



RESEARCH EXPERIENCE FOR UNDERGRADUATES
APPLICATION FORM, SUMMER 2008
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

Ecological Modeling – (May 19 – July 11) group leader Dr. Caner Kazanci

Temperature, blood pressure and specific enzyme levels are typical health indicators for human beings. For a healthy person, the values of these indicators lie in specific intervals. Defining similar health indicators for ecological systems is a major question in ecosystems ecology. Over the years there have been many efforts in this direction, resulting in many formulas that claim to represent the health of an ecosystem. However most of these formulations are relative measures, and are not universal to all ecosystems. One such example is the cycling index: The higher the cycling in an ecosystem, the higher the utilization of mass and energy within the system before it is lost due to respiration and other factors. Therefore cycling index is believed to represent ecosystem health. However, there is no specific interval for cycling index that identifies a healthy ecosystem.

Our objective is to come up with a solid universal non-relative ecosystem health indicator, such as body temperature. We tackle this problem by combining mathematical, computational and statistical approaches. We developed an online software called EcoNet (<http://eco.engr.uga.edu> \url{ }) for simulation and analysis of ecological models. EcoNet is capable of measuring most currently available ecosystem health indicators.

In this project, students will use real ecological field data (gathered from over 40 ecosystems) and EcoNet to compare current ecological health indicators, and investigate new mathematical definitions of ecosystem health.

Background: Students should have a course in linear algebra and in differential equations. The project will involve substantial use of computers, and students should be interested in learning to program.

Numerical Analysis – (June 9 – July 27) group leader Dr. Ming-Jun Lai

Multivariate splines are smooth functions composed of piecewise polynomials defined on triangulations. These functions in the univariate setting are a major tool for describing curves and tensor product surfaces on computer which have been used in many areas of research and industrial applications for curve and surface visualization and simulations. As finite elements, these functions are a standard tool for the numerical solution of partial differential equations.

In this REU program, we will study the general theory of multivariate splines and use them for scattered data interpolation and fitting, surface design, and to solve PDE numerically. We will first spend three weeks on the basic theory of multivariate splines using the monograph "Spline Functions on Triangulations" written by Dr. Lai and his coauthor Larry Schumaker. Then we will spend two weeks learning how to use multivariate splines for data fitting problems including programming in MATLAB. Finally we will spend another two weeks learning how to use multivariate splines for numerical solution of partial differential equations. Some examples of MATLAB programs will be given as a starting point. Students will use them to develop and solve more sophisticated problems.

Background: Students should have multivariable calculus and one course in differential equations. Some experience with computer programming is preferable, but all students must be interested in and willing to learn MATLAB programming and numerical simulation.

****PLEASE SUBMIT BY FEBRUARY 29, 2008****

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 laura@math.uga.edu)