Suggested Laptop Computers for Incoming Physics Students

Overview & Suggestions

Class of 2029

PURPOSE:

This document outlines suggestions for a baseline laptop that could serve as a model for undergraduate students entering the Physics and Astronomy program in the Fall of 2025.

OVERVIEW:

Below are suggestions for PC and Mac models that incoming first-year students might purchase to enhance their learning experience. Software and applications are also suggested. Where applicable, shareware and other free, web-based sources are identified. Students could bring their laptops to class for use in a given experiment or access the software later for data analysis and reports.

In our University Physics and College Physics classes, students are frequently tasked with utilizing various software. This can involve a range of applications such as Vernier DataLogger, ioLab, and graphing or calculation software such as MS Excel. Bluetooth applications are also necessary for some of these tasks. Reports are often written using MS Word. Presentations frequently utilize MS PowerPoint. Wireless and internet access via RIT Campus Wi-Fi is also helpful. All of this may be part of in-class activities and homework.

2025 PROCEDURE:

The general working approach to this survey was relatively informal. Required applications and PC capabilities are based on the overview of what a given instructor might expect a student to utilize for a given class. Classes were assumed to be those a student would take during their undergraduate career.

A benchmark set of laptops was considered. The desire was to identify something reasonably affordable from the low-to-mid range PC market. Suggested requirements are intended to align well with the intended software products students could be expected to use during the 2025-2029 program window. RIT-based outlets, such as the Digital Den, and outside vendors were all considered.

It was also assumed that this computer purchase would be one-time and that the equipment would be with the student for a 4 to 5 year program. If upgrades were required, those would be modest and feature free or low-cost applications or hardware available to most students. Considerations for ADA utilization, modifications, and ease of use were also included in the search.

SUGGESTED EQUIPMENT 1:
GENERIC LAPTOP RECOMMENDATIONS

TABLE 1: 2025 General Requirements & Specifications

Laptop	Component	Minimum	Recommended	Notes
Generic Capabilities	Processor /Series	11th Generation i7 / AMD equivalent	11th to 13th Generation i7 / AMD equivalent or higher	
	Processor Specs	4 cores, 2 GHZ or higher	12 cores, 3 GHZ or higher	
	RAM	16 GB	32 GB	
	Video	Integrated graphics with high-end CPU	NVIDIA RTX 2/3xxx series, Quadro series, or Ampere series (at least 4 GB GDDR5), or equivalent AMD discrete graphics card	• For integrated graphics (non-card). • Either will provide better battery life
	Storage Drive	512 GB Solid State + External Storage	512 GB Solid State + External Storage – OR – 1 TB Solid State	
	Technical Support / Warranty	1-year Warranty + Accidental Damage. This comes standard with most PC laptop and MAC purchases. RIT students would do well with at least a 1-2 year warranty	4 years ProSupport+ Warranty (includes Accidental Damage Coverage; default for models bought through University Dell Webstore)	
	Operating System	Windows 11 Mac OS 12/Sequoia Note: despite some student enthusiasm, current Linux distributions are not recommended	Windows 11 or Mac OS 12	Note: despite some student enthusiasm for UNIX/ Linux/RedHat, current Linux distributions or hobby installs are **not** recommended

SUGGESTED EQUIPMENT 2: PC Compatible

TABLE 2: 2025 "SoPA Dell" 1, 2 & 3 Model Laptops //
Reference Models are the Dell XPS 9530 14 or 16- inch models

Laptop	Component	Minimum	Rationale	Additional Note
SoPA DELL 1 (reference model)	Memory	16GB, LPDDR5X, 6400MT/s		 DDR5 Memory Stack
	Processor	INTEL Core Ultra 7 (24MB Cache 5.4GHz)		Suitable for active video, graphics, simulations, applets
	Graphics	Intel ARC Graphics	Installed via graphics card firmware	No adapter or software installation required
	Screen	14.5 or 16. 3 FHD+ (1920 x 1200) InfinityEdge Non-Touch Anti-Glare 500-Nit Display Intel(R)		
	Operating System	Windows 11 Home	Windows 11	
	Misc 1	Intel® Killer™ Wi-Fi 6E 1675 (AX211), 2x2, 802.11ax, Bluetooth® wireless card	WiFi & Driver pre-installed	
	Misc 2	Backlit Black English Keyboard		For low-light or lecture settings
	Misc 3	1-SD Card slot		Suggested for additional storage
	Misc 4	3.5mm combo jack		
	Misc 5	Ports	3 Thunderbolt™ 4 (USB Type-C™)	Used for some peripheral equipment for in-class labs (Arduino, Raspberry Pi, M2K, Analog Discovery 2)
	SoPA Dell 1	Link Dell XPS 14		$1499
	SoPA Dell 2	Link Dell Latitude 3450		$1210
	SoPA Dell 3	Link Dell XPS 16 Laptop		$1399
	Avg Price:	$1370		**Avg price based on features selected for two standard models**

As this type of hardware and the component vendor(s) can be somewhat generic, it may be assumed that the hardware in Tables 1 and 2 are identical or relatively similar in performance and cost. These components are driven by industry standards and IEEE specifications, so there is limited variation.

SUGGESTED EQUIPMENT 3: Apple MacBook Air & Pro

TABLE 3: SoPA MAC 1 & 2 Model Laptops // Reference Apple MACBook Brand

SoPA MAC-1	SoPA MAC-2	Notes
Apple MacBook Air	Apple MacBook Pro	Uses macOS Sequoia. Comes with standard MS Office Suite. The MacBook offers speed with affordability.
 ~15″ Retina display M4-core CPU with 4 performance cores and 6 efficiency cores • 8-core GPU • Hardware-accelerated ray tracing • 16-core Neural Engine • 120GB/s memory bandwidth Media Engine • Hardware-accelerated H.264, HEVC, ProRes, and ProRes RAW • Video decode engine • Video encode engine • ProRes encode and decode engine Link	~16.2-inch Liquid Retina XDR display  ~4-Core CPU ~20-Core GPU ~24GB Unified Memory ~512GB SSD Storage ~16-core Neural Engine ~Qty 3 Thunderbolt 5 ports ~HDMI port ~SDXC card slot ~headphone jack ~MagSafe 3 port • Magic Keyboard with Touch ID • Force Touch trackpad • 140W USB-C Power Adapter Link	Students familiar with MAC will have no problem using these. There may be some compatibility issues with aspect ratio when using these with overhead projectors for presentations, but nothing that cannot be mediated. There are two recommended add-on desktop kits for expanded usage or ADA adjustments. Macs are Bluetooth compatible. All systems feature Apple Intelligence
Est. Price: $1399	Est. Price $2499	

SOFTWARE & SUNDRIES:

Below is a listing of software and applications that a Physics or Astronomy undergraduate might use during their career at RIT. These applications are based on feedback from instructors. Most of this software is actively used in the workshops or as part of data analysis that is completed after a given experiment.

As a community, RIT does a very good job providing applications for student use. Many instructors expressed concern over offering students costly software. In all cases faculty tend to promote and utilize shareware or software that is available to students, for free, via the Creative Cloud and the RIT Software Center.

All of the applications in Table 4 are used in our classrooms. The five suggested laptops would work well with these applications. Students could run this software on their laptops during or after labs and activities.

TABLE 4: Software utilized as part of SoPA instruction

Software	Source & Cost	Cost*
MS Office Home & Student Suite	Included in cost of PC purchase	$80
MS OneNote	MS365 family of products. Allows 1TB storage per contract	~ $70 per year
Overleaf/LaTeX Editor		$17/month for Personal license
Python	Anaconda / shareware	free/shareware including via RIT and online-python
ioLab	MacMillan Publishing	Free to students in our classes or via web emulator
Arduino	Arduino website	Shareware/free/web emulator
Vernier Logger Pro	Used with course instrumentation in CP1, CP2, UP1, UP2, and as demonstrations in other settings	Free to students in our classes or via web emulator
Scopy	Analog Devices	Free with hardware provided by SoPA for in-class use
Waveforms	Digilent	Free with hardware provided by SoPA for in-class use

CONCLUSIONS:

The listings and brands are recommendations only. Overall, it is encouraged that students begin their careers with RIT well-equipped to succeed in their classes. Representative machines with state of the art components offer a good mix of memory and speed that will allow access to a range of applications. If students wish to pursue the purchase of different models, the specification listing in Table 1 would serve as a good guide.

Software and teaching tools may be expected to evolve, and are likely to do so across a 4-5 year time span. Bluetooth compatibility and access via your laptop is strongly recommended. Laptop specifications are suitable for any new software an undergraduate would be expected to use. A laptop with the listed capabilities would also be able to utilize newer versions of the software listed in Table 4. Internet access for Zoom meetings and on-line resources such as web emulators for code (online-Python, ioLab, GitHub) should also be kept in mind when selecting a laptop model.

The great caveat to this report is the balance of costs and need for an individual student. The purchase of a dedicated laptop that a student can use across 8 to 10 semesters, plus additional work for clubs, seminars, and co-ops, is a significant financial commitment.

Prices may also be subject to market volatility: vendor, production levels, supply chain issues, and seasonal demand. If a student and their family wished to purchase another brand or a used system that is their choice. The specifications outlined in this document for memory, speed, and support equipment should be kept in mind as the student looks for resources to make their undergraduate career a success.

Consider your investment in a PC or Mac as part of your journey at RIT. In addition to the day-to-day requirements of your coursework, explore what these seemingly mundane yet quite sophisticated computer systems can help you achieve. There are remarkable shareware communities on campus, nationally, and internationally. And a growing community of Makers and IoT enthusiasts are quite welcoming to people of all skill levels. Computing and programming challenges are not just fun, but an excellent way to expand your skills and resume.

We wish you every success in your career at RIT and welcome you to our Tiger community!