

Olin College
Facilities, Equipment, and Other Resources

Laboratory:

COMPUTER LABORATORY: the main computer laboratory is located on the ground floor of Milas Hall and is open to students 24/7. The laboratory houses workstations, several poster printers, and equipment for AVID video and audio editing.

ADVANCED COMPUTING LABORATORY: consists of several high performance workstations, a high-capacity file and web server, a centralized backup server, and supporting network and power infrastructure.

EMBEDDED COMPUTING LABORATORY: consists of a wide range of alternative computing systems, from reconfigurable devices such as field-programmable gate arrays (FPGAs), to digital signal processors (DSPs), to embedded microcontrollers. Leveraged by students for courses and independent projects and faculty research.

LIFE SCIENCES LABORATORIES: utilized for research and teaching in the areas of biology, bioengineering, biophysics, microbiology and genetics. Each faculty member who pursues research has approximately 250-400 square feet of dedicated research space. The labs are equipped with standard features such as “house” gas, air, vacuum supply, sinks, safety showers, bench and cabinets.

MATERIALS SCIENCE AND APPLIED CHEMISTRY LABORATORIES: support a number of chemistry, materials science, and engineering courses and support the SCOPE design projects, and a variety of materials- or chemistry-related independent study and research projects.

ELECTRICAL AND COMPUTER ENGINEERING LABORATORIES: state-of-the-art suite of equipment available for use by students in a variety of required and elective courses and individual projects.

THERMAL FLUIDS LABORATORY: the centerpiece of the Thermal-Fluids Laboratory is the open loop wind tunnel with a removable test section (area is 1 square foot) and a top speed of 100 mph. Accessories include a converging-diverging test section, a heated flat plate model, a pressure cylinder model (both rotating and stationary), a smoke generator, pitot tube, pressure rake, pressure transducers, thermocouples, a thermocouple welder, and a number of student designed demonstration models for class use. There is also a dedicated data acquisition computer with LabView and National Instruments data acquisition card.

MICROFLUIDS LABORATORY: The microfluidics lab has all the equipment needed to post-process and fabricate PDMS based microfluidic devices.

DYNAMICS AND CONTROLS LABORATORY: two Educational Control Products experimental systems for use in linear systems and feedback control courses such as *Dynamics* and *Controls*. The two experimental systems are specifically designed for classroom experiments focusing on engineering fundamentals. One experiment is the Model 205 torsional plant (angular inertia and rotation) and the Model 210 rectilinear plant (inertia and translation). Students perform essentially identical experiments on each system exploring explore linear systems (time-response, frequency-response, model-experiment comparison, degrees-of-freedom) and simple control design (time-domain and frequency-domain feedback on lumped parameter systems).

ROBOTICS LABORATORY: To support its robotics courses, Olin maintains an inventory of National Instruments Compact RIO computers, I/O devices and over 25 licenses for student use. These are used in conjunction with a variety of cameras for vision experiments, stepper motors, servo motors, brushed and brushless motors for control experiments, as well as acoustic and IR sensors for obstacle sensing experiments. In addition, Olin maintains two high-resolution (centimeter-accuracy) GPS systems, a robotic John Deere Gator, two autonomous surface vehicles (kayak and twin-hull), an industrial-grade ROV, a tri-wheel UGV, 6 small tracked UGVs and 9 quad copters of differing payload capacities and sensing capabilities.

INTELLIGENT VEHICLE LABORATORY

Olin College’s Intelligent Vehicle Laboratory, overseen by Dr. David Barrett, is a four-bay shop building which provides work and garage space for projects ranging from John Deere Gator-sized vehicles to autonomous agricultural equipment. The IVL also has space for welding and fabrication and a ventilated bay for painting vehicles. Also contained in the IVL is a 20’ test tank for scale prototype underwater vehicles and propulsion systems, and a fully-equipped composite hull fabrication facility for building custom unmanned surface and underwater vehicles.

Computer:

All faculty and staff are provided with workstation or laptop computers. Students are required to purchase a standard

laptop computer. The College provides loaner laptops to ensure that students are not disadvantaged through downtime of their own laptops. A computer lab on campus provides additional access and specialized software and printing capabilities. The college maintains a laboratory with high-end computers for computationally intensive work. The Information Technology department maintains licenses for a variety of software such as MATLAB, Simulink, SolidWorks, COSMOSWorks, Comsol Multiphysics, Maple, ANSYS, and Cadence PSpice.

Office:

All faculty have individual office space (approx. 150 sq. ft.) with complete office resources and administrative staff support.

Other:

The College has a 34-acre outdoor robot test track, the largest on the east coast, with a variety of terrains including hills, meadow, scrub forest, marsh, rocky slopes, a boulder field, and simulated agricultural areas.

MAJOR EQUIPMENT

SPECIALIZED EQUIPMENT FOR LIFE SCIENCES RESEARCH AND TEACHING: Leica SP5 Scanning Laser Confocal Microscope and associated accessories (1), Shimadzu gas chromatography (GC), Waters High Pressure Liquid Chromatography (HPLC) machines, anaerobic bacterial cell culture chamber, Nikon Eclipse TS100 phase-contrast inverted microscope with fluorescence capability and attached camera (1), light microscopes (3), histology microtome and plate heater (1), video microscopy camera (1), lyophilizer (1), high resolution analytical balance (1), Biotek Synergy 4 Plate Reader.

For a complete list of Olin equipment, see attached equipment list.

OTHER RESOURCES:

Provide any information describing the other resources available to the project. Identify support services such as consultant, secretarial, machine shop, and electronics shop, and the extent to which they will be available for the project. Include an explanation of any consortium/contractual arrangements with other organizations.

DESIGN STUDIOS: the design studios provide a specialized environment for engineering students to learn and practice design and are similar to the studio spaces commonly available to students in architecture programs. These rooms provide space for 75 Olin students as well as 15 cross-registered students per semester. The studio spaces are fully configurable to meet the needs of individual and team design projects as well as the different needs of different design courses. The rooms are equipped with a full complement of modeling and prototyping tools and equipment as well as full Internet and media capability. The rooms are furnished with design specific furniture including tables, pin-up boards, white boards and storage containers.

MACHINE SHOPS: is divided into Main Shop areas and a Mini-Shop. The Main Shop areas, which are open during the daytime hours, are equipped to handle almost any type of project. The Mini-Shop is available to trained students and faculty from 6:00am-2:00am, 7 days a week.

RAPID PROTOTYPING FACILITY: Olin has extensive rapid prototyping capabilities including two Dimensions 1200 Elite FDM direct parts printing machines, two laser cutters, a waterjet, a shopbot CNC router and a Gluco injection molder.

LARGE PROJECT BUILDING: Olin has a 6800 square foot Large Project Building that consists of 4 high bay project spaces accessible by 14' roll up doors, a dedicated machine shop and an enclosed spraypaint and composites fabrication bay. The space currently contains basic machine tools, a 2000-pound overhead crane, an 18' diameter test pool and a 10 x 8 x 8' painting booth.

MACHINE SHOP EQUIPMENT.

Type	Equipment
CNC Machinery	Kondia Mill W/2 axis Millpower CNC Control Clausing Metosa CNC 17x40 Lathe W/8 Station Power Turret Sharp LMV Mill W/2 Axis Millpower CNC Control Richmond VMC 600 Vertical Machining Center OMAX Jet Machining Center Model 2626/20hp Epilog Legend 32EX 75 Watt Laser Engraver Trotec Speedy 300 Laser Engraver SP300-120W
Manual Metal Cutting Machinery	Bridgeport Mill W/DRO Atlas Milling Machine W/DRO 2VS08 Colchester 15x50 Geared Head Lathe w/DRO Clausing Metosa Lathe W/DRO Model C1545VS Alliant Lathe GH1340A w/DRO Clausing 6x18 Surface Grinder w/DRO
Metal Working/Forming	Acra Sheet Metal Shear FS-F5216 Baileigh SH5210 Hydraulic Shear 48" Baileigh Finger Brake V-412-6 24" Diacro Finger Brake Scotchman Iron Worker 5014-CM Dake 10" Cold Saw Pneumatic/Hydraulic Tube/Pipe Bender Diacro Turret Punch Sheet Metal Notcher Power Nibbler
Ancilliary Equipment	Clausing Kalamazoo Horizontal Band Saw Clausing Startrite Vertical Band Saw Clausing 15" Drill Press Model #1690 Band Saw Blade Welder/Shear/Grinder 230V SM1975/H Ingersoll Rand Air Compressor Model #2475 Bench Grinders Belt/Disc Sander
Welding	Milleromatic 210 Wirefeed Welder Milleromatic 210 Wirefeed Welder W/Spool Gun Miller Resistance Spot Welder Model SSW-1020ATT Miller Coolmate 3 Thermal Arc Prowave 185 TSW Welder Hyper Therm Power Max 600 Plasma Cutter Miller Syncrowave 180 SD Welder
Plastics Molding/Forming	Formech 660 Vacuum Forming Machine Morgan-Press Injection Molding Machine-Model #G-100T Econogrind Slow Speed Granulator ESL180/180
Measuring and Metrology	24" x 36" Starret Precision Granite Surface Plate 81 Piece Precision Gauge Block Set 12" Precision Cylindrical Square Precision Test Indicators Multitude of hand measuring tools

ELECTRICAL AND COMPUTER ENGINEERING EQUIPMENT. Most of the equipment is organized into standard stations. The number of stations (presently around 50) is sufficient for students to work in pairs in all first- and second-year courses, and in groups of 3 to 5 in junior and senior courses. Each station includes:

- A GPC-1850D Triple Output Power Supply
- A GFG-8255A 5 MHz Function Generator
- A Tektronix 3012B 2-channel 100-MHz Digital Storage Oscilloscope

We also have 30 sets of the following station accessories:

- National Instruments USB 6009 Data Acquisition Modules.
- A Fluke Digital Voltmeter
- A Weller WTCPT Soldering Iron

We also have a supply of FPGA / microprocessor / DSP equipment:

- 20 Xilinx FPGA evaluation boards with common peripherals: Digilent D2SB-DIO4 & Digilent S3
- 10 Analog Devices DSP evaluation boards
- 4 Xilinx Virtex2-Pro evaluation boards: Xilinx ML310 & Digilent XUP-V2Pro
- 2 Microchip PM3 Universal Device Programmers for PICmicro microcontrollers
- 12 Microchip ICD2 In-Circuit Debuggers for PICmicro microcontrollers
- 2 Ellisys USB Explorer 200 USB 2.0 protocol analyzers

In addition to these stations, Olin also has specialized gear housed in an electronics prototyping room (accessible 24/7), including:

- A printed circuit board (PCB) prototyping mill
- A Weller WRS 3000 surface-mount rework soldering station
- A reflow oven for soldering PCBs with surface-mount components
- A semiautomatic pick-and-place for populating PCBs with surface-mount components
- A Tektronix Logic Analyzer
- A Tektronix Spectrum Analyzer
- A Digital Impedance Meter
- 10 TDS 3014B 4-channel 100-MHz Digital Storage Oscilloscopes