Title: Acquiring and post processing 3D data in anthropology and archaeology

Class 2, 17th-19th, June 2019

Format: MORPHOSTATS-3D: Geometric Morphometric Methods for the analysis of shape and form variability.

17th June

- **9.00am – 10.00am I TOPIC:** INTRODUCTION TO GEOMETRIC MORPHOMETRICS:
Definitions, History, Data Acquisition, (semi) Landmarks, Procrustes Superimposition, Shape and Form analysis, Applications.

Lecture session: Prof. Stefano Benazzi
Geometric morphometrics is a toolkit of methods for the numerical analysis of 2D and 3D shape variation. Anthropologists use geometric morphometric methods for answering questions about how parts of a body vary or how they respond to processes like growth, evolution, or injury. Moreover, these methods find applications in archaeology, archaeozoology, and in life science disciplines.

- **10.00am – 10.30am II TOPIC**: VIEWBOX

Lecture session: Dr. Rita Sorrentino, Prof. Stefano Benazzi
Introduction to the software. All the 3D models for the practical sessions are provided by the Department of Cultural Heritage University of Bologna.

- **10.30am – 12.30pm III TOPIC:** EDITING 3D MODELS
Lecture and practical session: Dr. Rita Sorrentino, Prof. Stefano Benazzi
How to Viewbox options can be used to edit 3D models.

- **12.30pm – 2.00pm LUNCH BREAK**

- **2.00pm – 5.00pm IV TOPIC**: CREATION OF 3D TEMPLATE IN VIEWBOX

Lecture and practical session: Ms. Carla Figus, Prof. Stefano Benazzi
Conceptualization and creation of 3D configuration of landmarks, curve semi-landmarks and surface semi-landmarks.

18th June

- **9.00am – 12.30am V TOPIC:** APPLICATION OF THE TEMPLATE TO THE TARGET

Lecture and practical session: Dr. Gregorio Oxilia, Prof. Stefano Benazzi
Upload target sample in Viewbox and application of the template.

- **12.30pm – 2.00pm LUNCH BREAK**

- **12.30am – 4.00pm VI TOPIC:** APPLICATION OF THE TEMPLATE TO THE TARGET
Practical session: Tutors
Participants will continue with the application of the template to the target models in order to create a sample that they will statistically analyze.

- **4.00pm – 5.00pm VII TOPIC**: WORKING WITH DAMAGED/INCOMPLETE SPECIMENS
Lecture and practical session: Dr. Rita Sorrentino, Prof. Stefano Benazzi

How to include damaged specimens (e.g., fossils, archaeological materials) in the sample estimating missing landmarks and semi-landmarks. We will cope with a damaged specimen and provide a virtual reconstruction of the missing portions using GM techniques.

19th June

- **9.00 am-10.30 pm VIII TOPIC:** STATISTICAL ANALYSIS IN VIEWBOX
  Lecture and Practical session: Dr. Rita Sorrentino, Prof. Stefano Benazzi
  General Procrustes analysis (GPA) and Principal component analysis (PCA). Shape space and form analysis.

- **10.30 am-12.30 pm IX TOPIC:** LANDMARK SUFACE WARPING AND GRID DEFORMATION
  Lecture and Practical session: Dr. Rita Sorrentino, Prof. Stefano Benazzi
  Reconstructing the shape changes along the principal axes warping a mesh to a target. Recognize morphological differences between two specimens by means of Thin Plate Spline (TPS) grid.

- **12.30pm – 2.00pm LUNCH BREAK**

- **2.00pm – 4.00pm X TOPIC:** FROM VIEWBOX TO OTHER SOFTWARE
  Lecture: Dr. Rita Sorrentino, Prof. Stefano Benazzi
  How to extract and save shape coordinates from the target model. Using data collected in Viewbox to make analysis in other software (e.g., R, Avizo).

- **4.00pm – 5.00pm XI TOPIC**   RECAP AND QUESTIONS

FEES: CLASS 2
Under graduate students, graduate, phd students: 250 euros
Professionals: 350 euros

Sponsored by Fondazione Flaminia , Avizo(FEI), 3D systems and dHAL software.

Venue and laboratories:

DBC, V. Ariani, 1 – 48121 Ravenna

DICAM, V. Tombesi Dall'Ova, 55- 48121 Ravenna