**COMPUTER SOFTWARE**

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| **Introduction** |

 This file outlines software programs and other applications that could help you complete your research. To access thee programs, you could utilize three avenues, as outlined in the following table.

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| --- | --- |
| Option | Details |
| Software central | * Software central is a CDU program that offers research candidates many programs at no cost
* ITMS can download software central onto your computer—and you can search “Software central” from your Windows icon
* For more information, read <https://www.cdu.edu.au/itms/staff-software>
 |
| Open source software and freeware | * After you leave the university, you might not be able to afford the software available on Software Central or would prefer inexpensive or free alternatives.
* Therefore, you should become familiar with the open source alternatives.
* Note that open source software is not only free of charge but also enables users to access, modify, and redistribute the source code.
* In contrast, freeware is free of charge but does not enable users to access, modify, and redistribute the source code.
* To illustrate, LibreOffice is an open source alternative to many of the Microsoft Office programs, such as Word, Excel, and Powerpoint.
 |
| Purchase software | * Research candidates often purchase software using their research funding allocation
 |

**How to utilize this document**

This document classifies the various software programs into several categories. To identify relevant programs, first decide which category is relevant to your purposes. Then, read this section to uncover suitable alternatives. The information will be gradually updated over time. The categories include programs that revolve around

* audio editing
* converting formats
* drawing
* pdf tools
* photo editing
* profile management, such as Research Gate
* project management
* qualitative data analysis
* quantitative data analysis
* reference management
* specialist software
* video editing

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| **Audio editing** |

 During your research career, you might often need to edit audio files. For example, you might want to record lectures you present or interviews you conduct. You might want to develop audio materials, such as music or voice, for your studies, and so forth. The following table outlines the software that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Audacity | * Edits and records audio, such as deleting or muting sections
* Can include many effects
* Can edit multiple tracks—such as mix multiple instruments
 | * Free
 | * Perhaps the most popular free audio editing programs
* However, the interface may be cluttered with some unnecessary features
 |
| Hya-Wave | * Very simple to use
* Can implement on your browser: you do not have to install a program
 |  | * Can only edit one track at a time—and thus cannot mix multiple instruments for example
 |
| ocenaudio | * A simple interface
* You can hear the change as you change the parameters; you do not have to preview the audio to hear the effect
* Many effects including reverberation
 |  | * Can only edit one track at a time—and thus cannot mix multiple instruments for example
 |

 For more information, see https://www.musicianonamission.com/best-free-audio-editor/

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| **Converting formats** |

 Often, you need to convert files from one format, such as jpeg, to another format, such as gif. The following table outlines the programs that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Ffmpeg | * Converts audio and video formats to other formats
 | * Open source and thus free
 |  |
| Format factory | * Converts audio, photo, and video files from one format to another format
 | * Free for CDU staff and students on software central
 |  |

 If you want to convert files to or from pdf files, proceed to the section on pdf files.

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| **Drawing** |

 When writing reports or preparing materials, you might sometimes need to draw diagrams, flowcharts, or other figures. The following table outlines the software that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

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| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Autodesk Sketchbook | * facilitates expressive drawing and concept sketching
 | * Free for CDU staff and students on software central
 |  |
| Draw.io | * constructs diagrams and flowcharts
* some excellent templates to help you construct these diagrams
* can store the diagrams online—such as in Google drive
 | * Open source and thus free
 |  |
| Microsoft 3D builder | * downloads 3D files, such as photos of 3D objects, and then can edit these files
* embeds your name or other words in a photo of an object
* combine objects
* integrate objects with customizable templates of shapes
* subtract objects from each other
 |  |  |
| Krita | * Animation, drawing, and digital painting
 | * Open source and thus free
 |  |
| Sketchup | * 3D drawing for architecture, interior design, engineering, film design, and similar fields
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| Visio 2016 | * comprises templates to draw many types of charts and diagrams
 | * Free for CDU staff and students on software central
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| **pdf tools** |

 Often, you need to manage and edit pdf files. For example, you might need to merge two pdf files that you receive—or convert pdf files to another format, such as a Word file. The following table outlines the software that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| altopdf.com | * converts, splits, merges, edits and signs your pdf documents
 | * Free
 |  |
| Foxit reader | * edits pdf files
* create, view, and sign pdf files
* converts pdf files to text
* converts many formats to pdf
 | * Free for CDU staff and students on software central
 |  |
| Cisdem PDF Converter OCR | * converts pdf into 16 formats
* converts scanned pdfs to native, searchable pdfs
* convert Words, Excels, PPT, and images to pdf
 |  |  |
| PDFsam Basic | * splits and merges pdf files—and performs other modifications on pdf files
 | * Free for CDU staff and students on software central
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| **Photo editing** |

 When writing reports or preparing materials, you might sometimes need to edit photos. For example, researchers may edit photos to enhance the quality of images as well as to reduce the size of files. Small files are better on websites, because they tend to improve search engine rankings. The following table outlines the software that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Adobe Lightroom | * Often regarded as simpler to use than Photoshop
* Includes many tools to fix problems or blur images
* Improve or recolor images
* Add text to images
* Copy and paste other objects into images
 |  |  |
| Adobe Photoshop | * Many sophisticated features to retouch and improve images
* Improve or recolor images
* Add text to images
* Copy and paste other objects into images
* Many filters and brushes
 |  |  |
| Corel PaintShop Pro | * Simple to use although not especially advanced
* Can add many textures and backgrounds
* Can blur or enhances various parts of the image
 | * Less than $100; flat fee
 |  |
| GIMP | * Retouches photos, enhances pictures, and provides other functions
* Can edit photos in many formats
 | * Free
 |  |
| Inkscape | * Edit your images or add colors
* Add text to images
* Copy and paste other objects into images
* Some mapping as well
 | * Free
 |  |
| Luminar from Skylum | * Can swiftly brighten, tone, clarify, and improve images
* Many filters, such as Sunrays—in which you add realistic sun rays to images; blurs some parts of images
 | * Flat fee rather than monthly subscription
 |  |
| ON1 Photo RAW | * Many effects to edit your photos
* Add textures and borders
 | * Free
 |  |
| Paint.net | * Edits photos
* Intuitive and easy to use
 | * Free for CDU staff and students on software central
 | * Available on Windows only
 |

- For other alternatives, visit <https://enviragallery.com/best-photo-editing-software-for-photographers/>.

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| **Profile management** |

 To enhance your career, you need to manage your profile. For example, you should use social media sites—such as LinkedIn or ResearchGate—to promote your work or summarize your achievements. The following table outlines the software or sites that researchers often utilize to achieve this goal. In particular, this table specifies

* some of the key features of each software or site
* the price of each software or site
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| ORCID | * assigns each researcher a personal ID
* automatically collects your research
* auto-populates your research activity, such as your publications, in grant applications
 | * no cost
 |  |
| ResearchGate | * social networking site for researchers
* contains over 10 million researchers including research candidates
* can create a profile, list publications, upload your papers
* helps researchers identify collaborators who share your interests
* you can request the papers you cannot access from the authors
* each author receives a score to measure their productivity
 | * open source and thus free
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| **Project management** |

 Some software—such as Microsoft Project, Microsoft Onenote, ToDoist, Jira, and Trello— has been designed to help you manage your project. Whenever your project, such as a thesis, comprises multiple tasks, each corresponding to different deadlines, these software packages may be useful. For example, this software might help you

* prioritize your tasks to increase the likelihood you will achieve your deadlines or milestones
* collaborate with other people on some of these tasks
* appreciate how progress on one task might affect progress on other tasks
* manage your workload
* construct Gantt charts to specify which days or weeks you will dedicate to each task
* complete various procedures that help you achieve your goals, such as manage risks

The following table outlines the software that researchers often utilize to manage their projects effectively. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Asana | * Helps prioritize and organize tasks to help you achieve your deadlines
* You can also assign tasks effectively to members within a team
 | * A free version exists
* A premium version is $11 a month
 |  |
| Basecamp | * Helps plan outdoor activities, organize data like photos, and share data
* Helps plan routes
* Integrate maps into plans
* Estimates the difficulty of hikes or bike rides
* Displays topographic data
 | * Free for CDU staff and students on software central
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| CMapTool**s** | * Creates, uses, and shares concept maps
 | * Free for CDU staff and students on software central
 |  |
| Jira by Atlassian | * Helps assign work and tasks to particular individuals in a team
* Utilizes the concepts of agile teams, Scrum, Kanban, & hybrid models to manage projects effectively
 | * From $10 a month
 |  |
| Mindmeister | * Creates mind maps
 | * Free if you save 3 or fewer maps
* Can photograph and then delete maps if you want to create more than 3
 |  |
| Slack | * Facilitates collaboration and productivity across teams, departments, offices, and nations
 | * About $10 to $20 a month
 |  |
| Trello | * Comprises a variety of tools—such as boards, lists, and cards—that enable you to organize and prioritize your projects
 | * Free
 |  |
| Microsoft OneNote |  |  |  |
| Microsoft Project | * A suite of tools that help you manage projects
 | * Free for CDU staff and students on software central
 |  |
| ToDoist |  |  |  |

**Tools that help you organize your files**

 Rather than manage your projects, other software can help you organize your files. For example, sometimes, after committing an error, you might want to return to a previous version of a document. Some tools help you organize the versions of your files, called version control. The following table outlines this software.

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Git or Gitlab | * Stores versions of your files—enabling you to recover previous versions
* Can store on the web—to facilitate collaborations
 | * Open source and thus free
 | * Version control works better with text files, such as R scripts or LaTeX files
 |
| GitHub | * Same as Git, but may need to pay for repositories that only specific people can access
 |  | * Bitbucket can provide the same service but at no cost
 |
| ownCloud  | * Specifies which directories to synchronize with a cloud
 |  |  |

**Tools that help you plan your research**

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| RDMO | * Helps you conduct data management plans
 | * Open source and thus free
 |  |

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| **Qualitative data analysis** |

**Should I use software to analyse qualitative data**?

 When researchers collect quantitative data, they almost invariably utilize software, such as R, SPSS, or STATA, to analyse the data. In contrast, when researchers collect qualitative data, they do not always need software to analyse data—besides Microsoft Word or Excel perhaps. To decide whether to use software, skim the following table. In particular

* this table outlines some of the main features or functions of software to analyze qualitative data
* decide whether these features or functions could benefit you
* if so, you might want to access one or more of these options
* this software could also benefit you in future jobs.

|  |  |
| --- | --- |
| Common features | Description |
| Annotations | * You can attach notes to segments of data
* These notes might include codes, insights, or connections to other data in your dataset
 |
| Mixed methods | * You can sometimes integrate qualitative data—such as interview transcripts—and quantitative data—such as responses from surveys
 |
| Search and retrieval | * You can often search your data and retrieve data that conforms to specific criteria—vital if your data files are extensive
 |
| Sentiment analysis | * You might be able to integrate the data to ascertain the extent to which participants tend to express favorable or unfavorable opinions about some topic
 |
| Text analytics | * You might be able to analyze patterns in the texts—such as how often one concept tends to follow another concept
 |
| Visualization | * You might construct heat maps, multidimensional scaling, and other displays
* These displays offer some insight on the frequency with which various words or concepts appear in the data—as well as insights on which words or concepts tend to appear in close succession
 |

**Features of qualitative software packages**

 The following table outlines the software that researchers often utilize to analyse data collected during qualitative or mixed methods research studies. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| ATLAS.ti | * A very intuitive design and interface
* Imports many formats, including data from Twitter, Endnote, and Evernote
 | * Can be less than $100 for students
* Can be more than $2000 for commercial use
 |  |
| Dedoose | * Effective if you want to collaborate with other researchers
* Offers excellent encryption technology to improve the safety of data
* Backs up the data nightly
 | * Less than $20 per month
 |  |
| Leximancer | * Conducts content analysis
* Utilizes an algorithm to extract sets of words that appear close together and, therefore, tend to represent an underlying concept
 | * Less than $1000 a years
 |  |
| LIWC: Linguistic inquiry and word count.  | * Determines the extent to which a specific test uses words that correspond to many pre-existing categories, such as negative words or words that imply an epiphany
* Many studies have shown how use of specific words predicts various outcomes
 | * Less than $200
 |  |
| MAXQDA | * Can search and retrieve many kinds of data
* Can organize and categorize data including audio files, survey data, images, and tables
* Can analyze many kinds of media including bibliographic data from reference management programs such as Endnote
 | * Can be between about $1000 and $3000
 | * Can also undertake some quantitative analyses as well
 |
| NVivo | * Imports and stores many formats including transcripts, images, videos, online surveys, and web documents
* Performs many analyses, such as word clouds, word trees, and comparisons
* One of the most popular options
 |  | * Can also undertake some quantitative analyses as well
 |
| Raven’s Eye | * Provides automated analyses of written language, using algorithms that examine patterns of language
* The analyses helps researchers understand the values and perspectives of their participants
* Applies Quantitative Phenomenology
 | * Can be jess than $15 a month for students—but over $350 a month for commercial enterprises
 |  |
| Quirkos  | * Excellent interface to code data
* Shows how topics are connected as you code the data; that is, you can visualize overlap or correlations across data effectively
 | * Can be less than $100 for students
* Can be more than $750 for commercial use
 |  |

The red rows correspond to software that CDU research candidates can access at no cost

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| **Quantitative data analysis including GIS** |

 At Charles Darwin University, to conduct quantitative data analysis, most researchers and research candidates use

* SPSS, freely available to all researchers at CDU
* R, a free package
* Stata, freely available to all researchers at Menzies

In the majority of circumstances, you will not need any other statistical packages. However, in some instances, you might be interested in other statistical packages because

* some researchers prefer a simple interface in which you do not need to include codes—and, therefore, may not want to use R or Stata
* SPSS may not be able to perform all the relevant analyses
* SPSS and Stata are relatively expensive; you may not be able to access these packages after you leave the university and would like to use tools that you could utilize in the future
* specialized packages might conduct particular techniques, such as power analyses, more effectively than SPSS, R, or Stata; they might include more options and present more output, for example.

**Open source software**

 The following table presents some of the open source software you could use to conduct quantitative data analysis. Note that open source software is not only free of charge but also enables users to access, modify, and redistribute the source code. In contrast, freeware is free of charge but does not enable users to access, modify, and redistribute the source code.

|  |  |  |
| --- | --- | --- |
| Software | Functions | Other notes |
| ADaMSoft | * Data mining
 |  |
| Gretl | * Econometrics
 |  |
| Just another Gibbs sampler or JAGS | * Bayesian hierarchical models
 |  |
| JMulTi | * Econometrics
 |  |
| LIBSVM | * Support vector machines—a variant of machine learning
 |  |
| OpenNN | * Neural networks—a variant of machine learning
 |  |
| PSPSS | * A free alternative to SPSS
 |  |
| SOFA Statistics | * Statistical software that is easy to use
 |  |
| Weka | * Machine learning
 |  |

**Proprietary software**

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Functions | Priceor check website | Other notes |
| EViews | * econometric analysis
 |  |  |
| GraphPad InStat | * simple statistical package with simple guidance and explanations
 |  |  |
| GraphPad Prism | * biostatistics and nonlinear regression
* with simple guidance and explanations
 |  |  |
| Microfit | * econometrics
* time series
 |  |  |
| MLwiN | * multilevel models
 |  |  |
| Neural Designer | * deep learning—that is, machine learning
 |  |  |
| nQuery Sample Size Software | * to estimate sample sizes and conduct power analyses
 |  |  |
| PASS Sample Size Software | * to estimate sample sizes and conduct power analyses
 |  |  |
| RapidMiner | * machine learning
 |  |  |
| Simul | * Econometrics—especially for multi-sectoral or multi-regional modeling
 |  |  |
| SmartPLS | * partial least squares path modeling
* partial least squares structural equation modeling
 |  |  |
| StatXact | * exact nonparametric and parametric statistics
 |  |  |

**GIS and mapping software**

 Some software is specifically created to support mapping and geographical information systems. These software packages are designed to create, edit, and analyse maps and geographic information. The software can demonstrate how geographic features can affect business and other decisions. The following table outlines this software including key features and pricing.

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| ArcGIS:  | * creates maps
* uses maps
* analyses map information
* presents and teaches users relevant statistics
* compiles and manages geographic information
 | * Freely available for CDU staff and students
 | * often considered the market leader
 |
| ENVI | * processes and analyzes geospatial imagery
* enables researchers to visualize and analyse radar, thermal and other similar data sets
* extracts information from these images
 | * Freely available for CDU staff and students
 |  |
| Geomedia | * Provides advanced data management, visualization, analysis, and cartographic tools
* Produces 3D models very swiftly and accurately
 |  | * the main rival to ArcGIS
 |
| Global mapper | * Tailored to both novice and expert GIS users
 | * Less expensive than most rivals
 | * Originally designed more to map elevation data
* One limitation revolves around variety in print layouts and symbolization
 |
| MapInfo Professional | * Intuitive to use
* Strong focus on including local information
 |  |  |
| Maptitude | * Produces appealing maps swiftly
* Includes 3D prism, bar chart maps, scaled-symbol maps, and other formats
* Includes population, household, employment, and education data
 |  | * Revolves around mapping more than GIS processing
 |
| QGIS | * Open source GIS software
* If combined with a graphics editor, such as adobe illustrator, can complete most basic GIS tasks as well as licensed versions
 | * No cost
 |  |

Note: The red rows correspond to software that CDU research candidates can access at no cost

 Other alternatives include GE Smallworld, Bentley map, SuperGIS, IDRISI, AutoCAD Map 3D, Tatuk GIS, and more. For more information, visit <https://gisgeography.com/commercial-gis-software/>

**Analysis of visual images or videos**

 Some researchers utilize software that extracts numerical information, such as statistical data, from digital images or videos. The following table outlines some examples.

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Agisoft Metashape | * conducts photogrammetric processing of digital images
* generates 3D spatial data
 | * Free for CDU staff and students on software central
 |  |

**Construction of graphs to display data.**

 Some of the software that is used to analyse data, such as Excel, R, SPSS, and Stata, also generate reasonable graphs. Nevertheless, some programs have been specifically developed to generate graphs in particular circumstances. The following table outlines some examples.

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Fityk | * Curve fitting and corresponding graphs
 | * Open source and thus free
 |  |
| Gephi | * Networks and complex systems
* Dynamic and hierarchical graphs
 | * Open source and thus free
 |  |
| MayaVi | * Computational grids,
* Scalar, vector, tensor data.
* Texture & ray-cast mappers.
 | * Open source and thus free
 |  |
| Microsoft Power BI | * Transforms data into stunning visual displays to share
* Business analysis
 | * Free for CDU staff and students on software central
 |  |
| OpenPlaG | * Many categories or graphs
 | * Open source and thus free
 |  |
| Orange | * Broad range of visual displays and statistical analysis
 | * Open source and thus free
 |  |
| ParaView | * Fluid dynamics
 | * Open source and thus free
 |  |
| Ploticus | * Broad range of plots
 | * Open source and thus free
 |  |
| Tecplot | * Fluid dynamics
 |  |  |
| Think-cell chart  | * Integrates with Powerpoint
* Gantt charts
* Waterfall charts to understand cumulative effects
 |  |  |
| Visit | * Can construct graphs when the data sets are very large
 | * Open source and thus free
 |  |
| Webix | * Maps and charts
* Data tables
* Organograms—like organization charts
* Gauge charts—like petrol gauges
 | * Open source and thus free
 |  |

For more information, see https://en.wikipedia.org/wiki/List\_of\_information\_graphics\_software

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| **Reference management** |

 One of the most laborious tasks in research is to manage your references. For example, you might want to store your articles. You then might want to construct reference lists or bibliographies as swiftly as possible. At CDU, all staff and students can utilize Endnote for free. Alternatively, you might want to use open source or freeware, such as Mendely or Zotero. Nevertheless, other tools could also facilitate the management of references

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Zenodo | * In some disciplines, you need to report the doi of each reference—a unique number that identifies each source
* Zenodo can be used to extract these doi numbers as rapidly as possible
 | * Free
 |  |

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| **Specialist software** |

 Some software is relevant to specific disciplines, such as engineers, architects, and graphic designers. The following table outlines some of this software. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Autodesk | * software to assist procedures in architecture, engineering, construction, manufacturing, media, education, and entertainment industries
 |  |  |
| AutoCAD | * computer-aided design and drafting
* for architects, project managers, engineers, graphic designers, city planners and other professionals
 |  |  |

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| **Video editing** |

The following table outlines the software that researchers often utilize to edit videos. In particular, this table specifies

* some of the key features of each software
* the price of each software
* and other notes

|  |  |  |  |
| --- | --- | --- | --- |
| Software | Features | Price | Other notes |
| Camtasia | * Records and edits videos
* Provides excellent tutorials on how to use the program
 | * Free for CDU staff and students on software central
 |  |
| Da Vinci Resolve | * Color correction
* Audio mixing and effects
* Visual effects, including
 | * Free versions are quite powerful; paid versions are better
 |  |
| OpenShot | * Provides 3d animated titles and effects
* Can resize, scale, trim, and rotate clips
* Can mix audio files
* Easy to use
* Many features for a free package
 | * Free
 | * Set up can be cumbersome
* Available for Windows and Mac
 |
| Pinnacle Studio | * Many effects and transitions
 | * About $150
 |  |
| Powtoons | * Animations and other effects to enhance videos
 | * Around 20 to $50 a month
 |  |
| VideoPad | * Can provide text and caption overlap, transitions, and other effects
* Includes sound effects
* Can stabilize videos
* Can change the video speed
* Can import music
* Enables 3D video editing
 | * Free but not for commercial use
 | * Available for Windows and Mac
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| **Other software to consider** |

* Blender 3D modeling
* Fusion 360
* Grammar checking software such as Grammarly
* Labjack
* LaTeX
* Software to execute experimental studies, such as Inquisit
* Solidworks
* Tableau desktop
* 7zip to zip and unzip files