

Criterion B.6 Facilities

The Engineering Physics program at NMSU provides students with a high-quality infrastructure, including classrooms, laboratories equipped with modern engineering tools, and computer facilities. The laboratory courses are specifically designed to familiarize students with current experimental techniques and instrumentation, as well as develop a better understanding of the fundamental physical principles involved in these experimental techniques.

B.6.1 Classrooms

The NMSU Department of Physics is based in Gardiner Hall, which has three standard-size classrooms, one large classroom, and two theatre-style lecture halls (see Table 6.1). The standard sized classrooms (rooms GN 116, GN 117, GN 118) seat up to 36 students. Each one is equipped with blackboards and pull-down screens for standard overhead and electronic-media projection. The large classroom (room GN 218) is located on the second floor and seats up to 57 students. This classroom is equipped with blackboards, a pull-down screen for overhead projection. A permanently installed projector for electronic media is planned (e.g. Microsoft PowerPoint[®] presentations). The two lecture halls are fully equipped for the effective instruction of large physics and engineering classes. The two lecture halls are connected by a storage room, which houses demonstration materials and equipment. The larger hall (room GN 230) seats up to 130 students. It is equipped with two large fixed blackboards, a multi-speaker sound system, two sliding blackboards and two permanently installed projectors for electronic media and are pointed towards two motor driven screens. These are wired directly to the large demonstration workbench at the front of the lecture hall. There is also an overhead projector present in the lecture hall, which may be pointed at one of the two screens and a large demonstration workbench with sink. It is supplied with power, cold water, compressed air, and gas. There is overhead rigging for the demonstration of many standard physics and engineering concepts. The smaller of the two lecture halls (room GN 229) seats 79 students and is equipped with one fixed blackboard, a multi-speaker sound system, two sliding blackboards, a motor driven screen, and a permanently installed projector for electronic media that is wired directly to the demonstration bench. This demonstration workbench is equipped with a sink. It is supplied with power, cold water, compressed air, and gas.

Gardiner Hall also has a tutorial room (room GN 225), where the students may seek help with their studies. It is staffed by graduate and undergraduate students from the Department of Physics. Also available is a student lounge (room GN 102), where both Physics & EP study groups can gather to do their homework, socialize and have the opportunity to seek help from the more advanced students.

Table 6.1: Classroom facilities in the Department of Physics (Gardiner Hall) available for the EP program.

Room Number	Type	Number of Seats	Equipment
GN 116	Classroom	36	blackboard; overhead
GN 117	Classroom	36	blackboard; overhead
GN 118	Classroom	36	blackboard; overhead
GN 218	Classroom	57	blackboard; overhead
GN 229	Lecture Hall	79	blackboard; overhead; computer projector; workbench
GN 230	Lecture Hall	130	blackboard; overhead; 2 computer projectors; workbench

B.6.2 Instructional Laboratories

Gardiner Hall has three laboratories for introductory engineering physics, GN 108, GN 204, and GN 206. Each laboratory can seat over 20 students. GN 206 is equipped with 8 desktop computers. All labs contain the equipment necessary to run 10 to 12 laboratory sessions for teams of up to four students. Many of the modules used in the laboratories are created for Team-Based Learning.

Gardiner Hall also has six advanced laboratories that are used for undergraduate instruction (see Table 6.2). GN 53 hosts a 4-source Raman Spectrometer. GN 65 contains equipment necessary for radiation source storage, a Compton-Scattering set-up as well as a Hall experiment. GN 66 is equipped with facilities to measure the electronic properties of nanoparticle-doped polymers. Introductory experiments in quantum physics can be done in GN 132. GN 167 is a chemical laboratory equipped for doping nanoparticles into polymers. GN 265 has four set-ups to perform experiments in geometrical, physical and laser optics. Finally, GN 364 has instrumentation to conduct scintillation experiments.

Table 6.2: Laboratory facilities in the Department of Physics (Gardiner Hall) for the EP Program.

Room Number	Used for Laboratory Course	Facilities and Equipment
GN 53	Phys 475	1 <i>Raman in Via Microscope</i> (4-source lines)
GN 65	Phys 475	1 <i>EG&G Ortec Compton-Scattering Apparatus</i>
GN 66	Phys 475	2 Keithley 6487 Picoammeter/Voltage Source devices
GN 108	Phys 214L Phys 216L	8 complete set-ups to run <i>Introductory Physics labs in Electricity, Magnetism, and Optics</i>
GN 132	Phys 315L	4 set-ups to complete <i>Measuring and Error Analysis as well as Counting Statistics</i> 4 set-ups to measure <i>Electron Charge to Mass Ratio</i> 4 set-ups for <i>Atomic Spectroscopy</i> 2 set-ups for <i>Charge of the Electron – Milliken Oil Drop Experiment</i> 2 set-ups for <i>Measuring Planck’s Constant – Photoelectric Effect</i> 2 set-ups for <i>Quantization of Atomic Energy Levels – Franck-Hertz Experiment</i> 2 set-ups for <i>Electron Diffraction</i> 1 set-up for <i>Measuring the Speed of Light</i> 1 set-up for <i>Nuclear Magnetic Resonance</i> 1 set-up for measuring <i>Electrical Conductivity of Metals and Semiconductors</i> 1 set-up for <i>Measuring the Zeeman Effect</i> 1 set-up for <i>Infrared Absorption Spectroscopy – Barnes Spectrometer</i> 1 set-up for <i>Advanced Atomic Spectroscopy – Jarrell-Ash Spectrometer</i> 1 set-up for <i>Rutherford Scattering and the Range of Alpha Particles in Matter</i> 1 set-up for <i>Spectroscopic Determination of the Mass of Deuterium</i>

Table 6.2: (cont.) Laboratory facilities in the Department of Physics (Gardiner Hall) for the EP Program.

Room Number	Used for Laboratory Course	Facilities and Equipment
167	Phys 475	1 <i>Chemical Hood</i> 1 <i>Spin Coater</i> 1 <i>Sonic Mixer</i>
204	Phys 217L	6 complete set-ups to run <i>Introductory Physics Labs in Heat, Light and Sound</i>
206	Phys 213L Phys 215L	8 set-ups to run <i>Introductory Physics Labs in Kinematics and Dynamics</i>
265	Phys 370 Phys 471	4 set-ups for <i>Geometrical, Physical and Laser Optics</i>
364	Phys 475	1 set-up to <i>Measure Scintillation Counting</i>

B.6.3 Computer Facilities

B.6.3.1 Campus Computing and Networking

The facilities for computing and networking are distributed across campus. The Center for Student Computing Services is situated in the Information and Communication Technologies Building. The Center provides NMSU's students and faculty with access to Macintosh and Windows PC systems and software. Additionally, the center manages several general access computer labs at the main NMSU campus. Student computer labs are located in several campus buildings, including Corbett Center, Jacobs Hall, Breland Hall, and Gerald Thomas Hall.

On campus networking is achieved through a campus-wide, high-speed digital data network (NMSU-Net) available to all computer users on the NMSU campus. The network connects the University to the Internet and supports advanced research through the 'Internet-2' high-speed protocol. NMSU-Net allows students and faculty to conduct research, complete homework and class assignments, and communicate in a timely and efficient manner.

B.6.3.2 Computing Facilities in the Department of Physics

In addition to general computer facilities accessible by all NMSU students, the Department of Physics provides students and faculty with access to departmental computer laboratories, infrastructure, and network. The Department of Physics Computer Lab located in Room 264, Gardiner Hall is currently equipped with 14 dual-boot Linux Suse 9.1 / Windows XP computers connected to a central server. The department is planning to purchase a second server and 6 additional personal computers in order to increase the total number of dual-boot Linux / Windows computers in the Physics Computer Lab up to 20. The lab also contains various printers and other peripherals as shown in Table 6.3. The computers located in Room 264 are primarily used for teaching core Physics and Engineering Physics courses. Students enrolled in Physics and Engineering Physics programs also have access to the Physics Computer Lab during off hours and can use these computers to work on course projects and homework assignments

Other computer facilities available to Physics and Engineering Physics students include 8 Windows XP personal computers located in GN 206, 6 Windows XP computers in GN108, and 5 Windows XP laptops in GN 132. The computers located in GN 108 and 206 are designated for teaching Physics Labs, and the laptop computers in GN 132 are used only for Physics.

The Department of Physics building (Gardiner Hall) is connected to the NMSU campus network and Internet through the high-speed NMSU-Net. Commodity internet access throughout the building is provided via the 100 Mbps LAN cable connections and 54 Mbps Wireless Network. Ethernet hubs are available in every room of Gardiner Hall. An internet address space assigned to the local subnet of the Department of Physics building allows up to 512 fixed and dynamic IP addresses, which is sufficient to satisfy all departmental research and educational needs. Wireless network is presently available in laboratories, lecture halls,

and some offices. The department is planning to expand its wireless network and make it available in every room of Gardiner Hall.

Other electronic and digital equipment located within the Department of Physics and used for teaching Engineering Physics courses includes two laser printers, two flatbed scanners, and three digital projectors installed in the main lecture halls (GN 229 and GN 230). The department also has a Kyocera Mita Printer/Copier in GN 256. Plans are underway to install three additional digital projectors in the conference room and classrooms over the next year.

Table 6.3: Computer facilities in the Department of Physics (Gardiner Hall) available for the EP program.

Room	Number of units		Equipment and technical parameters
	Current	Future	
<i>GN 108</i>	0	8	PC: Windows XP, 2.4 GHz, 512 Mb RAM, 60 Gb HD
<i>GN 206</i>	8	8	PC: Windows XP, 2.6 GHz, 256 Mb RAM, 40 Gb HD
<i>GN 263</i>	1	1	Server: Dell, Linux, 1.4 GHz, 512 Mb RAM, 200 Gb HD
		1	Server: Dell, Linux, 2.8 GHz, 1 Gb RAM, 400 Gb HD
<i>GN 264</i>	14	20	PC: Dell, Windows XP / Suse 9.1, 1.6 – 2.0 GHz, 256 – 512 Mb RAM, 20 Gb HD
	1	2	Printer: Laser Jet, HP4200
	1	1	Printer: Laser Jet, HP2100
	2	2	Scanner: Scan Jet HP4300C
<i>GN 218</i>	0	1	Digital projectors / presenters
<i>GN 229</i>	1	1	
<i>GN 230</i>	2	2	
<i>GN 259</i>	0	1	