

GEOMETRIC MORPHOMETRICS
ISC5935
SYLLABUS

CONTACT INFORMATION:

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Office Hours: R 1:30-3:30 (or anytime except just before class)

REQUIRED COURSE MATERIALS: Enthusiasm and interest in the quantitative analysis of shape.

GENERAL RESOURCES: Lecture materials, reprints, and other materials will be made available in the Course Library on the course BlackBoard site accessible via <http://campus.fsu.edu>

COURSE DESCRIPTION: Geometric Morphometrics deals with the mathematical, statistical, computational, and practical aspects of the quantitative analysis of shape. For the biologist, this can take the form of addressing patterns of evolution, development, adaptation, function, etc. of skulls, wings, claws, teeth, or any number of other structures that make up an organism. The associated methodology can be scaled down to consider the structure of proteins and their function, and scaled upward to the exploration of astronomical phenomena and inward to the examination of patterns of human perception. This course provides the basic background that will allow those who need to use such techniques to address research questions in their own work the means to effectively do so. It will also provide participants coming from a more computational or quantitative background the knowledge and understanding of the methods and problems of the field so that they might contribute to the development of new and/or improved methods of shape analysis. The general subject areas covered in the course are:

- 1) Basic Definitions
- 2) Morphometric Data Types and Acquisition
- 3) Geometric Interpretation of Matrix Operations
- 4) Geometry of Multivariate Statistics
- 5) Construction of Shape Variables
- 6) Statistical Analysis of Shape
- 7) Shape Spaces
- 8) Outline Analysis
- 9) Advanced Topics: Allometry and Asymmetry
- 10) Alternative Methods

COURSE OBJECTIVES: The primary objectives of this course are to introduce students to the field of quantitative shape analysis and to provide a sufficient foundation for them, according to their interest and background, to effectively use or develop the mathematical, statistical, and computational tools of this field.

GRADING/EVALUATION: Final grades will be based upon the participant's attendance, enthusiasm, interest, and contribution to class discussion (10%). Much of the grade (50%) for all students will be

based on a final project presentation divided into two parts: an oral presentation to the class (%25) and a written summary of the project (%25). Students taking the course with the intention of learning methods for their correct use in other areas of research, e.g., biology, anthropology, etc., will have a mid-term exam covering the basics of morphometric data, matrix algebra, and basic morphometric analysis (%40). For these students, the final project should be an example of the application of the learned methodologies and existing tools to a question or problem within their primary sphere of knowledge. For class participants coming from a computational background, their final project will be to develop and present (orally and in writing) software to address an outstanding problem in morphometric analysis. Their mid-term assignment will be to present the background and any associated theoretical aspects of the problem they chose to address.

COURSE POLICIES: Class attendance and participation are required. Standard FSU rules on excused absences apply. Assignments will have a late penalty of 10% per week (10% within one week, 20% within two weeks, etc) to encourage punctuality but not be a death penalty. If there are extenuating circumstances that affect you, *please* see me.

ASSIGNMENTS: Class assignments are described in the GRADING/EVALUATION section. The only assignments are the final project and associated mid-term or preliminary presentation as described.

ACADEMIC HONOR CODE: The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "be honest and truthful and...[to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://www.fsu.edu/~dof/honorpolicy.htm>.)

AMERICANS WITH DISABILITIES ACT: Students with disabilities needing academic accommodation should: (1) Register with and provide documentation to the Student Disability Resource Center; and (2) bring a letter to the instructor indicating the need for accommodation and what type. This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the Student Disability Resource Center; 97 Woodward Avenue, South; Florida State University; Tallahassee, FL 32306-4167; (850) 644-9566 (voice); (850) 644-8504 (TDD); sdrc@admin.fsu.edu; <http://www.fsu.edu/~staffair/dean/StudentDisability/>

SYLLABUS CHANGE POLICY: This syllabus is a guide for the course and is subject to change with advanced notice.

COURSE TOPICS: Course topics are summarized in the enumerated list presented in the course description.

COURSE OUTLINE: Lectures will roughly follow the enumerated lists of topics covered in the course description. Topics will be presented on T and R lectures. Some of these classes will focus on software demonstrations and use and discussion of file formats and other technical details.