UNIVERSITY OF CENTRAL FLORIDA RESEARCH II

SUMMARY, HISTORY, NEED, VALUE

In 2018, UCF determined that developing a new innovative, interdisciplinary research facility would address campus-wide research space needs for multiple colleges. Advanced research infrastructure is a key to the improvement of academic ranking in the Science, Technology, Engineering and Mathematics fields (STEM).

The RESEARCH II building is UCF's highest priority facility on the 5-Year Capital Improvement Plan (CIP) for FY 2025-26 through 2029-30. RESEARCH II will provide research space primarily for the College of Optics and Photonics, College of Sciences, and College of Engineering and Computer Science. The building will also include interdisciplinary clean room space and a centralized state-of-the art machine shop operated by the Office of Research.

RESEARCH II will facilitate synergy among researchers and foster an environment that increases the emphasis on internal and external partnerships. With additional research space and personnel, the funding from industry partners and the quantity of industry-sponsored projects will increase. Indirect benefits will be measured in terms of student internships and permanent employment opportunities with partner companies and others for UCF graduates.

The proposed 105,060 gross square foot RESEARCH II building will serve hundreds of research personnel working simultaneously in multiple lab types. The building program for the facility was developed in partnership with the research leaders of the stakeholder Colleges, under the guidance of the Provost. The building as currently programmed will include 48 wet lab bays, 36 damp lab bays, 35 dry lab bays, 10,000sf of net cleanroom space, sub-fabrication equipment/storage, and office support space. Please refer to the detailed space program at the end of this document for more information.

UCF's timely investment in research lab and cleanroom infrastructure (equipment and space) will be a pillar in the University's strategic vision for raising UCF to **"one of the Top 25 public research universities in the country"** [Unleashing Potential | *Becoming the University for the Future*].

CLEANROOM FACILITIES

A survey of the US top universities reveals a strong correlation between university ranking and the prominence of user-based cleanroom facilities. Centrally-operated cleanrooms are one of the best catalysts to synergize research across different colleges, programs, and external partnerships.

The UCF nanofabrication facilities are currently unified only at the operation level. In 2019, UCF centralized cleanroom operations across three colleges. CR facilities are now operated and funded by the UCF Office of Research, and administered by a joint faculty committee.

Existing Cleanroom Facilities:

1) College of Optics and Photonics (COP)		
CREOL Nanofabrication facility (CNF)	2,082sf CR	2,692sf CR Support
CREOL Waveguide Fabrication/Cleanroom	627sf CR	318sf CR Support
2) College of Engineering and Computer Science (CECS)		
Advanced Microfabrication Facility (AMF)	3,272sf CR	1,290sf CR Support
3) College of Sciences (COS)		
Microdevice Prototyping Facility (MPF)	601sf CR	2,162sf CR Support

Despite improvements resulting from the centralization of cleanroom operations, overcoming three major challenges will achieve a facility competitive with the top US research universities:

Space: A contiguous 10,000 square foot centrally-operated cleanroom is proposed for the RESEARCH II building. UCF's current cleanroom facilities serve 25 Primary Investigators but the larger, proposed larger facilities could serve more than twice as many.

Equipment: UCF's existing microfabrication facilities lack cutting-edge equipment essential to the advance of emerging science, technology and engineering research. The proposed central cleanroom will require an investment of ~$25M in state-of-the-art equipment, much of which could be acquired *before a new facility is completed*! The President's 2021-22 Strategic Investment Program provided over $2.2M of new equipment, six faculty lines and two permanent technical staff members for the current cleanroom complex.

Cleanroom Standards: Cleanrooms are precisely engineered spaces that maintain, through finishes and mechanical systems, very low concentrations of airborne particles. Incoming air is filtered through a series of filters to remove all particles within certain tolerances. The maximum allowable concentration of particles per cubic foot is how the original classification was determined.

- OLD: The General Service Administration's **FS209E system** contained six classes: the "cleanest" was referred to Class 1 and the "dirtiest," Class 100,000 (i.e. 100,000 PPM per CF).
- NEW: The International Standards Organization's **ISO 14644-1 system** added two cleaner and one less clean designation.

Comparison chart:

FS209E	ISO 14644-1
	ISO 1
	ISO 2
Class 1	ISO 3
Class 10	ISO 4
Class 100	ISO 5
Class 1,000	ISO 6
Class 10,000	ISO 7
Class 100,000	ISO 8
	ISO 9

UCF's existing partnerships and collaborations will be positively impacted by RESEARCH II's cleanrooms. UCF's improved presence in this domain will have a sizable impact on the regional economy by creating high-paying jobs in entrepreneurial endeavors.

The proposed cleanroom facility will position UCF as a contender for membership in the National Nanotechnology Coordinated Infrastructure (NNCI), a prestigious organization of academic cleanroom facilities serving creative researchers nationally.

TYPES OF RESEARCH LABS

Wet Labs typically house activities and experiments that utilize chemicals, potentially hazardous liquids, and biological materials to support research and testing. Wet labs are appropriately equipped with the proper plumbing utilities such as piped gases and pure water systems, mechanical ventilation systems that support continuous outside air changes, and an electrical infrastructure adequate to support the research and associated equipment.

- FIELDS: Life sciences, Pharmaceutical, Medical technology, Molecular biology, Organic Chemistry, Physical chemistry, Pathology, Bioprocessing, Forensics, etc.
- EQUIPMENT: chemical fume hoods, biological safety cabinets, freezers, growth chambers, refrigerators, incubators, centrifuges, evaporators, scales, balance tables, storage and distribution of gases
- PHYSICAL ENVIRONMENT: Controlled environment to include once-thru air, drain and vent services, DI water, eyewash/safety showers, extreme cleanability.[1] Hazards: Chemical, Biological, Physical, Safety, Ergonomic

Damp Labs require a slightly different infrastructure-based type of laboratory environment than a Wet Lab. Damp labs focus on the electrical, optical and technology sciences which have greater requirements for clean power sources, higher electrical capacity and voltage needs, and can have specific constraints regarding radiation, electromagnetics, and vibration sensitivities of spaces. These spaces might include lab with isolated slabs, high-bays, maker spaces, machine shops, etc.

- FIELDS: Cleanroom, Optics, Engineering, Physics, Electronics, Robotics, Biomedical, Imaging, Material characterization, Simulation, Power and Energy Design, Automated or Electric Vehicles, etc.
- EQUIPMENT: Anechoic chambers, magnetic resonance imaging, computerized tomography
- PHYSICAL ENVIRONMENT: Controlled environment may include humidity and temperature control, clean power, dust control, advanced vibration control. Hazards: Physical, Safety, Ergonomic

Dry Labs are typically a lesser infrastructure-intensive type of lab typically utilized for applied or computational mathematical analyses, computer-generated modelling or simulations, coding, data analysis, and other analytical processes that do not pose significant hazards or risks. Dry labs that pertain to nanofabrication research and production require a “cleanroom” level of constructed containment that can maintain a very low levels of airborne particulates.

- FIELDS: Computer Science, Bioinformatics, Technology, Information systems, etc.
    - Dry Lab space will include research workspace for RAs and Post Docs, for that part of their job that is performed away from the hazards of wet or damp labs.
- EQUIPMENT: Computers, Machines
- PHYSICAL ENVIRONMENT: Computer lab environment. Ergonomic hazards only.

In addition to creating new labs of various types, the Research II building will also allow us to align the programmatic and space needs of existing research. The recent space study revealed that in our existing research portfolio, some research that only has Dry Lab needs is being performed in Damp Lab or Wet Lab space. This is one reason that nearly a third of the lab space in Research II is programmed as Dry Lab space. Aligning space use with programmatic need will quickly free up existing Wet and Damp Lab space in existing buildings on campus at very little cost.

[1] Ability to have contaminants removed such as residue, stains, deposits, microorganisms, and dust.

RESEARCH LAB CLASSIFICATION

Laboratories are typically classified by the level of hazardous exposure within the lab, i.e. Biosafety Level (BSL) 1, 2, 3 or 4. Dry laboratories typically do not have chemical or biological hazards present and require ventilation air that is free of particulates; therefore, classified by ISO levels in lieu of BSL levels.

Bio Safety Levels (BSL) differ greatly from ISO cleanliness levels. BSL requirements protect the occupants from chemical and biological hazards, whereas ISO requirements protect sensitive products against particle contamination.

Biological Safety Levels (BSLs) are designated by the Center for Disease Control (CDC) and represent a biocontainment classification system that defines the proper laboratory techniques, safety equipment and design required for each level. These guidelines are developed to protect researchers from possible infection or exposure to biological hazards and to prevent biological organisms from entering the environment and harming the public. Each BSL level builds upon the requirements of the previous level.

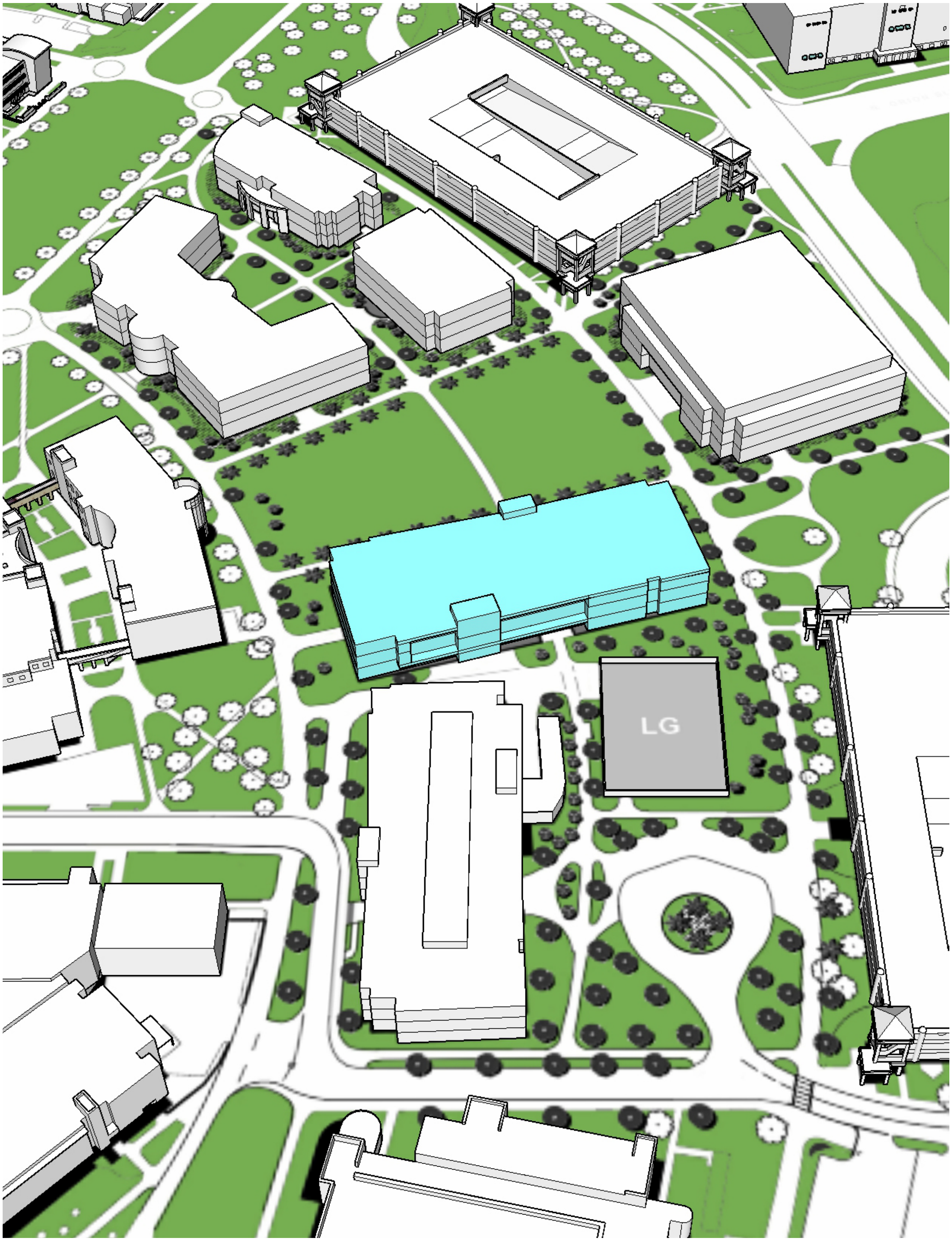
- BSL 1 Labs: minimal exposure risks and minimal hazards, Minimal PPE required, work can be performed on open laboratory benches. Doors are required to separate the lab from the rest of the facility.
- BSL 2 Labs: moderately hazardous microbes are present, such as influenza or HIV. Self-closing doors are required to separate the lab environment from the rest of a facility and to provide limited access to the lab. Minimal PPE required plus face shields, hand sinks are required and emergency shower / eye wash fixtures can be required with the use of chemicals. 100% exhausted air may be filtered, negative-pressure containment is suggested for specific processes such as Tissue Culture work. Such work is also generally conducted in biological safety cabinets (BSCs).
- BSL 3 Labs: required where high risk serious or potentially lethal airborne microbes are present, like tuberculosis or ebola. Access to the lab is restricted and controlled. Entrance is through an ante room through two sets of self-closing and locking doors. Extensive PPE and respirators are recommended, exhausted air requires filtration, sinks require hands-free fixtures and all work is conducted in ducted BSC.
- BSL 4 Labs: UCF will not have BSL4 Labs. They are highly specialized for high-risk applications where transmission is airborne and infections are commonly fatal.

OFFICE SPACE

UCF's new office space standards, adopted in 2023, will apply to RESEARCH II. The building will have private, shared, and open office space, office service, and conference/teaming rooms. UCF's "Me Space - We Space" model will assure that there are plenty of spaces for collaboration, and breaks from hazardous work.

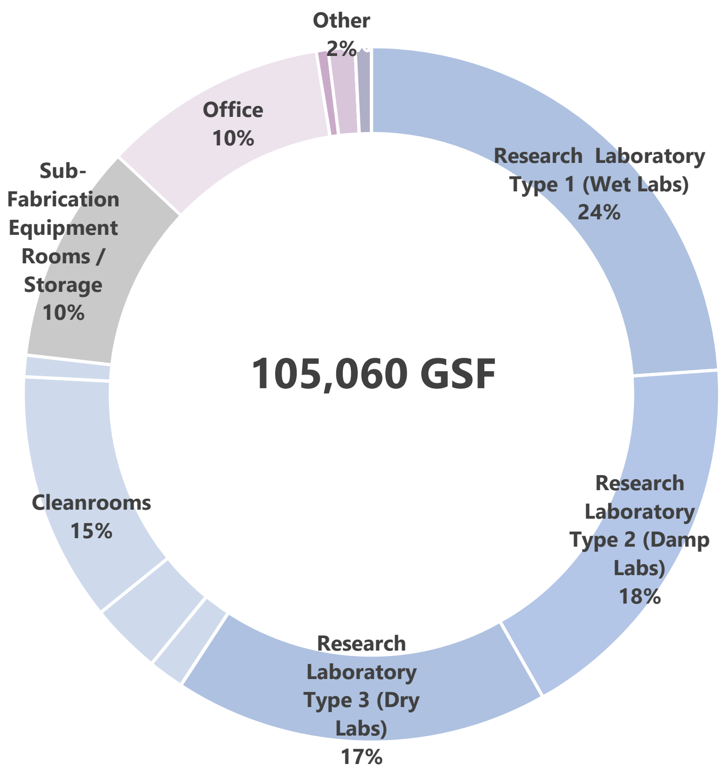
Please refer to the detailed space program at the end of this document for more information.

Research II building in Cyan – 3 stories, 105,060gsf



University of Central Florida
Research Building 2
Orlando, FL
Space Program - Version 6

3/14/2024



Item	Category	NASF	Efficiency Multiplier	Gross
250	Research Laboratory Type 1 (Wet Labs)	14,400	1.80	25,920
250	Research Laboratory Type 2 (Damp Labs)	10,800	1.80	19,440
250	Research Laboratory Type 3 (Dry Labs)	10,500	1.80	18,900
250	Cleanroom Labs (Class 100)	1,000	2.00	2,000
250	Cleanroom Labs (Class 1000)	2,000	2.00	4,000
250	Cleanroom Labs (Class 10000)	7,000	2.00	14,000
250	Cleanroom Support Spaces	600	2.00	1,200
250	Sub-Fabrication Equipment Rooms / Storage	6,150	1.40	8,610
310	Office	6,300	1.40	8,820
315	Office Service	330	1.40	445
350	Conference Room	750	1.40	1,050
600	General Use	0	1.50	0
700	Support Facilities	450	1.50	675
	Total Assignable	**60,280**	44,780	**105,060**
	Efficiency		1.74	

Quick Glance:	Qty:	
Research Lab Type 1 (Wet lab)	48	300 SF lab bays
Research Lab Type 2 (Damp lab)	36	300 SF lab bays
Research Lab Type 3 (Dry Lab / computational lab)	35	300 SF lab bays
Clean Room Bay Class 100 (ISO 5)	1,000	SF
Clean Room Bay Class 1,000 (ISO 6)	2,000	SF
Clean Room Bay Class 10,000 (ISO 7)	7,000	SF
Sub-Fabrication Equipment Rooms	4	Rooms
PI Offices	30	offices
Part-Time in office (2 per PI)	24	2 in an office or 60SF
Post Doc and RA Open Office Workspace	0	open office space

	Non Assignable Area		44,780
WWW	Circulation Area	36%	16,121
XXX	Building Service Area	8%	3,582
YYY	Mechanical Area	36%	16,121
	Structure/Envelope/Walls	20%	8,956
		100%	44,780