Introduction to 3D Printing for the Cultural and Natural Sciences

ANT 4930 and GLY4930

REALITY CAPTURE ➔ COMPUTE ➔ CREATE

Dr. Lori Collins, Research Associate Professor, Director, Alliance for Integrated Spatial Technologies, University of South Florida, Office CMC 102, Office Hours Tuesday/Thursday 10AM-Noon

Contact Info: lcollins@usf.edu, website: http://AIST.USF.EDU

Course Description:

This is an innovative education course that is being taught as an on-line offering. This course is geared toward those interested in Museum and Heritage Studies or Natural and Earth Science applications for 3D Printing and Rapid Prototyping, and those interested in developing a digital skill set in visualizing data design concepts. The 3D Printing and visualization techniques covered in this course are also relevant to a number of other industries and creative endeavors, including architecture and fine arts, engineering, hobbyist and other creative pursuits, and would be of interest for education professionals looking to incorporate 3D in the classroom. In this course you will learn the history, technologies and typologies of 3D printing, and the basics of data capture through techniques such as 3D laser scanning and photo modeling. We will examine innovative and freely available techniques for 3D model creation, and learn how to prepare and finalize your own data for 3D printing. Examples will focus on applications for 3D printing in fields such as archaeology, heritage and museum studies, education, and for use in understanding, visualizing, and interpreting natural and earth science phenomena.

Course Objectives:

Objective and Outcomes from this course – You will learn about 3D Printing and 3D Reality Capture techniques, with specific application for natural and cultural heritage uses such as museums, archaeology, environmental sciences, GIScience and Earth Science fields of study. Students will learn how to utilize reality capture techniques and develop a workflow for 3D modeling and printing, and be exposed to a range of printing types and solutions to produce models of objects, architecture, and landscapes. In particular we will look at:

- The connections between 3D printing, 3D laser scanning, and other types of reality capture
- The role of scale in 3D Printing and data capture
Workflows for 3D modeling and printing and applications for heritage, museums and the natural sciences

Which print materials and print types are best suited for a variety of applications and uses

The role and value of 3D printed objects for education and interpretation

Tips for successful design, production, and use of 3D printing for the natural and cultural sciences

Grading:

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<th>ITEM</th>
<th>PERCENTAGE</th>
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<tbody>
<tr>
<td>Module Assessments</td>
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<td>Exercise 1 Reality Capture</td>
<td>20%</td>
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<td>Exercise 2 CAD modeling</td>
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<td>Final project: Digital presentation of project, showcasing complete workflow, clean-up, and how you would make ready for printing. Additionally, you will demonstrate understanding for how these models can be used for cultural and natural heritage and science purposes.</td>
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Students will be graded on each assignment on a scale of 1-100 pts (counting for the percentage indicated).

Grading Scale:

A+ = 100-98%, A=97-94%, A-=93-90% B+ = 89-87%, B=86-83%, B-=82-80%, C+ = 79-77%, C=76-73%, C-=72-70% D+ = 69-67%, D=66-63%, D-=62-60%, F= below 59%

Course Schedule: *(Subject to Change) – most up-to-date posting will be on Canvas website, as are the readings (PDFs) unless otherwise stated.*

Module 1. Introduction: What is 3D Printing? The Technology: History & Evolution

Module 2. How 3D Printing Works

Module 3. Types of 3D Printing Technologies

Module 4. 3D Data Capture Techniques

Module 5. Sources of Available 3D Data for Printing


Module 7. Applications Overview: Cultural Heritage and Museums

Module 8. Applications Overview: Natural Sciences

Module 9. Ethical and Legal Considerations for 3D Data Capture and Printing

Module 10. Into the 3D Future: New Directions and Prognostications

Special Notes: Module Assessments are due at end of each module before moving to the next. Exercises are due on the dates specified and final project is due on the last day of class (1/2/2015). This is an
online, self-paced, accelerated course and runs from Dec. 15, 2014 to Jan. 2, 2015. Cheating and other academic dishonesty will be dealt with severely, in accordance with USF policy (see the current catalogue).

**Accessible, reliable Internet and computing platform.** Given the nature of this course is fully online, it is expected that students who elect to take this course will have access to a reliable computing platform and internet access that allows for the full use of the Canvas learning management system and linked course content. It is unlikely that you can complete this course entirely through a mobile device. Nonetheless, it is your student responsibility to ensure that you have access to both Internet service and a computing platform that allows you to fully engage in this class and complete the assignments within this course. It is the belief of the course developer/instructor that relying on Internet access from free hot spots, like a local café, or only a mobile device to complete this class does not meet minimum requirement. Additionally, to complete the exercises and final project you must have access to a digital camera, phone integrated camera or other camera/tablet device. Your computer can be PC or Mac – Windows or iOS platforms are fine. You will be required to download free software apps and course materials to your mobile and/or PC devices to complete your exercise activities, and you will be encouraged to try other software that is freely available for 3D viewing and model applications.