THE UNIVERSITY OF CHICAGO
Announcement of the
2022 Summer Program for Undergraduates

This announcement describes an eight-week summer program of study and research for undergraduates, most of whom are from the University of Chicago. Its web page is

http://www.math.uchicago.edu/~may/REU2022.

Its first year of operation was 2000, and details from past years may be found at
http://math.uchicago.edu/~may/VIGRE/index.html
http://math.uchicago.edu/~may/REU2012/
http://math.uchicago.edu/~may/REU2013/
http://math.uchicago.edu/~may/REU2014/
http://math.uchicago.edu/~may/REU2015/
http://math.uchicago.edu/~may/REU2016/
http://math.uchicago.edu/~may/REU2017/
http://math.uchicago.edu/~may/REU2018/
http://math.uchicago.edu/~may/REU2019/
http://math.uchicago.edu/~may/REU2020/
http://math.uchicago.edu/~may/REU2021/

In this program, students have the opportunity for intensive study and research in mathematics. Students participate in at least one of several courses taught by Department of Mathematics faculty members and are mentored by Department of Mathematics graduate students.

The purpose of the program is to provide an opportunity for students to be involved in a deeper experience in mathematics than is usually available during the academic quarters. This program is especially beneficial for undergraduates who are considering graduate study and research in mathematics.

The program has very limited federal support, not nearly enough to fund all deserving applicants, hence the level of individual support will typically be lower than at other REUs. As in the past, people accepted to the program but for whom funding is not available, or who are generously willing to participate without support, are welcome as full participants in all REU activities. Participants are selected on a needs blind basis.

DATES: June 13–August 5, 2022; June 13 –July15 for the Apprentice Program. It cannot be certain whether the program will be on campus or online, but it is very much hoped that it will be on campus. It is possible that a hybrid will have to be developed. If on campus, participants in the full program are expected to be in residence for all eight weeks and apprentices are expected to be in residence for the first five weeks and are welcome to participate in the program for the full eight weeks. University of Chicago participants are strongly encouraged to apply for University support (Metcalf, etc).

STIPENDS: Stipend information is under review . The more deserving people we accept, the lower the average level of support. Not meaning to be flippant, the idea is "To each according to their needs". We rely on the generosity of those not in need to say so. Stipends to those requiring them will be paid at the end of July. Please note: taxes will be deducted from these paychecks. Paid participants

are not permitted to hold a part-time job while participating in the REU without the approval of the program director. Some jobs in the outreach programs of the Department of Mathematics may be available.

ACCOMMODATIONS: University of Chicago students are expected to find their own accommodations. Graduate students and past participants will offer advice and assistance. If on campus, students from outside the University of Chicago will be offered assistance through the University of Chicago housing office.

Applications are due Friday, February 11, 2022. University of Chicago students should send responses to may@math.uchicago.edu. Outside applicants must apply through the AMS MathPrograms website:

`https://www.mathprograms.org/db/programs/1205`

Applicants will be notified of acceptance or possible wait list status by e-mail by February 25. (University of Chicago students may be informed of acceptance decisions a bit later than that.) We adhere to a general agreement among REUs that the deadline for responses to acceptances is March 8. (Any pressure on you to accept an offer anywhere else at an earlier date is unethical.)

THE PROGRAM OF STUDY AND RESEARCH: Students attend courses taught by Department of Mathematics faculty. The courses consist of lectures and problem solving sessions; graduate student assistants run help and problem sessions. Some research problems and some problems aimed to aid understanding are introduced. No previous knowledge or study in the areas taught is required. In addition, opportunities for reading and research with graduate students and/or faculty are offered, and regular meetings with graduate student and/or faculty mentors are required.

The apprentice program is similar, but includes material aimed at those with less mathematical experience. It is closely tied to the apprentice course. It lasts five weeks. Its participants are typically freshmen or sophomores who have not been in advanced mathematics courses. Apprentices, especially from the University of Chicago, often participate in the full program the following summer.

All participants in the program are required to write a short mathematical paper on some problem or topic of their own choosing, in consultation with graduate students and faculty. The paper may be either expository or research, but it must be substantial. A first draft must be submitted to mentors by August 15 and the completed paper must be submitted to the director of the program by August 29, unless permission for a later date has been obtained.

The first few weeks have a larger proportion of lectures than the later weeks, setting up background in some areas, giving self-contained presentations in others, and offering many problems. However, there will be classes and study and problem sessions throughout the program. Papers are strongly encouraged to be on topics related to the lectures.

Graduate student and faculty counselors will be on hand ready and willing to offer help throughout the program. Moreover, each student will be paired with a graduate student or faculty mentor who will meet with the student on a regular basis and will be available to offer tutorials. All participants are *required* to meet with their mentors *at least* twice a week. Topics for papers *must* be discussed with the mentors, first drafts *must* be submitted to them for feedback, and final drafts *must* take their comments into account. This is an essential feature of the program.

There will be student presentations on evenings during the last week of the program. It is hoped that many participants will make presentations. These can be made by individuals or by groups working together.

The program offers a wide variety of material at various mathematical levels. Some is problem oriented, some introduces areas that are not ordinarily encountered in the undergraduate curriculum. There will be lots of problems, including research problems, that students can work on in groups or alone throughout the program — and later!! Students are encouraged to work together and to organize evening and weekend study sessions. Students are expected to spend substantial amounts of time working on projects or problems outside of classes.

The precise program for 2022 has not yet been established. As always, we plan to offer a variety of courses at various levels, arranged into several "sequences". The program will be frontloaded in intensity to maximize opportunities to get started on research problems and papers. Abstracts of the course offerings will likely be made available in late May. At this writing (December, 2021), the list of faculty participants has not yet been determined. The faculty participants will be announced as soon as possible, and updates will appear on the web site.

Abstracts of courses from the 2002-2021 REU's are on previous years' web pages. As in previous years, there will be courses in many areas of mathematics, presumably including geometry, topology, number theory, probability, logic, and others.

In 2021, the program, very much as just described, was mostly held online. In addition to Chicago faculty, many speakers not from the University of Chicago gave talks, and they greatly enhanced the program. That new feature is likely to be implemented whether the program is on campus or online.