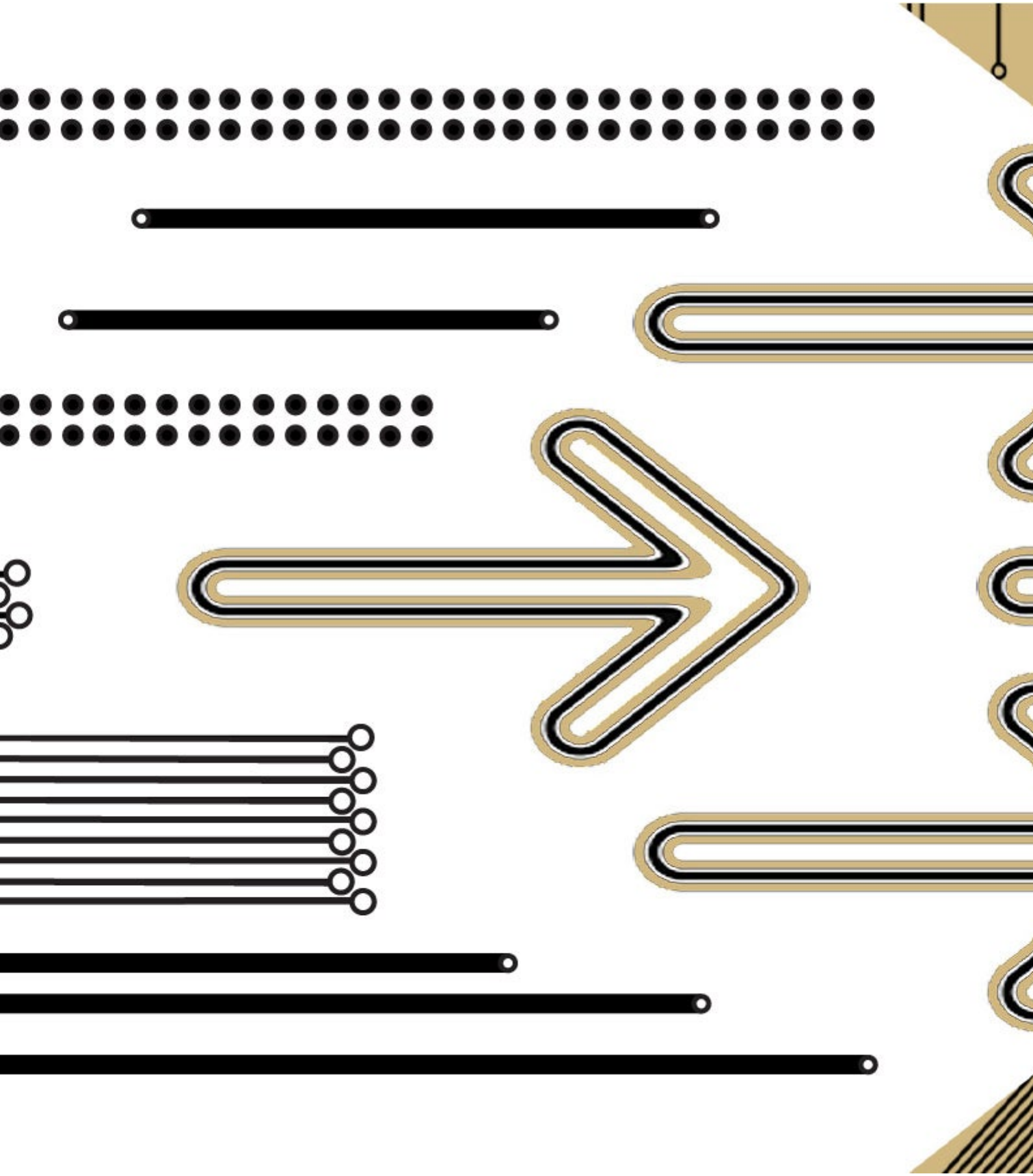
Published on *University of Colorado* (https://www.cu.edu)

CU Next Award [1]



By supporting faculty pedagogical innovation, especially with technology. CU Next aims to

increase the efficacy and efficiency of student learning in courses and degree programs.

This CU Next Award is focused on supporting individual faculty who seek additional resources to innovate their courses and programs. Specifically, the Award aims to reduce technology-related and other barriers for individual and small groups of faculty pursuing projects that campus or department funding cannot cover (e.g., hardware, software, programming, vendor contracts). This initiative requires that faculty from at least two campuses are cooperating in the project and that there is campus commitment to the project. While the award is not currently active, the projects below highlight the impactful work supported through this program.

CU Next Awarded Projects

Leveraging the Learning Assistant Infrastructure to Disseminate Technologically Rich Educational Environments Across Three Campuses

This innovation is being led by Laurel Hartley [2], associate professor in the Department of Integrative Biology at CU Denver, with co-Principal Investigators Valerie Otero, professor in the Department of Education at CU Boulder, and David Weiss, associate professor in the Department of Chemistry and Biochemistry at UCCS. Team members include Robert Talbot, CU Denver; Raphael Sassower, UCCS; Cerian Gibbes, UCCS; Betsy McIntosh, CU Boulder; and Laurie Langdon, CU Boulder.

This project will build capacity among faculty to implement mindful uses of teaching and technology through the undergraduate Learning Assistant (LA) model. Learning Assistants are undergraduate students who are legitimate members of the instructional teams of multiple courses at over 150 universities throughout the world. By developing a cross-campus CU Teaching and Learning pedagogy course, undergraduate Learning Assistants and their faculty collaborators will experience and experiment with learner-centered pedagogies that leverage optimal uses of technology, as well as flexible decision-making about the how, when and why of using specific technologies, and their consequences. This reconfiguration of power structures in classrooms will have a lasting impact on gateway courses across disciplines at UCCS, CU Denver and CU Boulder, including the measurable improvement of learning outcomes and student retention. Originally built at the Boulder campus in 2001 to support student conceptual learning, the Learning Assistant model rose to the challenge of the COVID-19 pandemic by supporting courses at CU Boulder and CU Denver in ways that used technology while also helping students stay connected and engaged.

Creating CU Cyber Range to Make UCCS and CU Denver a National Leader in Cybersecurity Education and Workforce Development

This innovation is being led by Shouhuai Xu [3], professor of Engineering and Applied Science at UCCS; co-Principal Investigator is J. Haadi Jafarian, professor of Computer Science and Engineering at CU Denver. Team members include Joshua Alcorn, UCCS; Jugal Kalita, UCCS; Greg Williams, UCCS; Joseph Murdock, CU Denver; and Douglas Sicker, CU Denver.

The project will create two innovative cyber operations courses and the CU Cyber Range, an interactive simulation environment where students can experience realistic cyber attack scenarios. The two new courses – Introduction to Defensive Cyber Operations (for junior students) and Defensive Cyber Operations (cross-listed for senior/graduate students) – and CU Cyber Range will be jointly designed by faculty members at UCCS and CU Denver. By using on-the-job equipment and monitoring student performance, the CU Cyber Range will equip graduates with the skills and experience needed for direct hire into the cybersecurity workforce. The project will reinforce and strengthen CU's position as a national leader in cybersecurity education and workforce development.

Data Advocacy for All: An Open Access Digital Repository for Innovative Data-Driven Curricula

This innovation is being led by Laurie Gries [4], associate professor with a joint appointment in the Department of Communication and the Program of Writing and Rhetoric at CU Boulder; co-Principal Investigator is John Tinnell, assistant professor in the English Department at CU Denver. Team members include Cameron Blevins, CU Denver; David Glimp, CU Boulder; Thea Lindquist, CU Boulder; Nathan Pieplow, CU Boulder; Virginia Iglesias, CU Boulder; Nickoal Eichmann-Kalwara, CU Boulder; Jordan Wrigley, CU Boulder; and Aditya Ranganath, CU Boulder.

Data Advocacy for All aims to extend data humanities education and to invigorate diversity, equity and inclusion (DEI) initiatives at CU Boulder and CU Denver. Data advocacy is an integrative, ethical practice of analysis, design and communication in which insights from a dataset are effectively conveyed to raise public awareness and drive social change. The Data Advocacy for All project will design, build, teach and assess a civically engaged, experiential curricular approach that leverages minimal computing and open-source tools. An eight-module sequence of data advocacy curricula will be taught and assessed at CU Boulder and CU Denver. As a case study, these

modules will be taught in relation to a single data-advocacy project investigating how natural hazards driven by climate change may affect Colorado communities susceptible to socio-economic vulnerability. With its humanities focus, the project will enhance the abilities of students to ethically and effectively inquire with data, communicate with data, and deploy data with a goal of creating more just futures.

Merging Engineering and Medicine by Integrating Technology Into Immersive, Hands-on Human Spaceflight Courses

This innovation is being led by Benjamin Easter [5], assistant professor of Emergency Medicine at the CU Anschutz Medical Campus; co-Principal Investigator is Allison Anderson, assistant professor of Aerospace Engineering Sciences at CU Boulder. The team also includes Arian Anderson, CU Anschutz.

The project will amplify student learning outcomes in human spaceflight medicine by integrating technology into three hands-on engineering and medicine courses, which form the core of a recently approved joint M.D.-M.S. degree between the CU Anschutz Department of Emergency Medicine and the CU Boulder Smead Department of Aerospace Engineering Sciences.

The focal point of this proposal is the innovative Medicine in Space and Surface Environments course, a joint product of CU Anschutz and CU Boulder faculty to teach students about providing medical care in space. The course is a hybrid of traditional lectures on medical care in austere environments, patient interview and exam skills, and a seven-day immersive field simulation in a Mars analog habitat. By innovating on this existing course, developing two supporting courses and expanding the M.D.-M.S. curriculum, the team will create an educational program that develops physician-engineers poised to lead in human spaceflight. The University of Colorado is uniquely positioned to serve the rapidly growing industry of human spaceflight and this proposal will enable a robust educational program to train future leaders in the field.

Interactive Simulations Based on Neural Networks to Teach Undergraduate Fluid Mechanics

This innovation is being led by Ankur Gupta [6], assistant professor of Chemical and Biological Engineering at CU Boulder; co-Principal Investigator is Kannan N. Premnath, associate professor of Mechanical Engineering at CU Denver.

Studies suggest that teaching fluid mechanics is challenging because the concepts are overly mathematical and abstract, and students often find it difficult to develop an intuitive understanding of concepts. This innovation focuses on this core subject for many STEM disciplines, acknowledging that the anxiety related to mathematics often has a greater impact on diverse students, thereby increasing inequity in learning with respect to gender, race and financial background. This team will develop interactive simulations to teach key concepts of undergraduate fluid mechanics, inspired by the use of modern computer engines to transform the teaching and learning of chess strategies. Making these fluid mechanics simulations rapid and web-based will improve access to resources and reduce mathematics anxiety among students.

Questions regarding CU Next can be sent to academicinnovation@cu.edu [7]

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