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**UNIVERSITY OF HAWAII
AT MĀNOA**

**FURNITURE DESIGN
GUIDELINES**

Prepared By
**University of Hawai'i Community Design Center
& MKThink**

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1 Introduction

Furniture is critical to the efficiency of any work or academic environment. The design guidelines serve to establish consistent and efficient furniture parameters and aim to support UH Manoa's Guiding Principles.

The goal is to promote an ergonomic and healthy work environment, maximize sustainability, provide high quality and durable furniture solutions, and enable flexibility in space design and layout to accommodate the changing needs in pedagogy.

Where possible, existing furniture shall be re-utilized.

The furniture design guidelines serve as a guide for project decision-makers to have a reference of furniture type and style to be chosen on campus spaces. This document serves as an illustrative guideline of products that meet the requirements. Furniture standards have been divided into three hierarchical tiers which are relevant to different space types.

●●● Tier 1: Furniture has been selected to furnish private offices. Furniture cost is on the higher end, it provides higher quality finishes and fabrics, as well as more elite furniture types and layouts.

●●● Tier 2: Furniture for shared and open office spaces and meeting spaces (meeting and conference rooms). Furniture cost is lower, while still providing ergonomics and comfort with a consistent aesthetic. Finishes and fabrics are replaceable.

●●● Tier 3: Furniture designed and selected for open and common spaces, as well as frequently used classrooms and labs. This furniture selection is more durable, can be easily cleaned or replaceable if needed. This furniture offers the most flexible combinations and layouts, and they enable campus users to move furniture and adapt academic spaces without compromising comfort, ergonomics, not academic efficiency. Tier 3 furniture has been selected with the student's needs and daily use in mind, they increase the building efficiency as they provide more flexible layouts.

Furniture shall be selected so that it allows for easy cleaning of the floor below. Ergonomics must include, but not limited to: adjustable seat height and depth, back angle, lumbar support and arm height. Seat upholstery shall meet or exceed ACT (Association for Contract Textiles) guidelines for flammability, Wet and Dry Crocking, Colorfastness to light, Physical properties, and high traffic abrasion. Write off fabrics are preferred in public spaces, and high traffic open seating. Durable coating fabric shall be used for ottomans and other furniture vulnerable to foot resting.



IMAGE 1-1: Camron Hulsey Make-A-Wish Foundation event.

2 Tables and Desks

2-1 Work Tables

The selected tables encourage flexibility in the classroom to give students the opportunity to rearrange themselves to collaborate with one another while still being able to work individually. The selection includes a table with single seating and tables with double seating. Tables can also be nested to create space within the classroom.

Verb Keystone (Personal) by Steelcase



Tabletops

- Verb worksurfaces are 1-1/8" thick wood-core with High-Pressure Laminate top and plastic edge band.

Plastic components

- Plastic components are optional and used to provide storage and display for Verb whiteboards.

Personal tables

- Personal tables come standard with the access leg with non-locking casters.

Keystone shape

- The keystone shape table provides the optimal reconfiguration capability in a small footprint, and can achieve the same arc created in lecture applications as the chevron table.

Colors

Table top



Fawn cypress

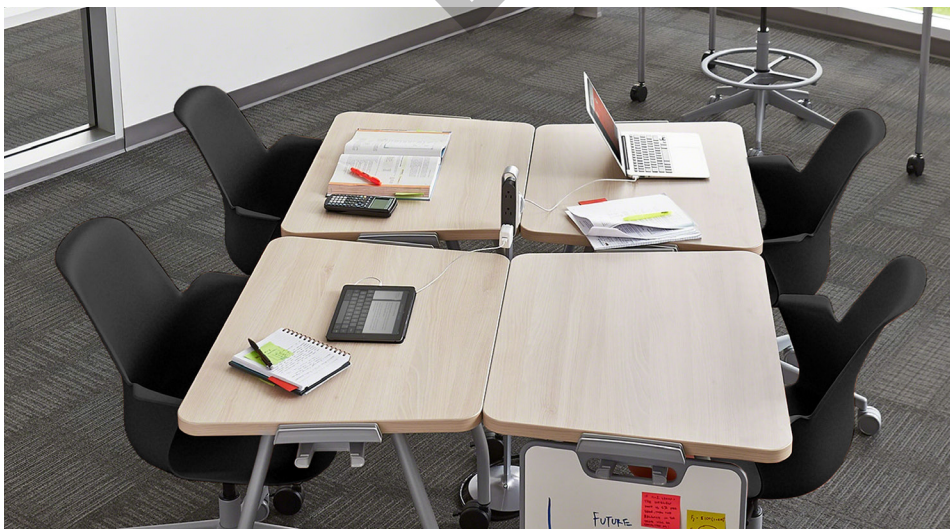


White

Frame/Base



Silver



Verb Chevron (Double) by Steelcase



Tabletops

- Verb worksurfaces are 1-1/8" thick wood-core with High-Pressure Laminate top and plastic edge band.

Plastic components

- * Plastic components are optional and used to provide storage and display for Verb whiteboards.

Chevron Shape

- The chevron shape tables provide a sense of personal space division as well as creating a subtle arc when in lecture mode to allow line of sight to everyone in the row.

Colors

Table top



Fawn cypress



White

Frame/Base



Silver



Piroutte (Flip-top, Double)

By Herman Miller



Tabletops

- Verb worksurfaces are 1-1/8" thick wood-core with High-Pressure Laminate top and plastic edge band.

Plastic components

- * Plastic components are optional and used to provide storage and display for Verb whiteboards.

Chevron Shape

- The chevron shape tables provide a sense of personal space division as well as creating a subtle arc when in lecture mode to allow line of sight to everyone in the row.

Colors

Table Top



Maple



White

Frame/Base



Silver



2-2 Desks

The selected desks and desk systems enable faculty and administrative staff to arrange layouts to best suit existing or new spaces.. The selection includes freestanding desks, desk systems. Integrated power and data are optional.

Canvas Private Office (Private)

By Herman Miller



Tabletops

- The rectangular surface can be attached to the wall, supported by storage or freestanding for optimal configuration.

Legs

- Post legs

Power and Data

- Power and Data can be accessed at the work surface or inside lower storage.

Colors

Table Top



Oak on Ash



Medium Matte Walnut



White

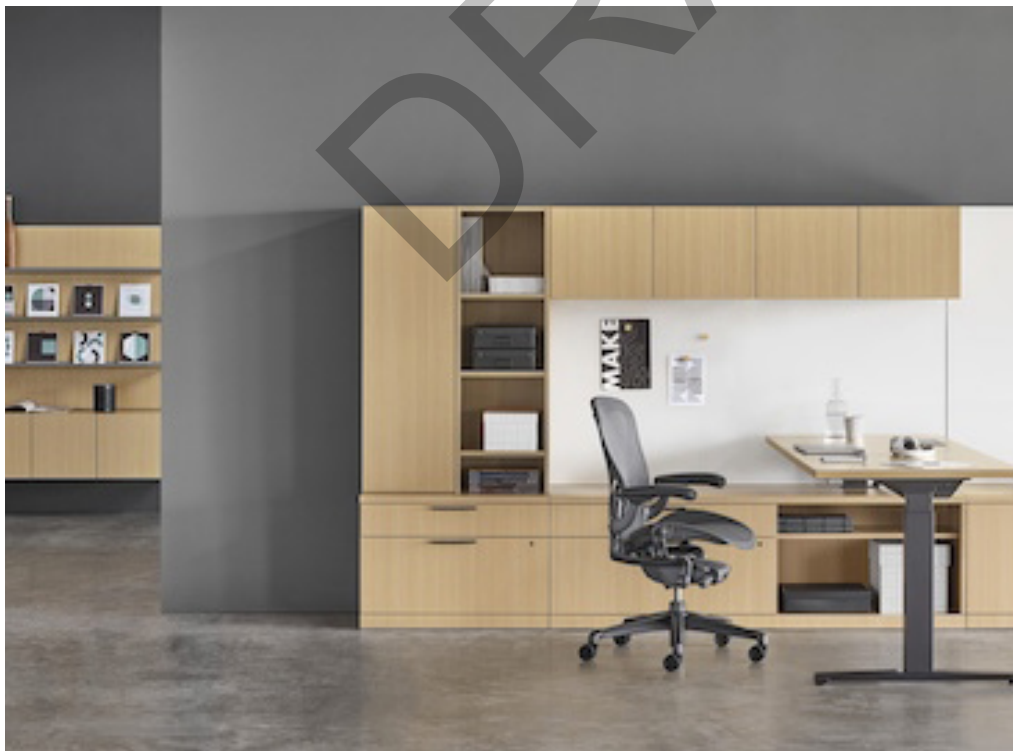
Frame/Base



Graphite



White



THINK

Canvas Office (Private/Shared)

By Herman Miller



Tabletops

- The rectangular surface can be attached to the wall, supported by storage or freestanding for optimal configuration.

Legs

- Post legs

Power and Data

- Power and Data can be accessed at the work surface or inside lower storage.

Colors

Table Top



Maple



White

Frame/Base



White



Canvas Landscape (Shared/Open)

By Herman Miller



Tabletops

- The rectangular surface can be attached to the wall, supported by storage or freestanding for optimal configuration.

Legs

- Post legs

Power and Data

- Power and Data can be accessed at the work surface or inside lower storage.

Colors

Table Top



Frame/Base



2-3 Guest & Side Tables

The selected tables have been selected based on the includes tiers of chairs based on office type tiers, to combine with meeting chairs and lounge seating in private offices.

Bowel Round Table (Private Office) By Steelcase



Top

- Solid wood top
- 48" (sits 4) or 60" (sits 6) diameter optional

Legs

- Powder coated steel base

Colors

Table Top



Natural Oak



White Washed
Ash

Frame/Base



Merle



White



Bassline Occasional Table (Private Office) By Steelcase



Top

- High Pressure Laminate top or glass

Legs

- Powder coated steel base

Sizes

- Round Small 25" diameter
- Oval Small 36"x20", Medium 54"x24"
- Coffee Table 13" height

Colors

Table Top



Natural Oak



White Washed
Ash



Frosted Glass

Frame/Base



Merle



White



Turnstore Paper Table By Steelcase



- Campfire Paper Table puts creativity center stage with a rotating top and options for glass or refillable paper writing surface.
- Created to bring teams together

Table Top



Paper



Glass

Frame/Base



Warm Oak



3 Seating

3-1 Work

The selected chairs encourage flexibility to give users the opportunity to rearrange themselves to collaborate with one another while still being able to work individually. The selection includes chairs that can be configured to incorporate worksurfaces, and chairs without built-in worksurfaces that can be grouped around tables or without tables. Chairs without worksurfaces are stackable, which allows them to be portable within the classroom or between other classrooms. The section also includes office seating and mixed use space seating.

Node: Tripod Base by Steelcase



Flexible seat

- Simple adjustments keeps people comfortable in a variety of postures. Arms serve as bag or purse hooks.

Personal worksurface

- Personal worksurface is adjustable, non-handed, and large enough to support digital and analog resources. It moves independently of seat shell and base. Its depth is adjustable for large and small users and allows for ingress/egress.

Casters

- Casters have hard, dual wheels that roll smoothly on carpets. Soft dual-wheel casters are available for use on hard floors.

Table stand

- Tablet stand supports all top-selling tablets and smartphones in both portrait and landscape positions, making content easy to view and freeing up space on the worksurface for other class materials.

Backpack storage area

- The tripod base reclaims the space under the seat. The space is 1.7 cu/ft. and allows for backpacks or personal belongings to be stored, and serves as a footrest.

Colors

Seat/Back



Frame/Base



The Shortcut Shell by Steelcase



Elbow rests

- Elbow rests are abbreviated to stay out of the way as the user gets closer to the worksurface and supports a wide range of postures.

Personal worksurface

- Personal worksurface is mounted on user's right, and designed to accommodate left- and right-handed users. It is 12"D x 22-1/4"W and features a safety stop to help prevent belongings and laptops from easily sliding off back edge.

Casters

- Hard, dual wheeled casters are standard for use on carpets. Soft, roll-control, dual-wheel casters are available for use on hard floors or chair mats.

Seat height

- Seat height adjusts pneumatically. to lower, pull lever up while seated. To raise, pull lever up and keep weight off of the chair. Lever is located on the left hand side.

Colors

Seat/Back



Seagull

Frame/Base



Merie



Caper by Herman Miller



Portable

- Caper is designed to be moved. Pull up a couple of Capers for collaborative work. Push a cluster of Capers together and transform a classroom. Take a whole Caper Cart of stacking chairs from the conference room to the cafeteria. Lightweight, durable, and easy to deploy, Caper is ideal for informal, flexible spaces where rearranging is encouraged.

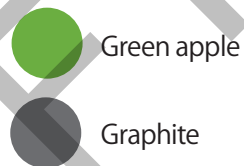
Stacking

- For space-efficient storage when they're not in use, Caper Stacking Chairs can stack six-high on the floor or 15-high on the Caper Cart, where they can be moved conveniently as a group. With optional ganging connectors, they make a tidy presentation space.

Performance

- Caper's glass-filled nylon seat and back are contoured for comfort, flexible for give, and colorful enough to brighten up any room. Holes in the material allow the body to breathe, dissipating moisture and heat so you remain cool.

Colors Seat/Back



Frame/Base



Gesture Chair (Private & Private/Shared Office) by Steelcase



Ergonomics

- Flexible seat with soft edge
- Additional lumbar support with adjustable dials
- Contoured backrest
- Manual adjustable reclining positions
- Adjustable arm rests
- Additional lumbar support
- Optional Headrest (Private office)

Casters

- Casters have hard, dual wheels that roll smoothly on carpets. Soft dual-wheel casters are available for use on hard floors.

Colors Seat/Back



Night Owl



Nickel

Frame/Base



Platinum
metallic with
seagull back



Black



Lino Chair (Shared/Open Office) by Herman Miller



Ergonomics

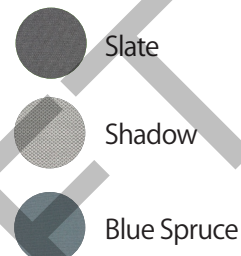
- Contoured seat offers total spinal and lumbar support
- Seat height, depth, reclination, adjustability is customizable
- Breathable material
- Fully Adjustable arm rests
- PostureFit back support

Casters

- Casters have hard, dual wheels that roll smoothly on carpets. Soft dual-wheel casters are available for use on hard floors.

Colors

Seat/Back



Frame/Base



Saiba Chair + Saiba Lounge Chair (Private Office) by Herman Miller



Chair

- Executive lounge Guest seating for private offices
- Mid or High back available
- * Saiba Lounge Chair optional for office lounge guest seating configuration

Casters

- Optional casters have hard, dual wheels that roll smoothly on carpets. Soft dual-wheel casters are available for use on hard floors.

Colors

Seat/Back



Quill



Silver Pine



Light Brindle



Leather Titanium

Frame/Base



Semi Polished



Bevel Sofa Settee (Private) by Herman Miller



Seat





- Executive lounge Guest seating for private offices
- Two seat sofa

Casters

- Optional casters have hard, dual wheels that roll smoothly on carpets. Soft dual-wheel casters are available for use on hard floors.

Colors

Seat/Back

-  Slate
-  Light Brindle
-  Silver Pine
-  Leather Titanium

Frame/Base

-  Semi Polished



3-2 Mixed Use

Away from the Desk by Steelcase



• Away from the Desk is a modular furniture system designed to accommodate a changing workspace. It facilitates both personal works and collaborative team work

- It is comprised of 70+ components that can be endlessly configured
- Large and small work aces can be specified within the system
- Integrated power, data and monitors are available for added performance.

Colors

Seat/Back



Pause:Canvas



Frame: Grey3



Palatine: Sand



Pause: Forge

Frame/Base



Silver



Sully by Steelcase



- Perfect for impromptu meetings & break-out spaces, the Sully stool delivers great flexibility without compromising on quality or comfort
- Two tone upholstery available
- Black or grey soft caster with or without brakes

Colors Seat/Back

-  Kvadrat: Divina Melange 0120
-  Kvadrat: Divina Melange 0931
-  Kvadrat: Divina Melange 0421

Frame/Base

-  Black



Ramsey
by Steelcase
III

- Designed to work together in small clusters, or as part of larger configurations in combination with Away from the Desk and Sully

- Two tone upholstery available
- Black or grey soft caster with or without brakes

Colors

Seat/Back



Kvadrat: Divina
Melange 0120



Palatine: Sand



Puse: Forge

Frame/Base



Black



3-3 Laboratory Chairs

ESD Chair
by LabTech supply Co.



Standard Options

- Contour or waterfall seat styles available
- Two paddle control for back angle, back height, and seat height adjustments
- 20" diameter adjustable aluminum footring (bench height models only)
- Five-legged aluminum base
- (5) 2" dual wheel conductive metal casters
- 1-megaohm resistor
- Zinc die-cast all metal casters (braking or free-rolling)

Colors Seat/Back



Blue ESD vinyl



Black ESD vinyl

Frame/Base



Chrome



Lab/Production stools by LabTech supply Co.



Standard Options

- Pneumatic lift for seat height adjustment
- 20" diameter adjustable footring (bench height models only)
- Reduced-size five-legged aluminum base
- (5) 2" dual wheel chrome or black hooded nylon casters
- Free-rolling casters, braking, reverse-braking, and glide options available

Colors

Seat/Back



Blue vinyl



Black vinyl

Frame/Base



Chrome



Lab Vinyl Chair by LabTech supply Co.



Seat Options

- Stamina Series
- Contour or waterfall style seats available
- Two paddle control for back angle, back height, angle and seat height adjustments
- 20" diameter adjustable aluminum footring (bench height models only)
- Five-legged aluminum base
- (5) 2" dual wheel chrome or black hooded nylon casters
- Casters: Free-rolling, braking, reverse-braking, and glide options available

Colors

Seat/Back



Blue ESD vinyl



Black ESD vinyl

Frame/Base



Chrome



4 Writable Surfaces

4-1 White Boards

Mobile and wall mounted options are available for each type of board. High-pressure laminate surfaces and a glass surface are available for both mobile and wall mounted options. Mobile whiteboards encourage flexibility within classrooms and allow students to brainstorm visually in small groups. The glass board also doubles as a surface for projections.

Groupwork (Mobile) by Steelcase



Surface

- Laminate markerboard surface has a non-glare writing surface and accepts all standard dry-erase markers. e3 CeramicSteel surface is magnetic.

Worksurface

- Worksurfaces are wood-core with High-Pressure Laminate top and plastic 3mm edge band.

High pressure laminates

- High-Pressure Laminates, or HPLs, are composed of multiple layers of crafted paper individually soaked in resin. There are 7-15 layers of paper combined to make the final sheet. The top layers are translucent melamine sheet and a decorative layer. The sheets are combined under heat and high pressure to form a single laminate sheet. The resulting sheet is then bonded under heat and high pressure to a wood core.

Dimensions

- Width: 24", 30", 36", 48"
- Height: 54", 66"
- Depth: 16"



View Projection Glass by Clarus



Projection

- Clarus' design team spent three years developing our patented, Micro AG 32 technology that delivers a beautifully crisp projection. View's efficient and purposeful design gives you picture-perfect presentations every time.

Clarus glass

- 1/4" Clarus tempered safety writing glass, with a non-staining writing surface. It is compatible with any marker, even permanent. It has a Clarus Opti-Clear Polish. Glass options also include the starphire glass (glossy) and the silk glass (matte). The finish is available in Clarus View White.

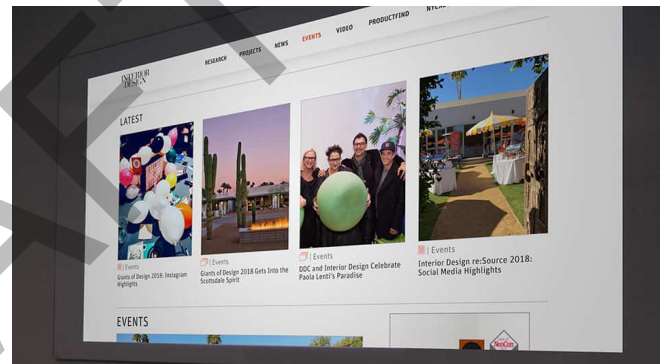
Surround 3.0

- Use a Surround frame to match the profile of View for all complementary glassboards used in the same area. This achieves consistent depth from the wall.

Dimensions

Markerboard w/ Optional Tackboard

- 40" x 48"
- 50" x 87"
- 60" x 104"



4-2 Digital Screens

Digital Screens and mobile displays simplify the technological relationship for academic instruction. Mobile digital stations provide effortless portability, mobility and flexibility to classrooms and meeting and gathering spaces.

Whiteboard and Mobile Display by Steelcase



Carefully designed with technological capabilities and effortless portability, it brings mobility and function to any conference or meeting. Available with a whiteboard in two different widths, or mediaboard with either mounting hardware and integrated storage or Steelcase media:scape technology.



Media:Scape by Steelcase



Media:Scape offers a variety of systems for users to connect more effectively. Media:scape integrates technology and furniture to bring people, space and information together for a collaborative work environment and more productivity than ever before.

- Optimal group collaboration
- Improve on existing academic teaching methods
- Removal of physical and virtual barriers
- Academic engagement with digital tools
- Environment for active collaboration

Media:scape Moblie

Allows users to apply media:scape in a diverse range of settings, wherever collaboration might occur.
Available in 2 heights: 40" mobile + 42" mobile

Media:scape Kiosk

Tailored to meet the needs of video collaboration for the individual. It integrates technology and furniture for greater collaboration and productivity in smaller settings.
Available in 2 heights

Media:Scpae Collaborative

media:scape collaborative settings seamlessly integrate technology, furniture and space to bring people together for greater communication and collaboration, and more powerful learning experiences.



Media:scape Mobile





Media:scape Kiosk



Media:scape Collaborative

Roam by Steelcase



The Roam Collection of mobile stands move easily on smooth-rolling casters for on-the-go transitions throughout any space. Locking casters provide added stability and safety. The mobile stand was thoughtfully designed to help teams work effectively. The legs are designed to be the ideal circumference for hands to easily grip. The storage tray keeps cables hidden and the back panel is useful to house various assets or presentation needs.



SMART Board Interactive display screen by SMARTBOARDS



The SMART Board interactive display is the hub of your meeting room. PC-free embedded computing provides one-touch access to collaborative tools, including a whiteboard, wireless screen sharing and a web browser. There's no need for wires, cables or manual software and firmware updates.

The 75" 4K ultra-high-definition LED display provides optimal image clarity and wide viewing angles. With the Pen ID feature, you can assign different appearances to the two pens and write or draw over any application in digital ink. Object Awareness allows you to perform mouse functions with your finger, write in digital ink with the pen, and erase with your palm or eraser - all without switching tools or modes. You can use a variety of gestures in applications, and two users can write or draw at the same time.



5 Instructor's station

5-1 Stations and lecterns

The selected instructor stations include lecterns and desk space for teachers to consult students individually. Lecterns allow instructors to teach lessons while standing with their notes at a comfortable height. Instructor stations may also include storage space for textbooks and other materials.

Verb Instructor Station by Steelcase



Design

- The Verb teaching station is designed to provide support for a range of postures and work modes, including instruction, collaboration, and concentrated work.

Worksurface

- Worksurfaces are wood-core with High-Pressure Laminate top and plastic 3mm edge band.

Lectern

- The lectern top is a High-Pressure Laminate with a urethane edge. It has an ergonomic 80° slant and a ledge at the bottom. It has an optional cup holder. The lectern top and arm has a 360° swivel allowing for maximum position flexibility and enhanced sightlines.

Modesty panel

- A modesty panel comes standard when a storage caddy is specified, and optional without a storage caddy.

Storage caddy

- When a storage caddy is specified, there is a cutout in the corner of the table matching the profile of the caddy.



All Terrain Mobile Lectern by Ki



Mobile instructor's desk

- Features All Terrain binder tower with lectern. Offers three open grommets and perforated partial modesty panel. Finished height is 40" with lectern.

Mobile lectern

- Features landing pad with bowed front, two accessory slots, two adjustable shelves.

Finish

- Units are cleaned thoroughly and subjected to a phosphate etching process before a hybrid epoxy powder paint is applied. Powder paints contain negligible VOC concentrations, less than 3% by weight. During the curing process of the paint, the VOC concentrations are driven off. Thus, the finished powder paint products would emit no significant quantities of VOC once installed.

Locks

- Locks are standard and feature a high-security double-bit design, keyed different and core removable.



High Tech Lectern by Nucraft



The wood

- All Nucraft veneers are carefully selected for uniformity of color and grain. Still, wood is a natural substance, and minor variations may occur due to its own uniqueness. Because of this, the furniture you receive may not be an exact match to our samples.

Design

- Modern and efficient in design, the High Tech Lectern is a presentation centerpiece. A/V and video equipment are seamlessly hidden within the case. The lectern includes a lock and standard 19" wide equipment racks, which can accommodate up to six rack units.



6 Benchwork

6-1 Laboratory benchwork

This section includes benchwork to furnish Class Labs and Research Labs. A variety of bench types can accommodate dry and wet labs, and the selected finish shall support the requirements of the subject matter.

Laboratory tables and workstations by LabTech supply company



Options include:

- Custom drawers or cabinets
- Vibration dampening
- Adjustable leg options
- Chemical resistant surfaces
- Keyboard pullout trays
- Enclosures with cooling fans
- Sound isolation
- Cable management
- LDC arms
- mobility options
- Custom design if required



Laboratory workbenches by LabTech supply company



Finish options include:

- High pressure laminate
- Epoxy resin
- Butcher block
- Phenolic resin
- Stainless steel
- High density polyethylene
- Custom design if required



ESD workbench by LabTech supply company



Options include:

- Leg adjustability 30"-36"
- ESD wrist straps
- Drawer options
- Risers with integrated outlet in panels
- Overhead lighting
- Upper shelves
- Custom applications are available



7

This section has been left intentionally blank.

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8 Storage + Casework

The selected storage provides mix and match alternatives for private, shared and open offices. Office hierarchy determines the Tier for the storage units. The selection includes storage for private, shared and open offices.

8-1 Office

Canvas Private Office (Private)

By Herman Miller



Configuration

- Customizable configuration, Canvas Private Office collection offers a variety of storage units that can be mixed and matched to accommodate the user's needs and space layout.

Power and Data

- Power and Data can be accessed at the work surface or inside lower storage.

Colors

Table Top



Oak on Ash



Medium Matte Walnut



White

Frame/Base



White



Graphite



THINK

Canvas Private Office (Shared/Open) By Herman Miller



Configuration

- Haven 022, Haven 005

Power and Data

- Power and Data can be accessed at the work surface or inside lower storage.

Colors

Table Top



Maple



White

Frame/Base



White



Canvas Storage (Shared/Open) By Herman Miller



Configuration

- Powered Low Credenza or Stanchion Low Credenza to support worksurface. Screen (optional).

Power and Data

- Power and data can be accessed directly in Canvas Storage through an eight-wire, four-circuit shared neutral system

Colors

Table Top



Clear on Ash



White

Frame/Base



White



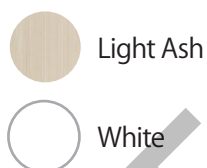
8–2 Classroom

Anchor By Knoll

Anchor is a preconfigured collection of user-friendly storage that addresses an individual's organizational needs in the changing workplace and classrooms. The broad scope including credenzas, pedestals, work surface stackers, towers and lockers features a neutral aesthetic and key dimensional alignment.

Offered in a variety of configurations including all-open, fully enclosed, or a blended solution of open and door/drawer configurations, Anchor provides a balance of accessible and secure storage. The collection is an ideal individual storage solution for focused, shared and team settings, or for storage needs in group settings outside of primary classrooms.

Colors Table Top



Frame/Base



Calibre By Knoll



Calibre provides a series of modular elements that can be combined to accommodate different classroom and class lab needs.

Add on modules enable the user to combine sliding drawers and cabinets with hinged doors to customize the storage to the required need.

Colors
Table Top



Frame/Base



8-3 Mixed use

TS Series Storage By Steelcase ●●●

TS Storage offers a line of pedestals, bins and shelves, lateral files, towels, and lockers.

Options offer fixed, mobile, slim and hinged top versions
Drawer heights include personal, box and file proud fronts.

Storage units feature contemporary, handle, ledge pull
Cushion top or additive cushion locking casters or
translucent casters Steelcase Lifetime Warranty.

Colors
Frame/Base



Medium Grey



White



Medium Grey



White



9 Technology

Today's workspace environment is constantly evolving as new technologies enter the workplace. Classrooms and class labs should be designed around the use of these new technologies as they help promote teacher and student success.

9–1 Connectivity and wi-fi

All work areas should will be outfitted with WI-FI. The minimum WIFI density should be 2:1 (devices:user). The units must be enclosed within the ceiling or wall-mount dependent upon room layout and ceiling height access. In addition, there should be Cat 6 Data connections, Wireless Data Network Connectivity, telephone and a Coax Cable Television Connection.

9–2 Audio equipment

Audio equipment is used in classrooms to enhance the capabilities of the instructor among other reasons. There should be fixed microphones installed on the lectern and wireless microphone available where needed. Rooms used for music, film studies or other specialized instruction should be professionally designed for these purposes. Speakers should be placed the front of the room or placed to project sound from the lectern and/or screen. They should also be mounted in or close the ceiling.

9–3 Visual equipment

Visual equipment is used to enhance the learning environment. There are certain guidelines that classrooms should follow to assure the visual equipment is effective.

These guidelines include:

- The number of screens required is based on the seating capacity, the configuration of the room, and the primary instruction style.
- Where possible, ASU recommends angling the screen in the corner of the classroom to both maximize the viewing angle to the audience and increase free whiteboard writing space. Angle-mounting the screen must typically addressed in building planning stages since it usually requires detailing reflected ceiling plan to address ceiling grid and lighting. If angle-mounting the screen is unfeasible, screen placement should still remain opposite from the teaching station area on the teaching wall to maintain whiteboard surface. (Please see Figures 1 and 2). Ceiling height is also critical when planning the layout of a Classroom.



- The higher the ceiling, the larger the screen and image size it can accommodate. Screens should drop no lower than 48 inches from the floor.
- To calculate the minimum required size of the projection screen or flat panel display the following criteria is used:
Minimum distance to front row = 1.5x the image width
Maximum distance to back row (furthest viewer) = 6x the image size (5x is recommended)
- If the 1:6 (image height = 1/6 distant to furthest viewer), cannot be met given limited ceiling height or environmental obstructions, additional projectors/screens or flat panel displays will be required to provide an adequate viewing experience for all audience members.
- Flat panel displays must meet mounting requirements consistent with Digital Signage applications (section 4.7 above)
- All projection screens must be tab-tensioned with aspect ratios of 16:10 to accommodate high definition format.
- Screens shall be ordered with the LVC (Low Voltage Controller) controller for use wall plate controller and/or integration with 3rd control systems solutions.

9–4 Interactive technology

Learning environments are becoming more advanced with the use of technology. Classrooms should incorporate these technologies by being designed to control all the audio-visual equipment and control lighting, blinds and other devices where needed. To improve ease of use, there should be standardized color touch panel screen layouts and clearly labeled buttons for rooms without touch panels. Lastly the classroom should be design for flexibility of adding new equipment and upgrading equipment.