

Space Descriptions

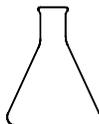


*Research Laboratory
NIH Design Policy and Guidelines*

C.1 Laboratories

NIH laboratories are generally classified as wet or dry.

Laboratories involving research with biological materials, radioactive tracers, and chemicals that are mutagenic, teratogenic, or carcinogenic are classified into four biosafety level (BL) categories (BL1, BL2, BL3, BL4). These categories are outlined in detail in Center for Disease Control and Prevention (CDC)/NIH, *Biosafety in Microbiological and Biomedical Laboratories*. Generally labs at NIH are classified as BL2. Any BL3 or BL4 labs need to be cleared with the NIH Division of Safety.



C.2 Wet Laboratories

Wet laboratories house functions that include working with solutions and utilize benches, sinks, and chemical fume hoods. Generally, a wet lab is fitted out with a full range of piped services such as lab and filtered water, lab cold and hot water, lab waste/vents, carbon dioxide (CO₂), vacuum, compressed air, eyewash, safety showers, natural gas, telephone, local area network (LAN), and power. For specific requirements see section E, Room Data Sheets.

C.2.1 Biochemistry/Pathology

Equipment includes a large number of refrigerators and freezers (-20°C, -70°C, and -135°C), a large number of centrifuges, many requiring single-phase 208 V, 30 A service. Access to chemical fume hoods, BSCs, and cold rooms is required.

C.2.2 Molecular Biology

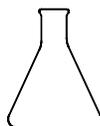
Equipment includes refrigerators and freezers (-20°C, -70°C, and bottled liquid nitrogen), centrifuges, many requiring single-phase 208 V, 30 A service. Access to chemical fume hoods, BSCs, bacteriological incubators, shakers, and darkroom is required.

C.2.3 Cell Biology

Equipment includes refrigerators and freezers. Access to BSCs with high/low CO₂ incubators, autoclave, cold room, and bottled liquid nitrogen is required.

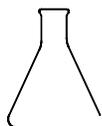
C.2.4 Organic Chemistry

A chemical fume hood for each investigator is desirable. Cleanup sinks and acid-resistant waste piping are required. Areas for storage and distribution of gas cylinders easily accessible to the laboratory through a central or manifolded system is required.



C.2.5 Physical Chemistry

The quantity and range of services and electrical power distinguish chemistry laboratories at the NIH. Power ranges from 110 V and 208 V up to 480 V. Due to instrumentation, heavy structural loading and high ceiling clearance may be required.



C.3 Dry Laboratories

Dry laboratories involve work with electronics and large instruments with few piped services. These laboratories are analytical laboratories that utilize and house sophisticated equipment: highly calibrated electronic apparatus in spaces that require accurate temperature and humidity control, stable structure and vibration control, shielded space, clean power, and filtered chilled water. These laboratories do not require extensive piped services and built-in casework. Floor loading and ceiling heights are also a consideration. Access must be planned for routine maintenance, repair, or calibration of equipment. For specific requirements see section E, Rooms Data Sheets.

C.3.1 Electrophysiology/Biophysics

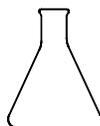
Laboratories require a large number of electronic racks and very little fixed bench space.

C.3.2 Electron Microscope

Electronic microscope suites may include imaging, a darkroom, a print darkroom, a graphics layout room, and a sample preparation area with a chemical fume hood. A stable, vibration-free structure is required. Use of vibration-damping tables, variable room lighting, and humidity control may also be required.

C.3.3 Laser

The laser suites must be isolated from vibrations and be light-tight, with a sample preparation space and chemical fume hood. Filtered chilled water for lasers and heavy floor loads are also a consideration. Specialty gases may be needed.



C.3.4 Magnetic Resonance Imaging (MRI)

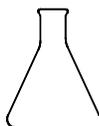
The MRI suites may include cold rooms, computer work areas, storage for gas cylinders, and a sample preparation space. Access and clearance, both vertical and horizontal, around the MRI must be carefully planned for both equipment requirements and delivery. Electromagnetic fields must also be considered.

C.3.5 X-Ray Crystallography

The X-ray crystallography suites must be isolated from vibration and have light, temperature, and humidity controls. A darkroom, computer graphic/modeling rooms, a purification and crystal growing room, tape storage, and computer work areas may be required for these laboratories.

C.3.6 Mass Spectrometry (MS)

The mass Spectrometry suites must be isolated from vibration. Sample preparation computers, and consoles may be required. Heavy structural loads are major considerations for MS laboratories. Point-of-use exhaust over equipment may be required.



C.4 Laboratory Support

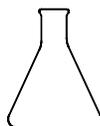
Laboratory support space shall be on the same planning module as the laboratory. It shall provide for activities that are not housed directly in the laboratory but are critical to the efficient operation of laboratory. This space is often shared by multiple laboratories. Such areas include autoclave rooms, constant-temperature rooms, cold rooms, computer rooms, darkrooms, developing rooms, equipment areas, glasswash, bench support, radioactive work areas, storage, and tissue culture laboratories.

C.4.1 Autoclave Room

An autoclave is an industrial appliance that uses pressurized steam to sterilize laboratory instruments, glassware, other hard materials, and infectious waste. When an ethylene oxide (EtO) sterilizer is required, the NIH Division of Safety and manufacturer guidelines must be followed. The autoclave area requires overhead exhaust, floor drains, electricity, hot/cold water, steam, heating, ventilation, and air conditioning (HVAC), and drain, waste, and vent (DWV). All finishes must be moisture resistant. Doors to the room must accommodate large equipment sizes.

C.4.2 Glasswash

The glasswash provides space for glasswashing, and drying appliances and carts, and has counters on legs, a sink, and overhead exhaust. All areas in the room shall be thoroughly caulked and sealed, and have a fixed ceiling, epoxy floors, and cleanable walls to withstand moisture and prevent pest infestation. Masonry or epoxy-coated gypsum board is appropriate. Space must be provided for staging clean and dirty glassware. Utilities include HVAC with supplemental cooling, electricity, cold water, reverse osmosis, DWV, vacuum, telecommunications, and equipment alarm system.



C.4.3 Constant Temperature Rooms

A cold room is an environmentally controlled prefabricated unit usually operated at 4°C. The room has stainless steel counters on legs, wire shelves, and a stainless steel sink. Utilities include electricity, vacuum, and mechanical ventilation and filtered water. Cold rooms shall be lockable, and all mechanical components shall be accessible and serviceable from outside the room. A high- and low-temperature alarm system shall be connected to the central equipment alarm. Cold rooms without any systems requirements are used for storage only.

A warm room is an environmentally controlled prefabricated unit used for growing cultures at a constant temperature. The warm room has stainless steel counters, wire shelves, and sink. Electricity, HVAC, filtered water, plumbing, and vacuum are required.

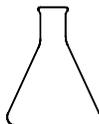
C.4.4 Computer Mainframe Area

This area supports computer mainframes or processors. Access flooring may be required. HVAC, electricity, special power, emergency power, uninterruptable power, and telecommunications/LAN systems will be required. Supplemental cooling may also be required.

C.4.5 Darkroom

This area will have casework, counters, work tables, and sink. All doors, walls, ceilings, and penetrations must be light-tight. Utilities include HVAC, electricity, hot/cold and chilled water, DWV, compressed air, gas, vacuum, spot exhaust, telecommunications, and reverse osmosis water. Requirements for compressed air, gas, and vacuum shall be verified during programming.

Darkroom-in-use indicators must be provided outside of this space.



C.4.6 Freestanding Equipment Areas

Freestanding equipment areas will provide space for shared equipment that may have high-heat loads, such as large freezers (-70°C), ultra centrifuges, high speed centrifuges, etc. Utilities include HVAC with supplemental cooling, electric, cold water, DWV, vacuum, telecommunications, and equipment alarm system.

C.4.7 Bench Lab Support

High-bench lab support rooms provide space for common or specialized equipment such as DNA sequencers and synthesizers, spectrophotometers, isotope counters, etc. Low-bench lab support rooms provide shared space for microscopes and other low-bench work. These rooms will have a sink, eyewash, emergency shower, and high benches. In addition to the standard provision of utilities, compressed air, gas, spot exhaust, nitrogen, reverse osmosis water, and telecommunications/LAN will be supplied. High- and low-bench features may be combined into a single room.

C.4.8 Radioactive Work Area

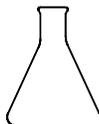
This area provides space for isolated radiation work. It will have an isotope hood, sink, eyewash, emergency shower, and flammable solvent storage cabinet. Utilities needed include HVAC, electricity, vacuum, compressed air, gas, hot/cold water, DWV, nitrogen, telecommunications, and reverse osmosis water.

C.4.9 Standard Ice Support Room

This area has ice machines, dry ice boxes, liquid nitrogen freezers, and liquid nitrogen cylinders. This room shall be located near a freight elevator and be provided with HVAC, supplemental cooling, electricity, floor drain, and cold water.

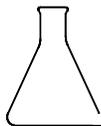
C.4.10 General Storage Room

This room has shelving or lockable storage cubicles with "wire-bar"-type, easily cleanable shelving. Special utilities are not required.



C.4.11 Tissue Culture

Equipment includes BSCs with high/low carbon dioxide incubators. Access to refrigerators and freezers, autoclave, sink, cold room, and bottled liquid nitrogen is required. Low-bench knee-holes for microscopes and drawers for pipettes near the BSCs are required. Shelving (depth as required) not to exceed 2,300 mm high for storage of plastic ware is required.



C.5 Offices and Shared Use Areas

C.5.1 Offices

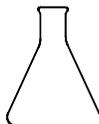
Offices shall be positioned to achieve close proximity to the occupant's laboratory work space. Ergonomic furniture shall be used in the office. Laboratory chiefs, section chiefs, principal investigators, and senior scientists will be provided with private offices wherever possible. If feasible, offices will be provided with natural light. Semiprivate offices may be provided for postdoctoral fellows. Open office space will be provided for clerical personnel and laboratory technicians with provisions for some privacy. Consideration may be given to clustering offices in order to have potential for sharing support staff. Storage requirements must be considered for records/files, copiers, and mail areas.

C.5.2 Work Areas

Work areas with computers may require HVAC, supplemental cooling, electricity, emergency or uninterruptable power, telecommunications/LAN, and space for computer equipment.

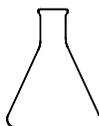
C.5.3 Small Conference Rooms

Small conference rooms for up to 8 people shall be provided for formal and informal meetings of section staffs. Large conference rooms for up to 25 will be provided for meetings of the laboratory staff. All conference facilities will be shared. Each space shall be equipped with white boards, audiovisual and projection equipment (35 mm and overhead), light control, and blackout, as well as telecommunications/LAN capabilities.



C.5.4 Break Rooms

Break rooms shall permit the safe consumption of food and beverage outside the laboratory while creating an inviting area for interaction. These areas serve as lounges for the employees and shall be equipped with white board, and tack board chairs, tables, bookcases, counters, microwave ovens, and perhaps a kitchenette with sink and refrigerator. Furnishings used in a break room must be cleanable and promote good sanitation. A library or resource center could be combined with a conference or break room or be in a separate entity. The room shall include locker space for coats, and purses, changing facilities, and one personnel shower per floor.



C.6 Building Operational Areas

Building operations include circulation, elevators, shipping and receiving, mechanical, electrical, and telecommunications, and restrooms.

C.6.1 Circulation

Circulation shall promote separate flows of people and materials. Vertical circulation must be simple and direct without being restrictive. Stairways and transition ramps shall be studied at connections between buildings with different floor-to-floor heights. A freight elevator will be located and sized to handle the transportation of materials from the loading dock to the point of use. Freight elevators require floor containment to prevent contamination of the elevator shaft in the event of a chemical spill. A heavy-duty passenger elevator shall be accessible as a backup to the freight elevator. Both shall be readily accessible to the loading dock.

In the laboratory areas, material movement will occur in common corridors (if no delivery/service corridor is provided). If a service corridor is provided, materials movement will occur in that area. Material-handling zones on each floor will be designed adjacent to dedicated service elevators for the purposes of staging, dispensing, and disposing of laboratory materials. Within each zone, separate storage areas will be provided for chemical and hazardous waste.

C.6.2 Loading Dock and Receiving

Shipping and receiving marshaling space will be adjacent to the dock. The receiving area shall be adequate for limited storage and staging of materials. Separate spaces shall be provided for holding and disposing of medical pathology waste, hazardous waste, radioactive waste, mixed waste, general waste, and recycling waste. An office, telephone, vending machines, toilet, and truck-height adjusters are required. The dock shall be covered and securable after hours. An outdoor telephone and doorbell shall be provided. If possible, loading docks shall not be on a required path of emergency egress to enable after-hours security. The dock shall be designed to minimize the harboring of pests.

