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

Class 1, 10th-14th, June 2019

Format: ACQUIRING AND POST PROCESSING 3D DATA : anthropology, archaeo-zoology and cultural heritage.

10th June

- **9.00am – 9.30am PLENARY PRESENTATION**: Introducing topics, lecturers, daily routine and location.

- **9.30am – 1.00pm I TOPIC**: Surface scanner and High-Resolution Micro-CT and Nano-CT, Imaging with advanced radiation sources (e.g., microfocus X-ray tubes, synchrotron radiation)
  Lecture and Practical session: Eng. Massimiliano Fantini (School of Engineering and Architecture - UNIBO) Dr. Daniele Panetta (CNR Institute of Clinical Physiology, Pisa)

  Introduction to 3D scanning: technologies and working principles (i.e. laser and structured-light 3D scanners). Technical features, characteristics, how to deal with raw data. 3D scanning in archaeo-anthropological and biomedical field: case reports on 3D data acquisition and 3D models reconstruction (i.e. for virtual anthropometric analysis, dentistry and prosthetic maxilla-facial rehabilitation). Examples of data fusion starting from different data sources.

  Introduction to equipment for high-resolution non-destructive testing and applications to preclinical imaging (in-vivo), biology and drug discovery (in-vivo and ex-vivo), analysis of skeletal remains, and current limits of spatial resolution (e.g., conventional radiology and (micro CT).

- **1.00pm – 2.00pm LUNCH BREAK**

- **2.00pm –5.00pm II TOPIC**: 3D Scan and data acquisition
  Practical session: Dr. Laura Buti (Department of Cultural Heritage, UNIBO), Dr. Gianluca Renzi,(3D systems), Dr. Antonio Di Leo (3D systems)

  Acquiring materials from different fields of interest and by different instruments: 3D BLU LIGHT SCANNER, LASER Scanner, photogrammetry.

11th June

- **9.00am – 01.00pm III TOPIC**: Geomagic Design X
  Lecture session: Dr. Laura Buti; Dr. Gianluca Renzi

Introduction to post processing software: Geomagic workflow, import acquired data, point cloud alignment, noise cleaning. All the data for the practical sessions are anthropological and archeological 3D models provided by the Department of Cultural Heritage University of Bologna.

- **1.00pm – 2.00pm LUNCH BREAK**

- **2.00pm – 5.00pm III TOPIC**: Geomagic Design X
  Practical session: Dr. Laura Buti; Prof. Stefano Benazzi
  Practical section on managing surface data.

12th June

- **9.00am – 01.00pm III TOPIC**: Geomagic Design X
  Lecture session: Dr. Laura Buti; Prof. Stefano Benazzi
  Mesh generation, healing defects, 3D model construction. Dealing with models, surfaces and meshes, models aligning, saving, how to export the data, file formats, compatibility.

- **01.00pm – 2.00pm LUNCH BREAK**

- **2.00pm – 5.00pm III TOPIC**: Geomagic Design X
  Practical session: Dr Laura Buti; Prof. Stefano Benazzi
  Practical section on managing surface data. Surface editing, preparing images for publications/presentations.

13th June

- **9.00am – 01.00pm IV TOPIC**: Avizo
  Lecture session: Dr. Timothy Ryan
  Introduction to Avizo's concept: how the software works. Getting started, raw data, Avizo preferences, file formats, data import.

- **01.00pm – 2.00pm LUNCH BREAK**

- **2.00pm – 5.00pm IV TOPIC**: Avizo
  Practical session: Dr. Timothy Ryan
  Set parameters, filters, large data, clipping, slicing visualization, multiplanar view, volume rendering, isosurface creation, lines and sections, tools and applications. All the data for the practical sessions are anthropological and archeological 3D models provided by the Department of Cultural Heritage University of Bologna.

14th June

- **9.00am – 01.00pm IV TOPIC**: Avizo

  Lecture session: Dr. Timothy Ryan

  Resampling and cropping, slice alignment. Segmentation process: Automatic and manual segmentation, segmentation editor, surfaces generation, surface visualization, save data, save project. Measurements, difference between isosurface and surface, exporting data and measurements.

- **01.00pm – 2.00pm LUNCH BREAK**

- **2.00pm – 5.00pm IV TOPIC**: Avizo

  Practical session: Dr. Timothy Ryan

  Practical session on segmentation protocol, surface editing, preparing images for publications/presentations, simple animations, camera path, animation director.

FEES: CLASS 1
Under graduate students, graduate, phd students: 350 euros
Professionals: 500 euros

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

FEES FOR PARTECIPANTS TO BOTH CLASSES:
Under graduate students, graduate, phd students: 550 euros
Professionals: 800 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