ADVANCED TECHNOLOGIES: INTRODUCTION TO 3D DESIGN AND PRINTING

The future of innovation and production

WORKSHOP SYLLABUS

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SCHEDULE First academic semester (Aug-Dec)

TIME 9:00 AM - 12:00 Noon, Fridays

LOCATION

Laboratory A-331
Department of Pharmacology
Guillermo Arbona Building, Medical Science Campus,
University of Puerto Rico

DESCRIPTION

This workshop will be conducted over four Fridays and will cover the theory and practice of 3D extrusion printing. The participants will be undergraduate students who will receive hands-on training on instrument operation and 3D design. Emphases are on development of basic designing skills, visualization, and solution of printing and designing problems.

ORGANIZATION

This is a lecture and hands-on workshop in which topics are presented by the instructors, designing and printing processes are explained, and assigned models are completed by students during interactive periods. The workshop sessions will be limited to 5 undergraduate students to allow for individual attention. The workshop assumes no previous experience or training with 3D printing, so the initial emphases are on the use of equipment and basic procedures.

WORKSHOP OBJECTIVES

1. To introduce undergraduate students to the theory and practical aspects of extrusion 3D printing.
2. To introduce students to various forms of graphical representation and the use of software in 3D printing.
3. To introduce students to time and quality designing and production requirements.
4. To orient students on the range of applications of 3D printing in the biomedical sciences.
5. To provide students with opportunities to develop basic designing and printing skills

WORKSHOP TOPICS

1. Concept and theory of 3D Printing
2. Operation of 3D printer (Airwolf HD 3D2x)
3. Printing from pre-programmed SD card
4. Theory and mechanics of scanning
5. Scanning of object and capture it in software
6. Converting scanned software to gcode format
7. Printing of a scanned object
8. Introduction to 3D Design (Sketchup Pro)
9. Operation of basic program Sketchup design tools
10. Designing a simple object to be printed in .3ds format
11. Converting the .3ds files into repaired .slt format with netfabb-basic, then into gcode format with Cura programs, respectively.
12. Loading gcode files into the printer control program and printing the designed objects.

READINGS AND REQUIRED SUPPLIES

Instrument manuals (Matter and Form Scanner, Airwolf HD 3D Printer)
Software manuals (Sketchup Pro, Cura, Master Control)

EVALUATION PLAN

Tests will be given at the beginning of each Friday session on topics to be covered during that session, then re-tested at the end of each session to determine the knowledge gained.

TENTATIVE WORSHOP SCHEDULE

WEEK	TOPIC/ACTIVITY
1	• Concept and theory of 3D Printing • Operation of 3D printer (Airwolf HD 3D2x) • Print from pre-programmed SD card
2	• Theory and mechanics of scanning • Scan an object and capture it in software • Convert scanned software to gcode format • Print scanned object
3	• Introduction to 3D Design (Sketchup Pro) • Operation of basic program design tools • Design a simple object to be printed in .3ds format
4	• Conversion of the .3ds files into .slt then gcode with netfabb-basic and Cura programs, respectively • Load the gcode files into the printer control program and print the objects

A Certificate of Participation will be given to each student that completes the four sessions of Workshop.