

GIS @ Edinburgh 2020 – Covid-Proof Geo

Accessing GIS Software in (or outside!) the School of GeoSciences

Listed below are various methods of accessing GIS software for GeoSciences staff and students at the University of Edinburgh. These were written for the dedicated UG GIS course Principles of GIS and also for use on the MSc in GIS but the methods are applicable to all users in the School. Some of these methods have been developed (or extended) by the University's Information Services division and/or local IT teams (e.g. it.geos@ed.ac.uk) in response to the Covid19 pandemic of 2020. Other methods are existing mechanisms that may prove preferable or more suitable depending on an individual's circumstances/needs or upon previous GIS experience. All methods provide access to the same type of software and to the full Advanced Licence package for ESRI's ArcGIS software that the University subscribes to as an institution. This industry-leading GIS software is traditionally ubiquitous across the Geospatial and Planning sectors and is therefore often used as the platform of choice for various courses, particularly at MSc level – we couldn't train GIS professionals without having exposed them to ESRI software! In recent years, however, the leading popular opensource* GIS platform, called QGIS, has not only caught up (some would say long ago!) but at times even surpassed ArcGIS in some areas though both platforms offer advantages and disadvantages. E.g. one may offer simplicity; the other finer parameter control and extra speed.

*Open Source software tends to have the major bonus that much of it is free (i.e. at zero cost) however its true definition (as per its name) is that the source (programming) code behind the program is made entirely available alongside the runnable program itself meaning you are free to modify, adapt or extend the program to meet your needs – the ultimate in customisation.

You are welcome (whilst continuing to follow all applicable guidelines as to correct and approved working procedures) to try any or all of the below options as suits you best – note that option (1) working in a lab environment is unlikely to be widely available until 2021 however there may be some socially distanced access to lab PCs at times. Option 2 is available for staff and possibly PhD students who are assigned a particular office or desk PC, however remote access for taught students to specific lab PCs may need to be agreed with, or managed by, IT services.

Please refer to further information as required at the following links and see the official sources of support for each of these services – also consult guidance for each particular course as appropriate:

www.geos.ed.ac.uk/it

which now contains a link to the new IT help pages at

<https://blogs.ed.ac.uk/geosciences-it-help/>

In particular see the top two links:

<https://blogs.ed.ac.uk/geosciences-it-help/induction/>

and

<https://blogs.ed.ac.uk/geosciences-it-help/covid/>

The latter is a newly condensed guide to remote working in general terms. **Note:** See the Software at home section for information on obtaining GIS and other software for use off-site *natively* on your own computer:

<https://blogs.ed.ac.uk/geosciences-it-help/software/>

Sources of help for specific connection mechanisms:

1) Open Access and School Labs

IS.Helpline@ed.ac.uk and GeoS IT Services it.geos@ed.ac.uk respectively

<https://blogs.ed.ac.uk/geosciences-it-help/computing-labs/>

www.ed.ac.uk/information-services/computing/desktop-personal/open-access/software/pc-software

2) Remote Connection to Lab PCs

Speak to GeoS IT Services – it.geos@ed.ac.uk

3) Apps.Ed – Virtual App Access on own machine

www.ed.ac.uk/information-services/computing/desktop-personal/apps-ed

You can use a web browser or download an app called Citrix Workspace to your device (a range of devices and operating systems are supported – including Windows, Mac, iOS and Android). This enables you to potentially run ArcGIS software on a number of less powerful devices or operating systems which are normally unsupported natively (e.g. Mac – which normally requires Windows virtualisation software such as Bootcamp or Parallels to be installed.) ArcGIS Desktop, ArcGIS Pro and QGIS are all available on Apps.Ed. Also available is a range of EO/RS software. **Note:** As well as the Citrix service there is an alternative Windows Virtual Desktop (WVD) facility, though this is at time of writing still in testing or may be lacking in some applications. Access to network drives in Apps.Ed is usually limited to U: and M: but be aware these may not work in WVD so teaching data may need to be provided via staff OneDrive locations with UG students saving to their OneDrive.

4) Installing GIS Software on own devices

See the relevant info included here:

<https://blogs.ed.ac.uk/geosciences-it-help/software/>

QGIS – Install as you desire (Windows/Mac both supported) – include GRASS if asked!

ArcGIS Desktop – see Main Software Deals > ArcGIS and specifically option 2 under www.ed.ac.uk/information-services/computing/desktop-personal/software/main-software-deals/arcgis/arcgis-staff-students [Also linked from IT's Software page above.]

ArcPro – This is licensed by your ArcGIS Online Organisational account (e.g. *edgeosci* within GeoSciences) if you have been given one. An option to enable downloading of ArcPro can also be set here by IT (or any staff member in the School who has been given ArcGIS Online Admin privileges) however it is often easier to simply download ArcPro directly from www.arcgis.com as a free trial (e.g. 60 days) but to then license/authorise the program (ongoing) by signing in to ArcGIS Online (within ArcGIS Pro) with the organisational account details provided. IT or the School GIS Support Officer can advise/clarify. **Note:** Taught GeoS students will automatically be given *edgeosci* accounts on a whole class basis; outside of GeoS IS also run a wider *edinuniv* ArcGIS Online instance.

Option 1 – The Traditional On-Campus Model (Observe distancing! But if you are in a lab...)

1) Log in to a GeoS Windows lab PC (or Drummond 2.02, or JCMB/other KB Geos Teaching Spaces)

2) Set up Data Source, *e.g.*:

i) Geos **netdata** – part of the geos network (i.e. \\groups.geos.ed.ac.uk\netdata)

To add this to Windows Desktop as G: Double-click on U:\SCE\GEOS\drive_mapping\Access Netdata
You can also **right-click** on this and **Send to Desktop** then **Pin** this [shortcut] **to Taskbar**.

ii) Alternatively data may be provided on the U: drive at U:\SCE\GEOS to allow access on Apps.Ed.

3) Identify Work Storage Location:

Each student has a default home drive mapped to M: in Windows. Use this! For PG students this should be provided on the GeoS network however for UG students this will be centrally provided. (Running the Access Netdata script will also add an additional GeoS provided space to T: however this will require to be re-mapped, along with netdata, each time you login). **Note:** M: must have some free space in it all times as ArcGIS saves some of its working files to M:\ArcGIS.

4) Locate ArcGIS apps at start > All Programs > ArcGIS – ArcMap, or ArcScene, ArcGlobe, ArcCatalog

5) Also note alternative software to be aware of – for own use/career:

Free Alternative GIS Platform which can be used is QGIS – note the QGIS with GRASS menu shortcut – from start > All Programs > QGIS i.e. QGIS folder. You can leverage GRASS/SAGA tools from QGIS.

6) Start ArcMap/ArcCatalog and set up Folder Connections**:

In ArcGIS map documents can be opened just as e.g. Word documents, however GIS data is added to a map document from what are called Folder Connections. These can be made in the traditional manner within ArcCatalog or they can also be made on the fly under (File >) Add Data however be sure to connect only to the relevant drive letter or folder (click OK) and connect no deeper since some GIS datasets actually consist themselves partly of folders. Once connections are made this way, immediately click OK to browse for files. ****Note:** Alternatively you can specify the network locations directly in the Add Data Name: box, e.g. \\groups.geos.ed.ac.uk\netdata then press **Enter**.

If easier, ordinarily you will need to make **two** folder connections:

i) One for source data as advised e.g. G:\avtrain or just G:\ after running the Access Netdata script, or perhaps just U:\, U:\SCE\GEOS or e.g. U:\SCE\GEOS\GIS\avtrain ,and

ii) One for storage/saving work (M:)

Unless in an emergency, or for issues of computer performance, do **not** save work to the local hard drive (C:\) as this will (if possible) be wiped clean upon logoff.

To date, PGIS and other courses/practicals reflect the above steps assuming the course is delivered in a face to face on-campus setting. In the event of no lab access you can attempt to run ArcGIS remotely using the Apps.Ed service (a Virtual Windows environment). This will also allow you to run ArcGIS software which is only available for the Windows operating system on a Mac via a web browser, or even on Android or iOS mobile and other devices. Should that fail remote PC access may be possible by arrangement with and managed by School IT.

If you have a device capable of running Windows (either a Windows PC/laptop or a Mac running virtualisation software to host an installation of Windows – e.g. Parallels or Bootcamp) you can also install ArcGIS Desktop or the new ArcGIS Pro* (its eventual successor) on your own machine. Alternatively you may wish to explore free Azure cloud hosting from Microsoft (possibly available via UoE) on which you can also install ArcGIS – offering another potential solution for non-native Windows (e.g. Mac) users. See more info below on these routes.

***Note – Desktop GIS Platforms: ArcGIS Pro vs. ArcGIS Desktop vs. QGIS:**

ESRI's ArcGIS Desktop is the leading commercial Desktop GIS package however in an increasingly open world we now have numerous opendata initiatives as well as opensource software – software that is usually free (in monetary terms) to obtain, but also whose code is entirely open and available to anyone, thus allowing anyone to work on improvements to the program which must be shared back with the wider user community to use.

The leading opensource GIS package is QGIS which comes packaged with some other opensource GIS software and which continues to challenge and often arguably beat ESRI's offerings. There is considerable uptake of QGIS however the principles of usage between platforms are the same and we aim to teach you the background concepts and ideas rather than a platform per se.

We would however urge you to take a look at QGIS and indeed we have tested at great length the ability to undertake the course requirements in either ArcGIS or QGIS – particularly the assessed project.

ESRI have attempted to address the changing GIS world with numerous simple, focussed web apps (e.g. Storymaps for creating rich map-heavy storytelling content, or ArcGIS Online for a consistent, free, but simple to use web browser based GIS application) and a phenomenally revised training resource with free downloadable training materials, online MOOCs, and more. They have also largely rewritten Desktop GIS for the modern age in the form of ArcGIS Pro. They also continue to add apps including an ever increasing range of Business Intelligence and Analytics software tools.

ArcGIS Desktop is still widely used and worth knowing for any career in GIS – particularly if for example tasked with migrating an organisation's entire ArcGIS Desktop work to the new ribbon-based Pro environment.

The PGIS course was on the verge of pre-emptively migrating from ArcGIS Desktop to ArcGIS Pro. While there are several new features in the latter (including the main potential combination of 2D and 3D views together in one project as opposed to separate ArcMap and ArcScene documents) the functionality is often similar for many purposes.

Given the uncertainty around Covid-19 and the ability to provide access to Windows PC environments we have decided to stick with ArcGIS Desktop as our default offering but enable students to explore ArcGIS Pro and/or QGIS at their leisure knowing that either ArcGIS or QGIS can be used to conduct the necessary project work for the course.

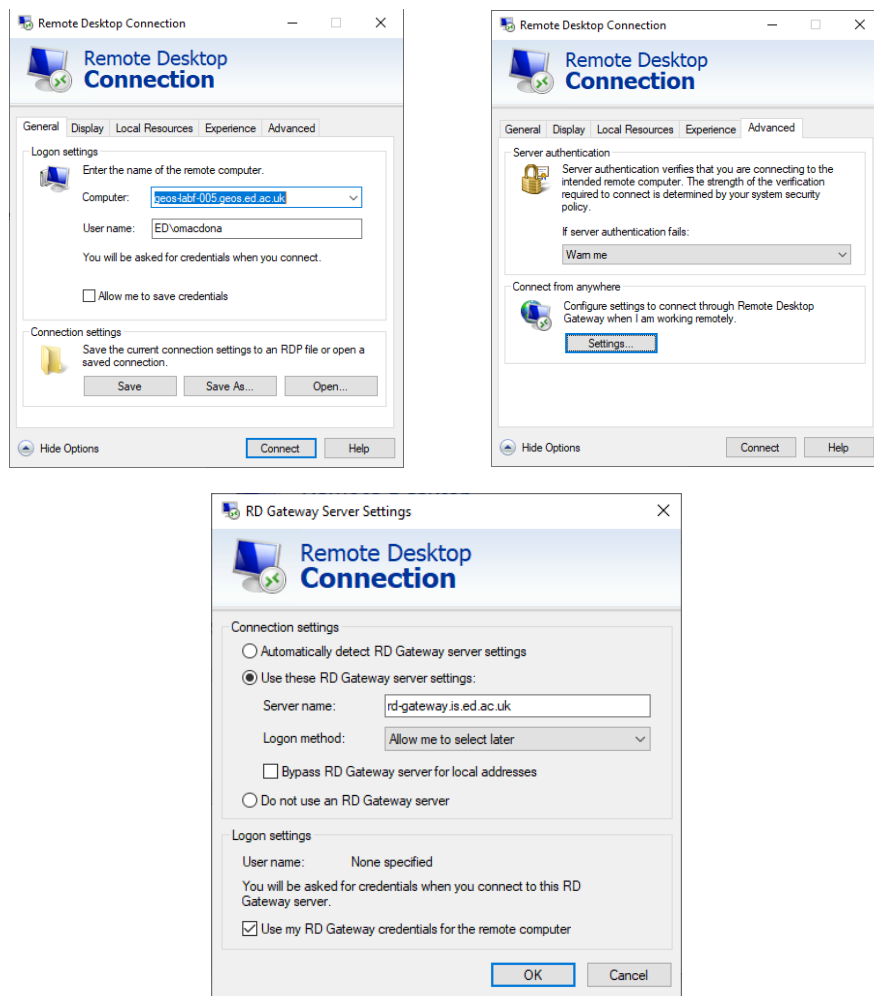
We are obliged to introduce ESRI ArcGIS to students – particularly MSc GIS students, and ArcGIS Desktop is still the widely used platform of choice with both ArcPro and QGIS gaining market share daily. All three platforms can be run in any of the combinations or scenarios mentioned.

Option 2 – Windows Remote Desktop Connection to lab PCs

This will involve or require the support of GeoS IT to identify a suitable PC to connect to and to allow individual students access to specific named PCs.

Use **start > Windows Accessories > Remote Desktop Connection**

The screenshots here show an example of connecting to a GeoS lab PC. You will need to change the computer name to the correct machine you have been authorised to connect to, and change the *User name* to yours complete with the ED\ part to specify the network it belongs to – e.g. ED\s1234567. (**Note:** Use backslashes here as we are using Windows, an alternative to ED\username is username@ed.ac.uk - try both alternatives if you have difficulties!)



The key settings are under *Advanced > Settings* and include using (tick) the UoE RD gateway *rd-gateway.is.ed.ac.uk*. Untick anything else under *Connection settings* then tick *Use my RD Gateway credentials for the remote computer* under *Logon settings*.

Once connected you can work with the remote PC in the same way as a standard lab PC on campus. Again avoid saving to the local hard drive (C:) but instead save to your network space, mapped to M:

Any changes to this connection mechanism should be documented on IT web pages.

Option 3 – Apps.Ed: Virtual Windows App Suite (run our software remotely on your own machine)

This is a service that has been developed and extended to cater for a much greater number of apps and users in response to the Covid pandemic and the need for remote working.

The service allows you to run various apps virtually (i.e. in the cloud/on a remote server and thus via a lower spec laptop than would normally be required for a native install). You can either run simply in a web browser, or you can download a fuller app (possibly offering better performance – in short, if you have any issues running in a web browser then download the app). The service can be accessed here:

<https://www.ed.ac.uk/information-services/computing/desktop-personal/apps-ed>

NOTE: This is the likely primary solution for replacing traditional face to face practical teaching. It is however possible to install ArcGIS on your own machine (see below).

NOTE: There are some special things to bear in mind when working on Apps.Ed or similar.

Network Shares/Folders – e.g. netdata and Apps.Ed Drive Access (M: and U: only)

Each application (app) runs in its own self-contained virtual instance but all have access to both your network storage space (M:) and the universal University drive (U:) For performance reasons browser access (web or File Explorer) within apps.ed is extremely limited. In GeoS much web development is performed natively in a UNIX/Linux environment using the School's XRDP service (or SSH/SFTP) however occasionally GeoSciences courses make use of various network locations mapped to appear in Windows such as netdata (/geos/netdata). This is normally mapped in Windows to drive letter G: however in the virtual apps.ed environment this currently requires to be accessed by its Windows 'UNC' network address: [\\groups.geos.ed.ac.uk\netdata](https://groups.geos.ed.ac.uk/netdata) instead of running a script to map this automatically as previously in a lab setting. This means that when accessing other parts of the GeoS network from a GIS package/program, you need to specify (i.e. type) this address at the appropriate point as follows (i.e. type [\\groups.geos.ed.ac.uk\netdata](https://groups.geos.ed.ac.uk/netdata)) in the following situations:

ArcGIS Desktop

To open map documents from GeoS netdata:

Type [\\groups.geos.ed.ac.uk\netdata](https://groups.geos.ed.ac.uk/netdata) in the File name: box under File > Open

To add data to a map document from GeoS netdata:

Go to File > Add Data then click on Folder Connections

Now type [\\groups.geos.ed.ac.uk\netdata](https://groups.geos.ed.ac.uk/netdata) into the *Folder:* box

ArcGIS Pro:

To open ArcGIS Projects in ArcGIS Pro OR to add data:

Type [\\groups.geos.ed.ac.uk\netdata](https://groups.geos.ed.ac.uk/netdata) in the top address bar.

QGIS:

Use the shortcut link at U:\SCE\GEOS\netdata to open projects or browse for data. (ArcGIS Desktop can also open documents using this link however all other Arc access requires the network address to be specified.)

Notes on working with Apps.Ed

1) You may require to **Permit** application programs (apps) to have access to your whole machine to allow input/output of data.

2) There is no official Web Browser, PDF displayer, Command Window (DOS or Powershell), or File Browser capability built into Apps.Ed. While this is not convenient it does at least keep things relatively simple.

2.i) A workaround for a File Browser is clicking on the link to a newly exported QGIS layer or output, using a Text Editor that will allow you to open the file location, or by using the built-in Internet Explorer, Ctrl+O (File Open) then typing U:\ (**Note:** The slash is required).

2.ii) If you require to e.g. download any files over the web (e.g. from Learn) then you can use a web browser on your own machine and then a suitable SFTP client (e.g. that within MobaXTerm on Windows) to re-upload these to your GeoS home directory on the School network,

OR

you can simply use Internet Explorer from one of the resources provided to IS.Apps as a web link (e.g. the Learn link) and save to M: or e.g. a OneDrive location.

Option 4 – Running ArcGIS on your own laptop

This is largely covered in the intro summary above.

See IT's web pages for more information, however traditionally there are two options:

- a) Standalone licence file (or hardware dongle) on local machine (e.g. own or field laptop)
- b) Licence provided by GeoS licence server over network (e.g. VPN) connection

Most software is now available via Apps.Ed (see above) however some (notable some GIS) software continues to be available for installation upon your own computer – usually with a standalone licence file. Packages available are:

QGIS – Install as you desire (Windows/Mac both supported) – include GRASS if asked!

ArcGIS Desktop – see Main Software Deals and specifically option 2 under www.ed.ac.uk/information-services/computing/desktop-personal/software/main-software-deals/arcgis/arcgis-staff-students

ArcPro – This is licensed by your ArcGIS Online Organisational account (e.g. *edgeosci*) if you have been given one. An option to enable downloading of ArcPro can also be set here by IT (or any staff member in the School who has been given ArcGIS Online Admin privileges) however it is often easier to simply download ArcPro directly from www.arcgis.com as a free trial (e.g. 60 days) but to then license/authorise the program (ongoing) by signing in to ArcGIS Online (within ArcGIS Pro) with the organisational account details provided. IT or the School GIS Support Officer can advise/clarify.

Note: Taught GeoS students will automatically be given *edgeosci* accounts on a whole class basis; outside of GeoS IS also run a wider *edinuniv* ArcGIS Online instance.

As well as GIS packages, Earth Observation/Remote Sensing software such as ERDAS Imagine or ENVI should be available for home use. See IT's Software at home/Software page (also linked from their Covid/Remote Working page):

<https://blogs.ed.ac.uk/geosciences-it-help/software/>

<https://blogs.ed.ac.uk/geosciences-it-help/covid/>