

Master of Urban and Regional Planning Program

TECHNOLOGY GUIDE

Fall 2022



University of Colorado **Denver**



CU IN THE CITY

WELCOME

ABOUT THIS GUIDE

Dear MURP students,

Welcome to the Master of Urban and Regional Planning program at CU Denver! We want your MURP experience to get off to a great start, and that includes being prepared from a technology perspective. Therefore, we've developed this MURP Technology Guide to give you the information you'll need to be well informed about the technology resources available to you at CU Denver, the computer hardware and software requirements for MURP students, plus technology-related suggestions so that you can "hit the ground running" when classes begin and remain successful throughout your time in the program.

This Guide includes the following sections:

- **Overview:** How we integrate technology into the MURP program and what we expect from you.
- **Facilities:** Tech infrastructure at CAP and CU Denver to support your planning education.
- **Online Resources:** Links to the online resources you'll use as a MURP student.
- **Software:** A rundown of the various computer applications you'll use in the planning program.
- **Hardware:** Recommendations for what to look for in a good laptop computer.
- **Security:** Requirements for staying secure when using technology at CU Denver.

We have tried to make this MURP Technology Guide as comprehensive as possible, so when you have a technology-related question, please check here first. But if you don't find your answer in this Guide, please reach out to me, other Planning faculty, or a CAP or CU Denver staff person and we will do our best to help you out.

Sincerely,



Ken Schroepfel, AICP
Assistant Professor CTT
MURP Technology Coordinator
Department of Urban and Regional Planning



OVERVIEW

ROLE OF TECHNOLOGY IN PLANNING

Like most professions, planning relies upon technologies of various kinds as critical tools across virtually all aspects of the field.

- Planners use geographic information system applications like ArcGIS and CityEngine to analyze and display spatial attributes of the built and natural environments.
- Planners use programs like Word, InDesign, and PowerPoint to create documents and presentations that are effective in communicating to different audiences.
- Planners use applications like Photoshop, Illustrator, and SketchUp to create compelling images and exhibits that communicate graphically.
- Planners use programs like Excel, Tableau, and RStudio to crunch numbers, manage data, and perform statistical analysis.
- Planners use technologies like Zoom, Microsoft Teams, and Outlook to communicate with other planners and with the public.
- Planners use GPS and various mobile apps and digital tools for gathering and processing data in the field or remotely.

Because the MURP program is based on the principle that you benefit from experiential learning and engaging with the world around you, like your comrades in the profession, you must also become comfortable with, and competent in, the use of a variety of planning technologies.

However, while the use of technology is common in planning, it doesn't mean that you must become an expert in every computer application used in the profession. Some planners use technology more than others, and the skill level you should have in any particular computer application will depend upon the type of planning you do and your specific role within a planning organization or project team.

As you are unlikely to know these future employment conditions with much certainty, we recommend you take a broad, diversified approach toward learning planning technologies while in the MURP program. The Planning faculty's recommendation for "how much technology to learn" while studying planning is shown in the box below.

Gain enough knowledge of, and experience in, a wide range of computer applications commonly used in planning to be generally competent in each. Then, if you have the interest, aptitude, or opportunity to deepen your expertise in a particular application or two, go for it.

EXPECTATIONS OF MURP STUDENTS

Keep in mind that, despite their ubiquity and importance, computer applications and other digital technologies are *tools* for helping planners do their jobs; they are a means, not an end. Here are our expectations of students regarding learning and using computer technologies while in the MURP program:

- We require you to possess your own computer during your time in the MURP program. Most students choose a laptop.
- We expect you to be familiar with the technology resources and policies for the MURP program, College, and University. This Guide should help you do that!
- We understand that for some students, learning about and working with new computer applications may be a challenging and stressful situation. Nevertheless, we expect you to approach the situation with an open mind and a willingness to learn new technology knowledge and skills. The Planning faculty and College and University staff are here to help you do that.
- We expect you to help your classmates learn and use planning technologies and, conversely, to be willing to learn from your classmates' technology knowledge and experiences.
- We expect you to conduct yourself in a professional manner in their use of computers and technologies. That means, for example, handling equipment with care, being vigilant about security, and saving and backing up your work on a frequent basis.
- We expect you to be fully prepared for every class, and that includes the first day of the semester. Fully prepared means having a computer in good condition, all relevant software installed and functioning, having access to the internet and cloud resources, and having critical accessories like power cables and adapters.

If you have any questions about what is expected of MURP students from a technology perspective, don't hesitate to ask any Planning faculty member.

MURP TECHNOLOGY CURRICULUM

The MURP technology curriculum is integrated into the overall MURP curriculum and consists of introductory instruction embedded within the Planning Practice and Technology core course that students typically take in their first year, technology-focused elective courses, and general elective courses that include instruction in other specialized planning-related technologies.

The exhibit to the right illustrates how the MURP Technology Curriculum is designed as an integral component of the overall MURP curriculum.

Introductory Technology Instruction: Year 1 – Fall

URPL 5010 – Planning Methods

Data Management, Analysis, and Visualization

- Microsoft Excel
- Tableau

URPL 5030 – Planning Practice and Technology

Visual Communication and Graphic Design

- Adobe Illustrator
- Adobe Photoshop
- Adobe InDesign

Cartography and Geographic Analysis

Spatial Modeling and Illustration

- Esri ArcGIS Online

- Trimble SketchUp

Through the introductory instruction provided in these courses, you will gain enough exposure in each application to understand its basic functions and features and the application's general workflow.

Planning Technology Electives

The MURP program offers several technology-related elective courses that students who seek to advance or expand their technology competency may take as part of the MURP program's Self-Directed Elective Curriculum. Additionally, students may identify a technology-focused course that is offered outside of the MURP program and request it be approved as a MURP open elective.

URPL 6250 – GIS for Urban Planning

Students with little to no experience with Esri's powerful desktop application, ArcGIS Pro, are encouraged to take GIS for Urban Planning as an elective, preferably in their first year. Offered annually in the fall and summer semesters.

URPL 6260 – Advanced Geospatial Methods

Students seeking greater competency in ArcGIS Pro are encouraged to take Advanced Geospatial Methods, which covers advanced topics such as geostatistics, network analysis, and automated GIS processes. Offered annually in the spring.

URPL 6265 – Visualization for Planning

Picking up where the introductory instruction in Planning Practice and Technology ends, Visualization for Planning provides intermediate-level instruction in Adobe and SketchUp. Offered annually in the fall and summer semesters.

URBN 6675 – Advanced Visualization for Urban Design

Offered by the MUD program and available as an open MURP elective, Advanced Visualization for Urban Design picks up where Visualization for Planning ends with advanced-level instruction in Adobe and SketchUp. Offered annually in the fall.

FACILITIES

CAP COMPUTER LABS

Boasting 50+ software-packed computers (PCs and Macs) with a full print center, the College of Architecture and Planning's two Computer Labs provide you with one of the most productive computing environments anywhere at CU Denver.

LOCATIONS, HOURS OF OPERATION, AND ACCESS

There are two computer labs in the CU Denver/CAP building at 1250 14th Street—Room 460 and Room 500—both just off the elevators on the 4th and 5th floors.

Students have 24/7 access to the Computer Lab Room 460 where the Help Desk and Print Center are located. During the spring and fall semesters, Computer Lab Room 460 is staffed the following hours:

- Monday through Friday: 8:00 AM – 8:00 PM
- Saturday and Sunday: 10:00 AM – 6:00 PM

The hours of operation for Computer Lab Room 500, which is unstaffed, are:

- Monday through Friday: 6:00 AM – 8:00 PM
- Saturday: 7:00 AM – 5:00 PM
- Sunday: Closed

A valid, encoded Student ID is needed to access both of the CAP Computer Labs. Card encoding can be done at the front desk on the 2nd floor of the CU Denver/CAP Building. Each semester the card access changes based on a student's current enrollment status. For CAP-related information technology questions, please email cap.it@ucdenver.edu. For university-related information technology issues (like user name/login credentials), please visit the Office of Information Technology [website](#).

EQUIPMENT AND FEES

The CAP Computer Labs provide the following equipment:

- Over 50 high-performance desktop workstations (PCs and Macs) each with dozens of applications appropriate for CAP students
- Laser printers: B&W, 8.5" x 11" and 11" x 17" formats – no cost
- Laser printers: Color, 8.5" x 11" format – \$0.25 per side

- Laser printers: Color, 11" x 17" format – \$0.50 per side
- Large format scanner (B&W or color) – no cost
- Large format Océ ColorWave 500 printer/plotter: Toner-based color, 20 pound paper, available in 18", 24" and 36" paper roll widths. \$0.30 per square foot—good for line work drawings, quick prints and drafts
- Several large format HP DesignJet printer/plotters: Ink-based color, 36 pound paper, 42" paper roll width. \$1.00 per square foot—good for best-quality prints

CAP COMPUTER LAB RULES

- Eating or drinking is not allowed in the computer lab. Please leave food and drinks outside the door. There is a break room located on the third floor and a student lounge on the fourth floor.
- Turn off cell phones in the lab. Loud rings and personal conversations should take place elsewhere. Please respect others using the lab.
- Access to the computer lab requires an encoded student ID card. It is important to carry your student ID with you at all times when on campus. Please do not prop the computer lab door open.
- Always save your work to portable media or to the cloud. The lab computers are not to be used as a place to store files. Computers in the lab are often rebooted and during this process all machines are reset and user data is cleared.
- Please be considerate of others. If a machine has been vacant for more than 15 minutes it is assumed to be free for use.
- Please do not use the scanning stations for general computer work. Leave them open for the students that need to scan.
- When class is in session in Computer Lab Room 460, students not enrolled in the course should use Computer Lab Room 500.
- When finished, always log off. This is a security measure to protect your privacy. Logging out clears the cache and resets the computer, freeing up resources.
- Due to legal issues, software from unauthorized sources cannot be installed on Lab computers. This includes digital camera software.

Mike Harring is the CAP Information Technology Manager. Please reach out to Mike with any questions or issues at cap.it@ucdenver.edu.



FACILITIES

CU DENVER WIFI NETWORKS

While on campus, you will need to connect to the CU Denver wireless (WiFi) network to gain internet access and to connect to cloud-based resources like your CU Denver OneDrive folder. To get started, you must have a computer running Windows 10 or 11, or macOS, and a wireless card or built-in wireless device.

The hardware and software for the wireless device must be installed prior to configuration. The network configuration can only be done within the areas that wireless signals are present. Additional assistance can be accessed through the Information Technology Services help desk at 303-315-4357.

There are two CU Denver wireless networks. One is named “CU Denver Guest.” This is an unsecured/open network and should not be used by students. The other wireless network is named “CU Denver” and will have either a padlock symbol or the word “Secured” next to it. This is the password-protected WiFi network that you should use while on campus.

To log in, select the CU Denver Secured wireless network from the list of available WiFi networks on your laptop or mobile device and, when prompted, enter your university user name and password credentials.

CU DENVER FAST LAB

The Facility for Advanced Spatial Technology (FAST) Lab forms the core of geospatial teaching activity at the University of Colorado Denver. This multidisciplinary teaching laboratory provides state-of-the-art GIS technology, including: ESRI ArcMap, ArcGIS Online, ArcGIS Pro, open source GIS software and database management systems, and remote sensing software. More information about the FAST Lab and access requirements can be found at: <https://clas.ucdenver.edu/fast>. The FAST Lab is located on the 5th floor (Rooms 5032 and 5033) of the North Classroom Building (southwest corner of Speer and Larimer) on the Auraria Campus.

CAP VISUAL RESOURCES CENTER

CAP's Visual Resources Center (VRC) provides various photography and audiovisual services and multi-media resources like image scanning, photography training, and loaning out digital cameras and other audiovisual equipment. The VRC's Portfolio Photography Studio in Room 420 is available for students to reserve. For more information, visit the VRC [webpage](#) or contact Jesse Kuroiwa, VRC Multi-Media Production Program Manager at: jesse.kuroiwa@ucdenver.edu

CAP COMPUTER LAB PRINTING REQUIREMENTS

With high demand for the use of the CAP Computer Lab printers, please follow these requirements to make the process quick and easy for everyone:

- **Print To PDF.** Don't “save as” a PDF but “print” to PDF instead. By printing to PDF, the file is as small as possible (and prints much faster) without sacrificing quality. You must have Adobe Acrobat Pro installed on your computer. Windows users, select File > Print and choose “Adobe PDF” from the Printer drop-down box. Mac users, select File > Print, click on “PDF” from the small drop-down box at the bottom, and then select “Save as PDF.”
- **Check Your File Size.** Standard board/poster sizes should be less than 5 MB. Even the largest board/poster sizes shouldn't be more than 20-25 MB. Using numerous photos or contour maps will inevitably lead to bigger files, but this is fine as long as you print to PDF.
- **Keep Image Resolutions Reasonable.** Your final boards/posters (and any images you use in them) should never be higher than 300 dpi. Use smaller resolutions if they still look acceptable, as this will greatly decrease file sizes and printing times.
- **Check Maximum Poster Dimensions.** The color plotters use 42” wide paper, but only have a printable area of 41”. Keep at least 1/2” margin on each side to ensure nothing gets cut off. The Océ ColorWave 500 plotter uses 18”, 24”, and 36” paper and the same margin rules apply. In both cases, maximum length is 120”.
- **Check Your File Type.** We accept PDF files only—no exceptions. Other file formats take too long to print.
- **Submit And Pay For Your Print Job.** CAP uses PaperCut, an online service that allows students to pay for printing or plotting in the CAP Computer Labs. To learn how to access and use PaperCut, enrolled students should: 1.) Log in to Canvas. 2.) On your Canvas dashboard, select CAP: Labs + Information. 3.) Go to the Modules section, find the module called CAP Computer Lab, and select the PaperCut Training courses.



ONLINE RESOURCES

MURPspace



MURPspace is the Microsoft Team used for communication and engagement between Planning faculty and students. MURPspace is organized into channels where conversations take place and files are stored related to the channel topic. The MURPspace channels reserved for announcements from Planning faculty include:

- Funding Opportunities: Open TA or RA positions, funded competitions, internal and external scholarships and fellowships.
- MURP Curriculum and Advising: Program requirements and policies, course updates, academic advising, dual degree/certificate programs.
- MURP Meetings and Events: Upcoming meetings, events, and activities taking place within MURP/CAP/CU Denver.

Channels for both students and faculty to initiate conversations include:

- MURP Alumni Association: Conversations about issues, activities, and events related to the MURP Alumni Association.
- Student Orgs – APAS, Planners Network, WTS: Channels reserved for APAS, Planners Network, and WTS organization announcements.
- Topics (Multiple): Conversations about ideas, trends, interesting articles, etc. relating to multiple planning-related topics.
- General: Introductions, general Q&A, and other miscellaneous conversations that don't fit into any of the other channels.

IMPORTANT! MURPspace NOTIFICATION SETTINGS

To ensure prompt notification of MURPspace messages, click on the three dots to the left of your Teams profile in the top right corner of your screen, click on **Settings** and then adjust the following:

- GENERAL: Under **Application**, check "Auto-start application" and "On close, keep the application running"
- NOTIFICATIONS: Under **Appearance and sound**, choose "Teams built-in" for the notification style. Under **Teams and channels**, click on the Custom box and from the list choose "Banner and Feed" for the first four options.

CANVAS



Canvas is CU Denver's online Learning Management System that provides a virtual classroom for students and instructors to share resources, exchange ideas, submit homework, assign grades, download files, and dozens of other activities relating to a particular course. Your instructors will utilize Canvas to some degree as part of conducting and

managing their courses. This is particularly true for the MURP courses that are taught by the full-time Planning faculty. Therefore, you should familiarize yourself with Canvas before the semester begins.

Students with university credentials can access their courses on Canvas at <https://ucdenver.instructure.com/> or by using the "Quick Links" button in the top right corner of the CU Denver home page. Your courses will appear on your Canvas dashboard after you have finished registration with the Registrar's office.

If you log in before the instructor has published the course, you won't be able to view any of the course content. Once your instructor publishes the course, you will be able to view all of the various pages, modules, assignments, and other components of Canvas that your instructor has decided to use for the course that semester. If you log in and a course has not been published yet, you can still view your profile, upload a profile photo, investigate and adjust your user settings, and poke around the main parts of Canvas.

While students can access a course on Canvas after its semester has ended, some functions within a completed course may no longer be available; therefore, it is a good idea to download all of the files and other resources available for the course from Canvas before the semester ends to preserve an offline archive of your course materials.

There is a handy Canvas app that works great on mobile devices. Download the Canvas Student app for iOS from the [App Store](#) or for Android at [Google Play](#).

CU DENVER OIT

The University's [Office of Information Technology](#) is the go-to source for questions relating to your University email account, user name and password, problems logging on to UCDAccess or Canvas, questions about downloading or installing hardware, multifactor authentication, and any other IT services not directly related to CAP or the MURP program. CU Denver OIT is easy to reach through their Service Desk Support via phone, chat, or email. Below is a screenshot from the OIT website showing the many ways to reach them.

Service Desk Support



Phone Support

303-724-4357 (4-HELP from a campus phone)

7:30 am to 5 pm, Monday through Friday



Chat Portal

[Start chat](#)

8 am to 5 pm, Monday through Friday



Self Service Portal

[Submit a ticket](#)

Access the OIT Service Center anytime!



Walk-up Support

Please call for assistance.

UCDAACCESS

UCDAccess is the main web portal where you access important online resources such as searching for and enrolling in courses (registration, drop/add), financial aid (view/accept financial awards, provide notice of external scholarships), billing (pay your tuition, set up a payment plan), and more. A fast way to get to [UCDAccess](#) is by going to the CU Denver home page (ucdenver.edu) and clicking the "Quick Links" button in the top right corner. Below are the links available in the Student Center (first tab on the left) after you've logged in with your university credentials.



Academics



Admissions



Advisor



Class Search



Register for Classes



Profile



Student Account



Financial Aid



Tasks - Holds



Tasks - To-Do Items

SOFTWARE

MICROSOFT 365



The Microsoft 365 suite of apps (previously known as Microsoft Office) are common tools used throughout the planning profession. University of Colorado Denver students receive a free student license to Microsoft 365. Your student license includes a combination of desktop apps that you download and install on your

computer, web-based versions that you can use with an internet browser, and mobile apps that you use on your mobile device. In addition to being free, your student license allows you to install your Microsoft 365 apps on up to five PCs, Macs, and mobile devices. Students with University login credentials can download and install their student copy of Microsoft 365 by visiting this [web page](#) at the CU Denver Office of Information Technology.

Important notes:

- Multifactor authentication is required to access the Microsoft 365 apps. See the Multifactor Authentication section on page 11 and the Duo Security section on page 9 to learn more about using the Duo app as part of multifactor authentication.
- If you have a previous version of Microsoft Office installed on your computer (Office 2016, Office 2019, or Office 365), you should uninstall it before installing the new version of Microsoft 365.
- You will want to install the 64-bit version of Microsoft 365 if your computer meets the minimum specifications. For PCs, you should be running the 64-bit version of Windows and have at least 2 GB of RAM; for Apple, macOS 10.13 or later and at least 4 GB of RAM.

While all of the computers in the CAP Computer Labs and the FAST Lab have the Microsoft 365 applications installed on them, it is strongly recommended that you install Microsoft 365 on your personal devices. The apps within Microsoft 365 that you will use most often as a MURP student are profiled in the following sections.

MICROSOFT WORD



Most students use Word for writing papers and other assignments that do not require a lot of formatting, specialized page layouts, or the inclusion of numerous graphics and images. For those more elaborate documents, the best choice would be Adobe InDesign. Word is available in desktop, online, and mobile versions.

MICROSOFT EXCEL



Microsoft Excel is the popular spreadsheet application students use for organizing tabular data, performing calculations, making tables and charts, and other data analysis tasks. For large data sets, Tableau and Microsoft Access are better alternatives. Excel is available in desktop, online, and mobile versions.

MICROSOFT POWERPOINT



Planning students give a lot of presentations while in the MURP program, and the most common tool they use is PowerPoint, which can incorporate multimedia such as videos and audio files and offers many types of animations and slide transitions. PowerPoint is available in desktop, online, and mobile versions.

MICROSOFT OUTLOOK



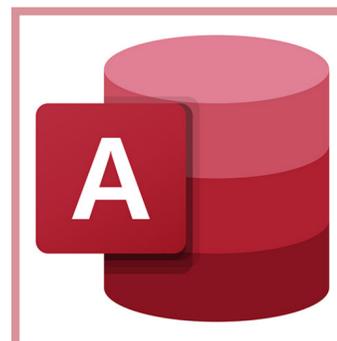
As the official university email client, you should use Outlook for sending and receiving all school-related emails. Students receive 50 GB of mailbox storage, and the integrated Global Address List includes all 25,000-plus CU Denver students, faculty, and staff. Outlook is available in desktop, online, and mobile versions.

MICROSOFT ONENOTE



OneNote is a versatile multi-feature tool integrated with other Microsoft 365 apps for gathering information and recording notes in the form of text, drawings, audio, video, and more, with multiple annotation and sharing functions in a free-form layout and design. OneNote is available in desktop, online, and mobile versions.

MICROSOFT ACCESS



Access is Microsoft's powerful relational database tool for storing, managing, and analyzing large sets of tabular data. Tableau is a more user-friendly alternative with data visualization capabilities. Access is only available as a desktop application, and only for Windows PCs. There is no online or Mac version of Access.

MICROSOFT TEAMS



Microsoft Teams is a unified collaboration and communication platform that includes chat and conversation threads, file storage, and more. The MURP program uses a Microsoft Team called **MURPspace** as the primary way of communicating between Planning faculty and students and among students.

For more on MURPspace, see

page 5. All MURP students are automatically subscribed to MURPspace and you should install the desktop version of Microsoft Teams on your computer and the mobile version on your smart phone to ensure you receive all MURPspace announcements and messages. The Microsoft Teams desktop app can be installed by downloading the installation file from [here](#).

MICROSOFT ONEDRIVE



OneDrive is Microsoft's cloud-based file storage service similar to Google Drive and Dropbox. Each student receives 1 terabyte (TB) of space as part of their CU Denver "OneDrive for Business" Microsoft 365 account—that's two hundred times the storage space of the free version of OneDrive! You can use OneDrive to save all your school files and sync them across all of

your devices and, if desired, share files and folders with anyone with CU Denver credentials. OneDrive is fully integrated with all Microsoft 365 applications and is accessed using your university login credentials and multifactor authentication. OneDrive is available in desktop, online, and mobile versions.

SOFTWARE

ADOBE CREATIVE CLOUD



Adobe Creative Cloud is a bundle of 20-plus apps considered by many people to be the industry standard for the graphic design, visual communication, digital arts and photography, and multi-media professions. Communication is extremely important in planning; therefore, planners and planning students are increasingly required to be

skilled at using a variety of graphical and visual communication tools like the Adobe Creative Cloud applications.

Three of the most popular Adobe Creative Cloud apps—Illustrator, Photoshop, and InDesign—are included in the MURP program's Technology Curriculum, with introductory instruction provided in the fall semester in Planning Practice and Technology, intermediate-level instruction available in the Visualization for Planning elective in the fall and summer semesters, and advanced-level instruction available in the fall in the MUD program's Advanced Visualization for Urban Design.

All of the computers in the CAP Computer Labs include Adobe software; however, it is strongly recommended that you install these Adobe applications on your personal devices for use in the classroom and off campus. The University of Colorado Denver offers current students a free license to the entire Adobe Creative Cloud suite. Instructions for accessing and installing your free Adobe student license can be found on the CU Denver Office of Information Technology's Adobe license [web page](#).

In addition to the suite of desktop apps, Adobe Creative Cloud also includes mobile versions of Photoshop and Lightroom, 100 GB of cloud storage, access to Adobe Fonts, the collaborative Adobe Creative Cloud Libraries, and much more.

Of the 20-plus apps included in the Adobe Creative Cloud bundle, Illustrator, Photoshop, InDesign, and Acrobat Pro are heavily used by MURP students. Students seeking to expand their Adobe expertise may want to consider exploring Premiere Pro and Lightroom.

ADOBE ILLUSTRATOR



Illustrator is the Adobe application you will use to create vector-based graphics, icons, diagrams, and figures of various kinds. Illustrator is also used to add text annotations and other content on top of photographs and imagery to make impactful exhibits that are important components in the planning communication process.

ADOBE INDESIGN



InDesign is Adobe's powerful app used to make report templates and page layouts for digital publishing. You will use InDesign to create professional-quality reports, posters, and other documents that incorporate text and objects originally created in Illustrator and Photoshop as part of an integrated Adobe workflow.

ADOBE PREMIERE PRO



While not covered in the MURP program's Technology Curriculum, Premiere Pro is Adobe's powerful video creation and editing software. Students wishing to create planning-related videos have access to this state-of-the-art tool that integrate seamlessly with other Adobe Creative Cloud applications.

ADOBE PHOTOSHOP



The common use of "photoshop" as a verb reflects the widespread influence this Adobe app has today. You will use Photoshop in many ways, including to edit imagery and other raster-based objects to create "before and after" photo-simulations, design artistic report covers, or simply to crop and straighten a photograph.

ADOBE ACROBAT PRO



The free Adobe Reader allows you to open and read any PDF file, but that's about it. Acrobat Pro is significantly more powerful, allowing you to create and edit PDFs, print to PDF, merge and divide PDFs, make PDF forms, digitally sign PDFs, and more. It's a must-have for planning students and practitioners.

ADOBE LIGHTROOM



While not covered in the MURP program's Technology Curriculum, Lightroom is a useful tool you can use to organize and batch-process photographs into digital libraries. Handy features such as perspective correction, dehazing, and tone and color balance greatly improve overall image quality and aesthetics.

TRIMBLE SKETCHUP



SketchUp is a digital modeling application that allows users to create drawings and renderings of 3D objects and places such as buildings, streets, and public spaces and geolocate them, if desired, at specific points on the planet surface. SketchUp includes an online "warehouse" of additional 3D objects like cars, trees, light poles, and other

physical elements of the natural and built environment for placing within the user's model, as well as applying textures and materials to the surface of drawn objects. SketchUp is increasingly used by many types of planners across the profession.

You will receive introductory instruction in SketchUp in the fall semester in Planning Practice and Technology, with intermediate-level instruction available in the Visualization for Planning elective in the fall and summer semesters, and advanced-level instruction available in the fall in the MUD program's Advanced Visualization for Urban Design course, available to you as an open MURP elective. Trimble offers several versions of SketchUp:

[SketchUp Free](#) is the free public version of SketchUp. It is solely a web-based online app. Therefore, it offers the benefit of accessibility from any internet-connected computer, but it also has limitations in functionality and requires a stable, high-bandwidth, internet connection to work. But for quick and small 3D modeling projects, it's a decent option.

[SketchUp Studio for Students](#) is Trimble's educational subscription that includes the powerful desktop version, SketchUp Pro, and a long list of supporting applications. You can receive a free subscription to SketchUp Studio for Students through CU Denver by sending an email request to cap.it@ucdenver.edu. Once the license has been provisioned, you will receive an email invitation from Trimble with links to create an account and activate your student license.

Even though all of the computers in the CAP Computer Labs have SketchUp installed on them, you will find it advantageous to have the desktop version of SketchUp installed on your laptop.

SOFTWARE

ESRI ARCGIS PRO



A geographic information system (GIS) is an important tool for collecting, managing, analyzing, and communicating geospatial data that has become ubiquitous in urban and regional planning.

ArcMap (also known as ArcGIS Desktop or just ArcGIS) has been Esri's primary GIS desktop application since 1999. In 2015, Esri launched **ArcGIS Pro**, a faster and more efficient GIS desktop application featuring additional automation, analysis, and publication capabilities. Numerous extensions, templates, and complementary applications constitute Esri's **ArcGIS family of applications**.

Additionally, **ArcGIS Online** is a cloud-based app, accessible through a web browser, that offers an easy-to-use interface and online accessibility. ArcGIS Online eliminates the "Mac problem" as ArcMap and ArcGIS Pro are not available for Apple's Mac operating system. ArcGIS Online offers full mobile integration, provides templates for mapping and analytics, and shares information and visualizations through interactive online widgets.

ArcGIS Online is intended for viewing, managing and publishing online map projects as well as for basic analysis, although over time analytic capabilities are expected to increase significantly. Additionally, ArcGIS Online is where students access the Esri virtual campus online courses and additional online apps such as Community Analyst, Business Analyst, Story Map Developer, and ArcUrban.

Currently, CU Denver students, staff, and faculty can publish online map projects, including story maps, that are viewable to anyone within the CU Denver domain. FAST Lab personnel are working with the campus administration on the possibility of opening up published map projects to anyone outside our domain, and a decision on this is expected in the 2022–2023 academic year.

You will receive introductory instruction in ArcGIS Online in the core MURP course, Planning Practice and Technology. Students with little to

no expertise in ArcGIS Pro are strongly encouraged to take the elective course, GIS for Urban Planning, preferably in their first year. MURP students can move beyond the introductory level by taking elective courses such as Advanced Geospatial Methods. There is also a **GIS Certificate program** available for students who seek a comprehensive education in GIS.

STUDENT ARCGIS LICENSES

Students enrolled in a course that uses ArcGIS Pro will receive from their course instructor a hyperlinked PDF with access to the ArcGIS Pro installation file and instructions for download. You can log into your ArcGIS Online account without installing any software by navigating to <https://www.arcgis.com/>. ArcMap/ArcGIS Desktop application installation and licensing files are managed by the CU Denver FAST lab. Questions about ArcGIS accounts can be directed to the FAST Lab at FAST@ucdenver.edu.

The method for logging into any Esri product is to use the organizational login option by choosing "Your ArcGIS organization's URL," typing in **fastucdenver**, and continuing with your regular university credentials sign-on process. This method also works for your browser-based login to ArcGIS Online. If you need additional Esri desktop applications, such as CityEngine or the older ArcMap/ArcGIS Desktop application, you should reach out to the FAST lab to obtain installation media and instructions and, in the case of ArcMap, a license file.

Esri-created instructions for installing or upgrading to **ArcGIS Pro 2.8.9** can be found at the Esri ArcGIS Pro [Set Up web page](#). For additional assistance, students should reach out to the FAST Lab at FAST@ucdenver.edu.

OPEN SOURCE GIS

There are several free/open source GIS and related software applications that you may want to investigate. The FAST Lab has a good list of free/open source geospatial software [here](#).



SOFTWARE

ZOOM



Zoom is the official platform for audio and video conferencing at CU Denver. Zoom may be used as the primary means of instruction within a class or as a helpful tool to collaborate with your classmates and instructors. Every CU Denver student has individual access to the university's enterprise Zoom license, the top-tier plan available that includes numerous

enhancements and security features not offered in the lower-tier plans. Therefore, you are required to use your university Zoom account and not a personal Zoom account to maximize the security and privacy protections while using Zoom for university purposes.

Zoom is available in desktop, online, or mobile versions. Of those, the desktop version of Zoom is by far the most secure and feature-rich version. Therefore, you are strongly encouraged to avoid using the online (web-based) and mobile versions and install the desktop version on your personal computer. Go to the [Zoom Download Center](#) and click the top blue button (Zoom Client for Meetings) and download and run the installation file **ZoomInstaller.exe** (works for both Windows and Mac). Mac users may need to adjust their [security settings](#).

After the installation is complete and the Zoom desktop app launches, you will be prompted to Sign In. Don't put anything in the Email/Password boxes. Instead, click on the "Sign In with SSO" button with the key icon to the right. SSO stands for "single sign-on" and is used to access institutional accounts like CU Denver's. Next, in the box that says "Enter your company domain" enter **ucdenver** in front of ".zoom.us" and click Continue. Follow the prompts and you will be redirected to the CU Denver single sign-on screen where you will enter your university credentials. After logging in, you will be redirected back to the Zoom desktop app.

When you click on a Zoom invitation link in an email, in Canvas, or elsewhere, your Zoom desktop application will automatically launch. For information about using Zoom, go to Zoom's extensive [Help Center](#).

TABLEAU



Tableau is a powerful data organization, management, and analysis application that merges the spreadsheet functions of Excel and the relational database functions of Access with a user-friendly interface to produce dynamic analytics and data visualizations. You will receive introductory instruction in Tableau in Planning Methods. Tableau

offers a free one-year academic license under their [Tableau for Students](#) program, which includes Tableau Desktop and Tableau Prep as well as full access to the eLearning Suite of training resources. You should enroll in the Tableau for Students program and download the software by completing [this form](#) and using your university email address as proof of eligibility. Tableau is also available in a mobile version.

R STUDIO



R-studio is a completely free and powerful application for statistical analysis. The graphics user interface is called R-Studio and is connected to R on the back end. R-Studio is designed to run analysis on numerical information such as surveys, geospatial data, etc. You do not need to learn a new coding language to operate this software. You may use R-Studio

in elective courses that focus on advance quantitative methods and data analysis topics. Note that the R-environment is constantly evolving and improving so we recommend that you update the software, if installed on your personal machines, at least once during the semester. Visit the [R-Studio download page](#) and install the R-Studio Desktop—Open Source License—Free version.

GOOGLE EARTH PRO



Google Maps is great for finding a restaurant or sending directions to a friend, but it is limited as a planning tool. Google Earth, on the other hand, is an amazing resource for planners. There are two versions of Google Earth: [Google Earth Online](#) is good for exploring the Earth through aerial imagery, but it has limited functionality. [Google Earth Pro](#),

however, is a free desktop app you install on your computer that offers a number of advanced features not found in Google Earth Online, such as the ability to save aerial imagery at a very high resolution to your computer as a JPG file. We strongly encourage you to install the Google Earth Pro desktop app on your computer and use it as your primary source for aerial imagery outside of a GIS application.

DUO SECURITY



Duo Security is a mobile app that you install on your mobile device as part of the University's multifactor authentication (MFA) process for access to email and Microsoft 365 applications. The first step in setting up MFA is to download and install the Duo app on your mobile device before registering with Duo on your desktop web browser. The Duo mobile app is available for

iOS at the [App Store](#) or for Android at [Google Play](#). For instructions on [registering Duo](#) and setting up your university MFA, start at the Office of Information Technology's [MFA web page](#). Duo will also be necessary to use VPN (virtual private network) to access university servers remotely through the GlobalProtect VPN application. For more information about using VPN, go [here](#).

OTHER APPLICATIONS

AUTOCAD



AutoCAD is design and drafting software produced by Autodesk that is commonly used in civil engineering and other design professions including urban and regional planning. Autodesk offers a free 1-year educational license for Windows or Mac with the creation of an individual account. Visit this [AutoCAD page](#) for details.

REVIT



Revit is modeling software created by Autodesk that is used by architects for designing building structures and systems in 3D. Students with architectural backgrounds may wish to take advantage of Autodesk's free 1-year educational license by creating an account on the Revit [student license](#) page.

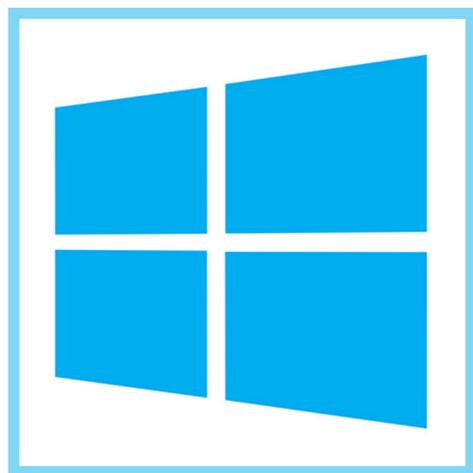
LUMION



Lumion is a powerful desktop application used by architects, landscape architects, and urban designers for creating high-quality renderings that are fully compatible with SketchUp, Revit, and AutoCAD. Students can sign up for a free academic license with a PayPal account on the [Lumion Pro Student](#) registration page.

HARDWARE

WINDOWS VERSUS MAC



Buying a new laptop for grad school? Debating Windows vs. Mac? Here are a few considerations...

The hardware you choose (PC or Mac) and the operating system (Windows or macOS) is dependent upon your budget, personal preferences, and the kind of software that you will be using on your computer. You will be happy to know that most of the software programs we use in the MURP program (Microsoft 365, Adobe Creative Cloud, Google Earth Pro, SketchUp, and Tableau) are compatible with both the Windows and macOS operating systems.

However, if you choose a Mac, then you need to know that none of the ArcGIS desktop applications run on macOS. There are a few solutions to this: 1) Use ArcGIS in the CAP Computer Labs, 2) Use an [open-source version](#) of GIS, or 3) Dual-boot your Mac to run both macOS and Windows using Bootcamp. For more about dual-booting, please visit this [Esri web page](#) (note: dual-booting your computer is a task for experienced users and the university does not offer technical support for dual-booting your personal computer). If you think you are going to specialize in GIS or use GIS often in your MURP career, you may want to consider getting a Windows-based PC.

Macs are favored by many professionals who work extensively with the Adobe Creative Cloud applications and are known for their reliability and general immunity to malware and viruses, but Macs also tend to be more expensive than PCs and may cost more to repair. PCs are available in a wider range of prices and configurations, but may be more susceptible to operating glitches and computer viruses. However, a majority of professional planning offices—whether in a government agency or a private firm—use Windows-based PCs.

General rule: Buy as much computer horsepower as you can afford!

COMPUTER SPECIFICATIONS

If you are planning on buying a new computer or upgrading your current computer for graduate school, we recommend a computer with the following technical specifications:

PC - WINDOWS

- 64-bit capable hardware running 64-bit version of Windows 10 or 11
- 32 GB or more of RAM (high performance), 16 GB of RAM (minimum)
- i9 processor w/ 6+ cores or AMD Ryzen processor w/ 8+ cores, > 3.0 GHz (high performance); i7 processor w/ 6+ cores or AMD Ryzen w/ 6+ cores, > 2.2 GHz (minimum)
- 1 TB or more Flash/SSD (high performance), 512 GB Flash/SSD (minimum)
- Dedicated Nvidia or AMD video card w/ 4 GB memory (minimum)
- Dual-band wireless card - 802.11 AC

APPLE - MAC

- 64-bit capable hardware
- 32 GB or more of RAM (high performance), 16 GB of RAM (minimum)
- i9 processor, > 2.4 GHz (high performance), i7 processor, > 2.3 GHz (minimum)
- 1 TB or more Flash/SSD (high performance), 512 GB Flash/SSD (minimum)

Note: Currently, Apple's new M1 chip is not natively compatible with dual-booting Windows with Bootcamp, or with design software like Revit and AutoCAD. If you plan on using any of those applications, be sure you have a Mac computer with an Intel chip like the i9 or i7.

SOFTWARE-RELATED MINIMUM REQUIREMENTS

The following links provide the recommended minimum requirements for the major software packages used by MURP students: [Adobe Creative Cloud](#), [SketchUp](#), [ArcGIS Pro](#). We urge you to exceed the minimum specifications if possible. However, we recognize that high-performance computers are expensive, and if buying one is outside of your budget, remember that some of the most powerful computers on campus are available in the CAP Computer Labs and the FAST Lab.

DELL LAPTOP SPECIAL DEALS

The university has arranged for CAP students to purchase select Dell laptops at significant discounts directly from Dell. If you are shopping for a Windows laptop, check out this [web page](#). Not all specification combinations (RAM, processor, etc.) may be available, but you might find what you're looking for and save some money.



SECURITY

MULTIFACTOR AUTHENTICATION

The University requires the use of multifactor authentication (MFA) to access any of the Microsoft 365 applications, CU Denver email with Outlook, Microsoft Teams and, for authorized users, access to network servers through a virtual private network (VPN). The use of MFA is to protect university computer systems and the privacy and security of CU Denver students, faculty, and staff from hackers and cybercriminals. The University's MFA process requires use of the Duo Security mobile app (see page 9).

You are strongly encouraged to download and install the Microsoft 365 desktop applications (Outlook, Teams, Word, PowerPoint, etc.) because, after the initial authentication prompt, you will only be prompted for authentication about once every 90 days thereafter if you use the desktop apps. But if you use the online versions of the Microsoft 365 applications—including Outlook and Teams—through a web browser, you will have to go through the MFA process every time you use the online application. The first step in setting up MFA is to download and install the Duo app on your mobile device. For instructions on using Duo and setting up your university MFA, start at the CU Denver Office of Information Technology's [MFA web page](#).

3-2-1 BACKUP STRATEGY

As a MURP student, you will be working on your computer a lot. Consequently, it's imperative that you follow best practices for backing up your work, which typically is a mandatory practice in a professional planning environment. Can you afford to lose that 20-page paper you've been working on for a month the night before it's due? You should make frequent backups of any file that you cannot afford to lose. Most experts recommend a 3-2-1 Backup Strategy:

- Have **3** versions of any important file (the original file on your computer plus two copies)
- Keep **2** of those copies on different media (for example, a flash drive and OneDrive)
- Store **1** of those copies off-site

Sound like overkill? Tell that to your professor when you're explaining that you can't turn in your assignment because your hard drive crashed and you lost all your files, or that you misplaced your flash drive that contained the only copy of your assignment. Search the web for "3-2-1 backup plan" and you will find dozens of sites with detailed explanations of how to incorporate a 3-2-1 backup strategy into your daily routine.

Backing up your work is something you should do multiple times a day. Get into the habit of at least once an hour saving a copy of the files you're working on to, for example, your OneDrive account. The MURP faculty strongly urge you to take these recommendations for incorporating a good backup strategy into your school routine seriously, because your inability to turn in an assignment due to a lost or corrupt file will never be an acceptable excuse.



Master of Urban and Regional Planning Program

TECHNOLOGY GUIDE

Fall 2022



University of Colorado **Denver**



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