Division of Academic Affairs
Technology Fee – Systemic Project Proposal
2017

Project Proposal Type

Systemic Project

Projects proposed by operational units of the university (e.g., colleges, academic departments, Library, etc.) for instructional technology enhancements of unit-wide or university-wide scope.

All Systemic Project proposals must be acknowledged (signed) by the operational unit head (e.g. Dean, Chair, Director, etc.).

Project Title

Skylab 3D Printing MakerSpace

Total Amount of Funding Requested

$17,500.00

Primary Project Coordinator

John Barksdale

Unit Head Acknowledgment

Unit Head Signature: _____   Date: 01/17/2017

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Systemic Project Proposal Template
2017

Systemic proposals must provide the following information:

1. **Description of initiative/investment to enhance instructional technology.**
   This proposal is for the purchase of two 3-D printers (the Fusion3-F400 and the Mojo industrial printer) and a Dell Precision 7000 Series CAD/drafting workstation that will complete the UWF Libraries' Skylab makerspace. The total one-time cost to purchase this equipment is $17,500.

   The UWF Libraries' experimental venture into providing 3D-printing equipment and training for students and faculty is in its 3rd year and has proven to be highly successful. As the former United Faculty of Florida's office space on the 5th floor of the John C. Pace Library has recently been vacated, we wish to convert this space into a dedicated 3D printing/modeling/drafting makerspace. We are already in the process of renovating this area to accommodate our existing 3D printers, as well as new state-of the-art 3D-printing and modeling equipment. Our efforts to remodel this room and purchase new equipment have exceeded our proposed budget; therefore, we are in need of additional funding to equip this room with two new 3D printers. One printer is capable of printing larger objects, and the other includes features that will assist students in the various types of projects that cannot be 3D-printed with our existing equipment.

   The first printer, the Fusion 3 F400 high performance desktop 3D printer, will give students and faculty the ability to print much larger objects, as it has a 14.2"x14.4"x12.6" print area. This area is considerably larger than our current 3D-printer capabilities. Skylab receives frequent requests to build models that exceed the size limitations of our MakerBot printers; therefore, the Fusion3-F400 will be a much needed addition to our 3D printing options.

Fusion F400-S 3D printer, photo – courtesy of Fusion3Design, LLC.

In addition, we wish to acquire a Mojo industrial printer that will be best suited for small projects and rapid prototyping. Its strengths are reliability, low maintenance, fewer failed prints, higher build strength, and the automatic inclusion of dissolvable support structures that allow it to create objects that cannot be made on our MakerBot printers. UWF's Continuing Education Department has two of the MoJo printers and they have proven to be reliable and provide quality results.
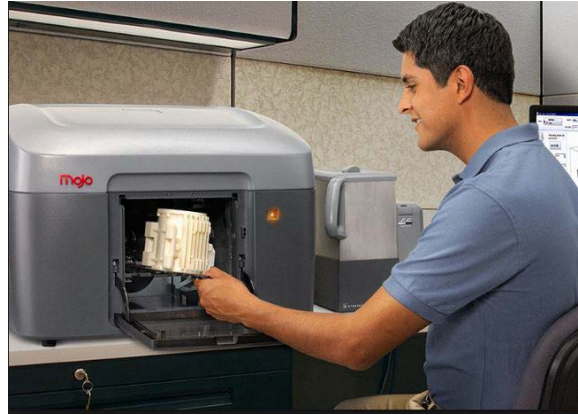
MoJo 3D printer, photo - courtesy of Stratasys.

3D modeling/drafting is essential in order to design custom made parts for mechanical engineering projects, physics experiments, robotics, and other endeavors across the curriculum. Basic modeling can be done on any of the libraries computers; however, more complex 3D drafting software and processes can be extremely taxing on a computer's CPU, memory and video card, causing the software to crash. Additionally, some 3D modeling features simply cannot be utilized on conventional computers. Therefore, we plan on adding a dedicated drafting workstation to the Skylab Makerspace that will be capable of running the state-of-the-art drafting software that we already have available without any issues in regards to hardware compatibility.

Dell Precision 7000 Series CAD/drafting workstation, photo – courtesy of Dell.

2. **Description of how initiative has a college/unit-wide or university–wide scope.**

    The new 3D modeling/printing equipment that the UWF Libraries plan to acquire for the new Skylab Makerspace will be available for use by all UWF students and faculty. While students and faculty from across the curriculum have utilized our existing 3D printers, the libraries expect that the majority of MakerSpace users will be students of Art, Applied Sciences, and Natural Sciences.

    To facilitate broad use of the 3-D printers, the Skylab has held multiple 3D-printing workshops throughout the year on the topics of 3D-modeling, 3D printer operation, and 3D-printing for beginners. These workshops provide all UWF students, faculty, and staff the opportunity to familiarize themselves with 3D modeling and printing processes so that they can utilize the software and equipment that we are making available in the library. Our plans are to continue these workshops and expand them by adding new and updated workshops as the need arises.

    The new Skylab makerspace will be available for students, faculty, and staff use from 7:30 A.M. until 12:00 A.M. Monday through Thursday, 7:30 A.M. until 8:00 P.M. on Fridays, 8:00 A.M. until 8:00 P.M. and on Saturdays, and from 12:00 P.M. until 12:00 A.M. on Sundays. Therefore, our equipment is readily accessible by all UWF students, faculty and staff. Furthermore, the Skylab is staffed with lab assistants who are trained in the operation/maintenance of the 3D printing equipment. Students can come into the Skylab at any time and learn how to operate the 3D printers themselves with the assistance of Skylab staff. Additional services for faculty include the printing of physical models for the classroom and for research projects. *(Skylab staff will print these items for faculty, they won't have to do the 3D printing themselves.)*

3. **Description of project alignment with UWF Strategic Plan.**

    UWF Priority 2.1: Respond to the changing needs of the region, state, and nation by investing strategically to *support innovative instruction* and high-quality, relevant, and distinctive academic and research programs.

    Our new makerspace and 3D-printing equipment will allow the Libraries to continue to support STEM related student projects and inspire learning by giving students the opportunity to be creative and see their designs and ideas come to life. We have observed many students who had little interest in math become motivated to learn the necessary geometry and other mathematical skills necessary in order to design and print their own 3D models.

UWF Priority 4.1: Support and sustain the high quality services and infrastructure needed to achieve identified UWF priorities.

When the UWF Libraries purchased the first 3D printer and made it available for use by all students, faculty, and staff in February of 2014, we were pioneers of offering this type of technology to library patrons. Henceforth, 3D printing services and technologies have become quite common offerings in both academic and public libraries. These technologies are advancing at a fast pace and our proposal is in an effort to sustain the high quality services and infrastructure that are necessary in order to achieve priorities outlined in the University's Strategic Plan.

4. **Description of benefits provided.**

The new 3D printers that we would like to acquire will allow the UWF community to create larger, more detailed 3D models and parts than our current 3D printers. The new models will also produce fewer failed prints thus decreasing frustration and increasing efficiency in the makerspace.

Types of Projects that Utilize the 3D Printers

- The Biology Department had parts designed for research projects during the summer of 2016. One part was designed to retrieve planktons from the seafloor and the other was used in the Turtle THiS project at the Gulf Island National Seashore.
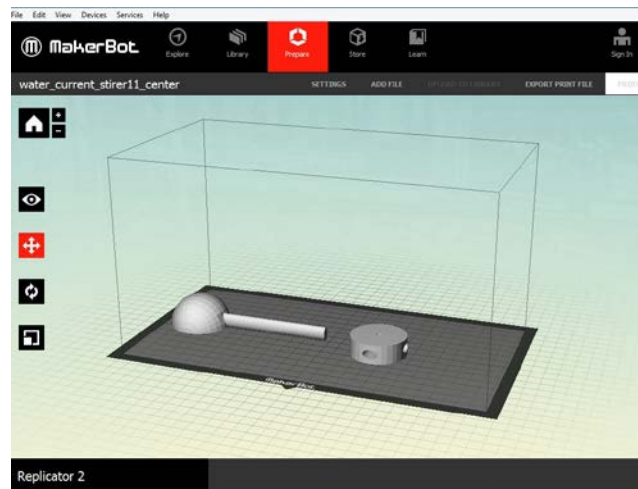

CAD 3D model of parts designed to retrieve planktons from the seafloor.

Mounts were created for these devices that are used in the Turtle THiS project at Gulf Islands National Seashore.

- Physics students used the Skylab's SolidWorks software to complete a lesson plan and create/print 3D print parts for high school students in India. The lesson covers the functions of laser communication devices and fiber optic connections. The high school physics lab in India needed devices that could hold laser pointers steadily and have the laser be reflected off of a series of mirrors at an equal height. The 3D printers in Skylab were utilized to complete the parts that were then sent to India.
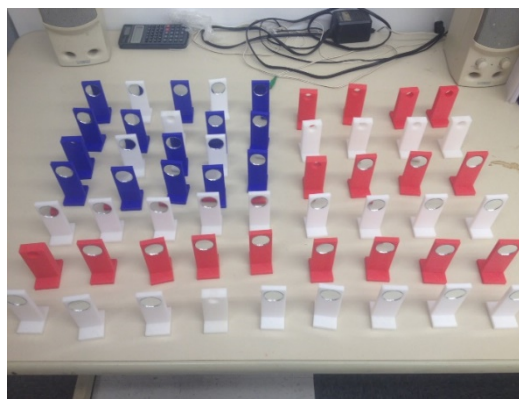
Parts 3d printed in Skylab ready to be shipped to high school students in India.

- Mechanical engineering students taking the EML 3022 Computer-Aided Design and Modeling course and working on other engineering coursework have been utilizing the 3D modeling software and printers in Skylab. The addition of a new workstation specifically configured to run CAD software and the new 3D printers will enhance the mechanical, electrical and computer engineering student's ability to develop/design mechanical, electrical and computer systems.

- Art students taking ART 3613C Digital Multimedia and working in other art courses, projects, and exhibits have been extensively utilizing the libraries 3D modeling and printing capabilities since the first 3D printer was installed in Skylab during the spring 2014 term. The addition of new more capable 3D printers will enhance their creativity by allowing them to create models that simply can't be printed by our existing equipment.

These examples are just a tiny fraction of the 3D modeling/printing projects that have been completed in Skylab. Students from across the curriculum come into Skylab every week with 3D modeling projects involving their coursework and personal projects. The Skylab is a hands-on makerspace and the skills learned while 3D modeling/printing in the library are marketable in today's workplace.

SolidWorks, AutoCAD, SketchUp and several other 3D modeling software programs are available for use on the library's computers. These 3D modeling software programs will run on our current machines, and some pretty impressive 3D models have been create with our existing software and computers. However, patrons often do experience glitches and crashes when attempting to do more complicated 3D modeling operations with our existing hardware. Therefore, we are proposing the addition of one professional CAD workstation that has been optimized to run SolidWorks 3D modeling/drafting software to be installed in the Skylab's new Makerspace. This new equipment will benefit students completing these types of projects.

5. **Description of how success/impact will be measured.**

Metrics on printer usage in hours are available as part of the 3D printers' user interface. Data on student and faculty printing is also collected by Skylab staff for all 3D prints. Additionally, Skylab staff interacts with all 3D printing patrons, giving assistance and training in the use of the 3D printing hardware and software. Quantitative and qualitative data for analysis will be derived from these metrics and interactions.

6. **Detailed description of resources required including hardware and software requirements and personnel costs (faculty compensation is not an allowed cost).**

Makerspace Hardware		
Item	**Cost Estimate**	**Description/Hyperlink**
MoJo 3D Printer & Supplies	$7,000.00	http://www.stratasys.com/3d-printers/idea-series/mojo
Fusion F400-S 3D Printer	$4,900.00	http://www.fusion3design.com/f400-enclosed-3d-printer/
Dell Precision 7000 Series CAD/Drafting Workstation	$5,600.00	http://www.dell.com/us/business/p/precision-t7810-workstation/pd?oc=cup7810w7p_4&model_id=precision-t7810-workstation
Total	$17,500.00	

These cost estimates include shipping and were quoted on 1/17/2017 for hardware/equipment that has been specifically configured to best suit the university's needs. Additionally, manufacturer's prices are subject to change.

7. **All Tech Fee Proposals must be reviewed by ITS prior to submission. Please provide your JIRA Ticket ID# here.**

   TF-16

8. **Proposed timeline.**

   Once the grant is approved and the funds are available, the equipment will be acquired and made available to students within 2 months.

9. **Plan for sustainability beyond conclusion of funding from technology fee, if applicable.**

   The funds provided through this technology fee proposal will cover the one-time cost of the 3D printers. Plastic filament for the machines and any future maintenance and repair costs will be covered by 3D printing fees.

10. **Resource matching commitments from other organizations/sources (identify organization and amounts), if applicable.**

    Estimated library funds totaling **$15,185.96** will cover the cost of renovating room 511 and purchasing tables and chairs for the new makerspace.

Skylab 3D Printing Makerspace Furniture Cost Estimates

Item	Quantity	Cost	Total
Chairs	4	$196.75	$787.00
Tables 72X30	2	$606.33	$1,212.66
Table 60X30	1	$579.30	$579.30
Table 36X27	1	$207.00	$207.00
			$2,785.96

Scope Statement
FY16/17

Project:	**Bldg. 32 Rm 511 3-D Printer Lab for Skylab**
Funding:	Dept. Funded
Budget Category:	Requested Funding: $12,400
Desired Completion Date:	2/17/2017

Background Info.: Unused space to be renovated for a dedicated and secured room that will have 3-D printers/modeling makers for the Sylab.

Scope: Replace wood door and front wall with new aluminum storefront door with sidelite & transom. Includes louvered grill for A/C return air. Add duplex outlets and six (6) data port outlets. Replace flourescent light fixtures with new LED fixtures. Rework light switches. Fill-in opening where light fixture penetrated wall. Repaint all walls/ceiling. Add two ceiling-mounted security cameras.

Dependent Relationship: There is no dependent relationship between this and other projects.

CSI Divisions Related to Project	Budget
Div. 1 General Requirements	$0
Div. 2 Existing Conditions - Structure Moving, Demolition and Soil Borings	$0
Div. 3 Concrete	$0
Div. 4 Masonry	$0
Div. 5 Metals	$0
Div. 6 Wood,Plastics, Composites	$0
Div. 7 Thermal and Moisture	$0
Div. 8 Openings - (door & wall demo, new storefront door with side lite)	$4,000
Div. 9 Finishes (shelf demo, drywall repairs, access panel, repainting)	$2,500
Carpet	$900
Div. 10 Specialties (Room ID signage)	$100
Div. 11 Equipment	$0
Div. 12 Furnishings	$0
Div. 13 Special Construction	$0
Div. 14 Conveying Equipment - Elevators	$0
Div. 21 Fire Suppression	$0
Div. 22 Plumbing	$0
Div. 23 HVAC	$0
Div. 25 Integrated Automation - Bldg. Automation Systems/Components	$0
Div. 26 Electrical	$3,300
Data Lines	$500
Div. 28 Electronic Safety and Security - Access and Intrusion Control	$400
Div. 31 Earthwork	$0
Div. 32 Exterior Improvements - Pavements and Site Furnishings	$0
Div. 33 Utilities - Storm, Sanitary, Electrical, Communications, Potable, Wells	$0
Div. 34 Transportation	$0

Subtotal - Construction Cost		$11,700
Contingency	5 Percent	$600
Building Permit Fee	(County)	$100
Construction Subtotal		$12,400
Design Services		$0
	Grand Total	**$12,400**

Accounts are charged only for actual costs. All funds not utilized by the contractors, consultants, or permitting, will not be charged to the department.

11. Individual responsible for reporting and accountability, along with contact information.

John Barksdale, Skylab Technology Manager
John C. Pace Library Bldg. 32,
University of West Florida
11000 University Parkway
Pensacola, FL 32514-5750

jbarksdale1@uwf.edu
850-857-6230