

SCHEDULE WEEK 6

All times are CDT

JULY 26 – July 30

<http://math.uchicago.edu/may/REU2021/SIXTH.pdf>

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Talks take place Monday through Friday afternoons (and/or mornings, at the discretion of speakers and hosts) Talks and group meetings are open to all participants or aimed at focus groups; for focus group events, those interested in joining and are not on the list of people in the relevant group should email the host in advance. All talks are 45 minutes to an hour, with at least a half hour break between talks. Open program talks are live on Zoom; with the speaker's permission, talks will be recorded and made available on Zoom.

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For those in the full program who are focusing on number theory, we have permission for you to attend:

MTWThF 10:00 Park City Undergraduate Summer School talks

(see <https://www.ias.edu/pcmi/programs/pcmi-2021-undergraduate-summer-school>)

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MW 2:30: The probability subprogram, new talk series

MW 2:30: Alisa Knizel

Title: Interactng particle systems in the KPZ universality class

Abstract: Exclusion processes provide a rich set of models that display interesting nonequilibrium phenomena. Using discrete time TASEP as an example, I will talk about some properties of these processes and the connection with the KPZ universality conjecture.

Professor Lawler will not be available for Tuesday/Thursday meetings this week.

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Geometry/Analysis/Dynamics seminar

Tuesday 2:30: Douglas Stryker (Princeton)

Title: Min-max theory for curves

Abstract: In recent years, min-max theory has been used to answer important questions in geometry related to minimal surfaces. I will illustrate the essential ideas of the theory in the simpler setting of closed geodesic curves.

Thursday 2:30: Zhenhua Liu (Princeton)

Title: An elementary introduction to calibrated geometry

Abstract: What is the easiest way to prove that straight lines realize the shortest distance between points? What is the most efficient way to fill in a hole in an m -dimensional subspace of R^{m+n} ? It's a natural question to ask how one can fill an $m - 1$ dimensional boundary with an m -dimensional surface of the least area in R^{m+n} . In general, this is a very hard geometrical and analytical question. The existence of a solution to such problems is highly nontrivial. However, we will give an elementary introduction to some special cases, called calibrated geometry, that can give us immense insights into such a problem.

<https://uchicago.zoom.us/j/96027580738?pwd=SnNVMDZrMmlsTmk4NkdjYkIzMHpPQT09>

MTWF 4:00: Peter May

Title: Model categories, equivariant and stable homotopy theory

Abstract: I will follow up on any requests. Topics to be visited or revisited include model categories and enriched categories; G-spaces, spectra, and G-spectra; operads and their applications; and other participant requests

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Tuesday 1:00: Emily Riehl

Title: Contractibility as uniqueness

Abstract: What does it mean for something to exist uniquely? Classically, to say that a set A has a unique element means that there is an element x of A and any other element y of A equals x . When this assertion is applied to a space A , instead of a mere set, and interpreted in a continuous fashion, it encodes the statement that the space is contractible, i.e., that A is continuously deformable to a point. This talk will explore this notion of contractibility as uniqueness and its role in generalizing from ordinary categories to infinite-dimensional categories

Thursday 1:00 Mona Merling

Title: Social choice and topology

Abstract: To avoid misleading anyone, this talk will not be about the sociology of topologists! "Social choice" is a model for decision making in economic, social, political contexts. For example: suppose that each person gets to vote on their favorite location where they would like to place a statue on an island. Is there a fair way based on these votes to choose the location? This will turn out to be a topological, even a homotopical problem, depending on the topology of the island. In this talk we will explore social choice models and fully answer the question about when they exist using algebraic topology.

Thursday 4:00: Angelica Osorno

Title: Title: Operads in Cat

Abstract: Operads are a good way of packaging certain algebraic structures. In this talk, we will explore those operads in Cat whose algebras are symmetric monoidal categories and other related structures. In these cases, recognizing the algebras over the operad involves two key ideas:

- finite presentation of the operad - coherence theorems for the algebraic structures

I will not assume any prior knowledge of any of the topics mentioned above.

Friday 1:00: Kate Ponto

Title: The intermediate value theorem, the Brouwer fixed point theorem, the Lefschetz fixed point theorem and its converse

Abstract: I'll guide you through the fun progression that starts with the consequence of the intermediate value theorem that shows all maps from a closed interval to itself must have a fixed point (an x so that $f(x)=x$). Our next result will be the same statement for the disk. We will then double back and consider circles. These are a starting point to talk about what happens for manifolds (of dimension at least 3).