CICompass
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Building the Next Generation of Cyberinfrastructure Professionals

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Date Published: April 6, 2023
DOI: 10.5281/zenodo.7807116

CICF Overview and Program Goals

The CI Compass Fellowship Program (CICF) is in its second year, with fourteen undergraduate students from seven institutions joining the 2023 CICF cohort.

CICF was created to broaden undergraduate student participation in cyberinfrastructure (CI) research, development, deployment, and operations.

The program targets undergraduate students from freshmen to super seniors and provides them with the opportunity to:

1) learn about CI development and the National Science Foundation (NSF) Major Facilities (MFs),
2) develop CI-related skill sets important to the work of MFs, and
3) engage with CI Compass and MF personnel through a virtual training and research program.

CICF is open to all undergraduate students in the United States. Applications for our next cohort of CICF student fellows will open in Fall 2023.

CICF Structure: Spring Program

During the academic Spring Semester, CICF student fellows participate in a virtual training program with CI Compass.

This Spring Program has two components, 1) a technical training program and 2) a research training program.

The technical portion of the Spring Program provides student fellows with experience in technical skills relevant to CI. Students learn and gain experience with basic software development (i.e., version control, testing), programming for scientists (i.e., Jupyter, Python, scikit-learn), systems thinking (i.e., operating systems, networks), and machine learning and artificial intelligence relevant to CI and MFs.

Additionally, student fellows participate in a research program to help them understand the importance and context of MFs, and the related data and CI. Students learn about research data ethics, FAIR (Findable, Accessible, Interoperable, and Reusable) data, and professional communication and networking. Student fellows also learn about the data lifecycle of specific MFs and engage with guest speakers from MFs and the greater CI community. Additionally, in groups, student fellows research a specific MF to learn about its science mission, CI, and data lifecycle. At the

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end of the Spring Program, student fellows present their research findings on their specific MFs to CI Compass and MF colleagues.

CICF Structure: Summer Program

CICF student fellows have the option to apply for a summer program, which offers a hands-on project-based learning experience at either an MF or a CI Compass institution.

Description of Year 1 Summer Program

During the Year 1 Summer Program, three CICF student fellows gained hands-on real-world experience at the University of Southern California.

CI Compass Fellowship Program facilitator Rajiv Mayani works with Student Fellow Nona Nersisyan at the University of Southern California Information Sciences Institute in Marina del Rey, CA.

The student fellows worked with CI tools, including the Chameleon Cloud testbed, the Pegasus Workflow Management System, and HTCondor, to test and classify lake zooplankton to learn about the health of the ecosystem and the impacts of environmental changes.

The student fellows wrote a conference paper titled "Application of Edge-to-Cloud Methods Toward Deep Learning" for IEEE eScience and presented the related poster at the conference in Salt Lake City, Utah, in October 2022.

Plan for Year 2 Summer Program

For Year 2, CICF is collaborating with three MFs to place student fellows at MFs for hands-on projects. Program facilitators have made plans for both in-person and virtual participation for six of our student fellows.

CICF Year 1 and Year 2 CICF Cohorts

During year 1 of the program, CICF had six students participate from two institutions (University of Notre Dame and University of Southern California).

For year 2 of the program, CICF has 14 students from nine institutions, including Indiana University, Louisiana State University, University of Iowa, University of Alabama, Arizona State, and others. Our 2023 students are completing their undergraduate studies in six majors (see Chart 1) and span from freshman through super seniors (see Chart 2).

Chart 1: CICF Student Majors

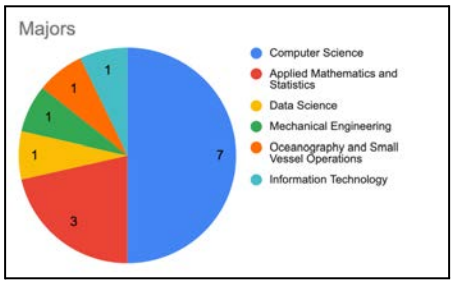
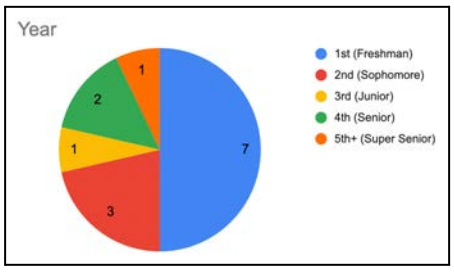


Chart 2: CICF Student Year



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Our 2023 cohort has eight female and six male students, two of which are first-generation students.

CICF Impact

CICF fulfills a specific gap in current internships and education. While there are many similar undergraduate opportunities, many of these programs focus on a specific scientific domain or on computer science. In contrast, CICF focuses on the technical and research skills necessary to a career in CI within the context of the MF community.

Additionally, the Spring Program provides the unique experience of preparing Fellows for hands-on summer programs at MFs. The Spring Program contextualizes the technical skills and explains how these would be applied in the real world at MFs or other large-scale CI.

Thus, introducing students to MFs and CIs could lead to participation in the CI and MF workforce or, at the least, make students aware of the possibility of these career options. By exposing the students to these skills and research, our goal is to offer a career in CI at MFs as a viable option for these bright students.

By providing students with an understanding of the challenges of the data lifecycle of MFs, CICF acts as a stepping stone for future MF and CI professionals.

Ways to Get Involved

Our goal is to expose the student fellows to MFs, especially to their day-to-day CI development activities and science efforts.

Major Facilities can engage in many ways, including:

- providing feedback on the program,
- participating as a guest speaker during the Spring Program,
- allowing students to access internal seminars and guest lectures, and
- working with the CI Compass team to provide summer opportunities for students.

During the first and second years of the program, the CICF program had guest speakers from ORCID, TACC, NHERI, MagLab, NCAR, IceCube, and NEON.

CICF is actively seeking faculty mentors at US colleges, including community colleges and universities to help recruit students, as well as partnerships with Major Facilities for summer projects for student fellows. CI Compass and CICF welcome students with varied educational and cultural backgrounds.

Please email cicf@ci-compass.org for more information and to get involved.

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