget and justification.** Each group will receive $250 from the Bren School to cover the group’s basic operations and printing. This funding will be held at the school and only accessible by the students. The students will determine how to allocate the funds to cover expenses such as conference calls, file storage, etc. If the proposed project requires additional funding for completion, such as specific software, datasets, or tools, the client must provide that funding. If needed, please include a budget with a description of anticipated costs that will be covered by the client.

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c. **Client letter of support.** Clients must submit a letter of support to clearly describe their commitment to provide data, additional funding, and/or any other resources for the project. The details of these commitments must be articulated clearly in the letter of support addressed to the Capstone Project Committee.

   c-i. **Funding:** If the proposed Capstone Project requires more funding than provided to the students by the Bren School, then the client is responsible for providing those funds. Please clearly describe the client’s financial commitment in the letter of support. Funds provided by the client for a specific group project ideally should be managed by the client. Grants to the University of California for specific Capstone Projects would require a Bren faculty principal investigator, preauthorization by UCSB’s Office of Research, and additional indirect costs up to 55%; gifts to the Bren School for a specific group project require an additional 6% for indirect costs. (If you are interested in making a gift to the Bren School, please contact Assistant Dean for Development [Lotus Vermeer](mailto:lotus.vermeer@bren.ucsb.edu)).

   c-ii. **Data:** For MEDS Capstone Projects, the client must provide data or facilitate acquisition to data. The client should specify the type and content of the data and how it may be accessed. It is preferable for the data to be provided to the students with no stipulation for a non-disclosure agreement or restriction for publication. If a non-disclosure agreement is required, please describe the constraints around the use of the data.

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**Project proposals are due via email on Friday, October 14, 2022 by 5:00 P.M. PT to** [projects@bren.ucsb.edu](mailto:projects@bren.ucsb.edu).

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**TIMELINE**

**Summer:** Bren School releases a Request for Proposals. New proposals for MEDS Capstone Projects are submitted by faculty and prospective clients.

**Fall:** Submit proposals by Friday, October 14, 2022. Projects are selected in late November; students and faculty advisors are assigned, clients are notified by the middle of December.

**Winter:** Client meets the team; students refine project objectives, review datasets and literature, and develop a design and implementation plan. Students present their design plan in a presentation to Bren School faculty and begin working on data analysis/processing/ manipulation.

**Spring:** Clients meet with the students and faculty advisor to review progress and reevaluate objectives, as needed. Following the design plan, students complete the data science objective, associated project repository, and technical documentation. Students then present their findings, interface, and/or data visualization to the public, client, and Bren community.

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THINKING ABOUT SUBMITTING A PROPOSAL?
To register your interest in submitting a proposal, please contact the Bren School Capstone Project Coordinator (projects@bren.ucsb.edu). The coordinator answers questions and provides guidance regarding proposal format. They also connect proposal authors with Bren faculty, staff, and students who can provide additional guidance and assistance in writing the proposal, as needed.

LIMITED INTELLECTUAL PROPERTY LICENSE
By participating in the Capstone Project, the client agrees that: (1) its logo and other "publicly available" intellectual property may be used by the Bren School (e.g., its students, faculty and staff) solely in connection with the specific Capstone Project in which the client participates, and (2) any Capstone Project's deliverables containing the client's logo or other intellectual property may be made publicly available via the Bren School's website and other formats. Upon written request by the client, a Capstone Project incorporating the client's intellectual property will include a disclaimer identifying the client as the owner of the intellectual property and that all rights are reserved by the client. The client may, upon written request, withhold consent to use certain intellectual property owned by the client.