



RESEARCH EXPERIENCE FOR UNDERGRADUATES
APPLICATION FORM, SUMMER 2007
Department of Mathematics, University of Georgia
Please type or print legibly in black ink and answer all questions completely

Name: Last First Middle

Soc. Sec. #: Date of Birth:

Current Mailing Address

Street Address: Apartment No.

City: State: Zip:

Valid until what date: E-mail Address:

Telephone No. Cell Phone No.

Permanent Mailing Address (if different from above)

Street Address: Apartment No.

City: State: Zip:

Telephone No.

OPTIONAL - Race/Ethnicity (check appropriate option; you may indicate more than one ethnicity):

- African American
White/Caucasian
Asian/Pacific American (please specify):
Latino/Hispanic (please specify):
Native American/American Indian (please specify tribal enrollment):
Other (please specify):

OPTIONAL - Gender Male Female

Citizenship/Residency (Following NSF rules, students must be U.S. citizens or permanent residents to receive REU stipends.)

- U.S. Citizen: Yes No
Permanent Resident: Yes No
Georgia Resident: Yes No

Academic Information

Name of your Undergraduate Institution:

City: State:

Major: G.P.A. Year in school: Fr So Jr Sr

Expected Date of Graduation: Month Year

Academic References

List the two faculty members you have asked to write recommendations for you.

1. Name: Department:

University: Telephone: Email:

2. Name: Department:

University: Telephone: Email:

Preference of REU Groups (*please list your REU group preference*):

First Preference _____

Second Preference _____

Description of REU Groups

Geometric Probability – group leader Dr. Joseph H.G. Fu

The first problem in geometric probability is the famous Buffon needle problem: what is the probability that a needle, dropped on a plane ruled by parallel lines an inch apart, crosses one of the lines? This is a very special case of the more general question: given two 2-dimensional shapes, what is the average shape of their intersection if one of them is spun around and tossed randomly onto the other? The same question can be asked for higher dimensional shapes, and if one applies certain measurements, called valuations, to the shape of the intersection, there is a very satisfying answer in the form of the "kinematic formulas". It is known that the same kind of answer must exist even if the spinning is restricted to a subgroup of the full rotation group, but the actual formulas remain a mystery! These questions can be asked for finite group actions on finite sets as well. The kinematic formulas turn out to be a repackaged form of a natural multiplication on the set of valuations. The resulting algebra is poorly understood except in the simplest case, but seems to have a lot of combinatorial structure. We will study it in some finite cases and in the geometric case of the unitary group, with lectures and detours to fill in background as needed.

Energies for Plane Curves – group leader Dr. Jason Cantarella

Suppose that a curve has a negative charge attached to every point. The repulsion of these charges drives nearby sections of the curve away from each other, leading the curve to a (locally) minimal energy configuration. For knotted curves, these minimum energy knots provide "standard" ways to draw the knot. For unknotted curves, these energies provide a way to simplify the knot. This group will work on some new projects concerning the behavior of these energy functionals for plane curves.

For most of these functionals, the curve of minimal energy is the circle. We will be interested in determining whether these functionals have critical configurations other than the circle, and working on extending our results on the circle to new kinds of energy functionals. In the process, we'll learn quite a bit about geometric inequalities in the plane. The group requires a good background in multivariable calculus. More advanced courses covering topics like the calculus of variations would be welcome, but are not required. This group is an instance of the <http://ada.math.uga.edu/research/researchgroup> UGA VIGRE Geometry Group.

****PLEASE SUBMIT BY April 1, 2007****

APPLICATION

UNOFFICIAL TRANSCRIPTS

PERSONAL ACADEMIC STATEMENT

2 FACULTY LETTERS OF RECOMMENDATION

TO

REU SUMMER PROGRAM

UNIVERSITY OF GEORGIA

DEPARTMENT OF MATHEMATICS

BOYD GRADUATE STUDIES RESEARCH CENTER

ATHENS, GA 30602

(Application materials may be emailed to michele@math.uga.edu)