

IT Across Careers Rubrics to Assess Basic IT User Skills

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NSF-ATE

Foreword

In today's global information economy, technology skills bring opportunities. To take advantage of these opportunities, learners and workers in all disciplines and career programs need to demonstrate a basic proficiency in using information technology (IT) core software applications and tools—which has, in turn, intensified the need for community college faculty to integrate technology into their classes through activities, projects, and learning experiences in which students demonstrate both academic content and technical knowledge.

But what does it mean today to be proficient in using core technology tools and systems? How do we know that our students have developed the basic IT proficiencies needed to compete and succeed in this new world, connected by cyber infrastructures and driven by rapidly changing technologies? How do we guide students' learning of essential IT skills and assess their progress?

IT Across Careers (ITAC) at EDC was funded by the National Science Foundation (NSF) to help community and technical college faculty answer these questions and meet these challenges. In collaboration with education and industry partners, ITAC has developed a common curricular framework and resources for teaching and assessing the IT core applications in career and academic programs. These resources are designed to help all learners develop and demonstrate the basic IT skills needed for working in today's global information society. To date, ITAC has articulated the following eleven IT core applications and has developed rubrics that describe four levels of competency for each application:

- Personal Information Management (PIM)/Productivity
- Electronic Mail
- Internet
- Writing/Publishing
- Presentation
- Spreadsheet
- Database
- Collaborative/Groupware
- Computer Operations
- Computer-based Equipment
- Global Positioning Systems/Geographic Information Systems (GPS/GIS)

Using the ITAC Rubrics

Rubrics are not only important tools for learning and assessment, they are also valuable guideposts and benchmarks for developing skills. ITAC Rubrics serve as "output criteria" for *employers* interested in upgrading the skills of their current workers and evaluating the effectiveness of their own training programs. For *educators*, the rubrics provide structure and content for designing programs and developing curriculum to encourage student achievement. For *learners* of all ages, ITAC Rubrics offer a set of skill development challenges as learners begin to explore career options and prepare for their working futures.

More specifically, the ITAC rubrics can be used in both formal and informal learning environments to assess the learner's mastery of core IT applications and tools.

We invite you to join with other education-to-employment professionals who use the ITAC rubrics as a resource for increasing rigor and relevance in their programs. ITAC Rubrics are designed specifically to help the following professionals:

- Educators who seek content and a rigorous structure for designing programs and developing curriculum
- Community and technical college faculty who want to integrate IT core skills into their programs and courses
- Secondary and post-secondary teachers and instructors who wish to assess the IT skills that students demonstrate in their class projects, set appropriate learning goals, and use a quality checklist for student achievement
- Curriculum developers seeking to design materials that integrate IT skills into different academic and career-oriented courses of study and to align courses with skill standards
- Employment training and workforce development centers, such as One-Stop Centers, to evaluate the effectiveness of training programs for adult learners and displaced workers
- Human resources staff who wish to more effectively evaluate the skill level of job applicants, based on the performance criteria of the rubrics
- Students and learners of all ages, from elementary school through adulthood, wanting to set goals for what they should know and be able to do and to track their competencies and achievements for resumes and job interviews
- Educators, curriculum developers, and trainers looking for assessment tools that are not tied or limited to specific brands of software or hardware

With the ITAC Rubrics, educators and trainers can be confident that they have a solid lens to assess student and learner performance with basic IT applications and industry-validated tools, and the foundation needed to set clear benchmarks for mastery of basic IT skills.

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JOYCE MALYN-SMITH

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1. Personal Information Management (PIM)/Productivity Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1: Manage personal schedule and contact information.</p>	<ul style="list-style-type: none"> • Create a to-do list (list of tasks only, no due dates or priorities). • Add information in only one type of schedule (daily, weekly, or monthly). • Add contact information. 	<ul style="list-style-type: none"> • Create a to-do list (with due dates or priorities). • Add, delete, and edit information in daily, weekly, and monthly calendar. • Add, delete, and edit contact information. 	<ul style="list-style-type: none"> • Create and update a to-do list with due dates, status, categories, and priorities. • Add, delete, and edit schedules. Use features such as recurring and multiple-day events or reminders. • Group and categorize contact information. 	<ul style="list-style-type: none"> • Integrate the information from the main functions of PIM (schedule, contact, and to-do list). • Personalize appearance of the calendar. • Synchronize PIM data across multiple devices. • Transfer contact information to and from IT applications such as e-mails, faxes, and letters.
<p>PE2: Create memos and notes.</p>	<ul style="list-style-type: none"> • Do not use these features. 	<ul style="list-style-type: none"> • Use one of the following features: notes, memos, or reminders. 	<ul style="list-style-type: none"> • Create notes, informal memos, and reminders. 	<ul style="list-style-type: none"> • Integrate notes, informal memos, and journal entries into other IT applications such as word processor and e-mail. • Create and maintain journal entries.

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2. Electronic Mail Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1: Use e-mail to communicate within and across organizations.</p>	<ul style="list-style-type: none"> • Create an e-mail account. • Access e-mail system using login and password. • Send, receive, and reply to an e-mail. • Save, delete, and print e-mail. 	<ul style="list-style-type: none"> • Create entry in address book. • Use address book to send e-mail. • Forward and redirect an e-mail. • Demonstrate knowledge of e-mail etiquette (do not flame people, no all caps, reply when only appropriate). • Use find and sort functions. 	<ul style="list-style-type: none"> • Create e-mail messages in accordance with established business standards (e.g., grammar, word usage, spelling, sentence structure, clarity).* • Manage mailboxes by deleting and organizing messages. • Use e-mail features such as reply requested, return receipt, out-of-office notices. 	<ul style="list-style-type: none"> • Filter messages into folders. • Set preferences/options. • Integrate e-mail and PIM address books. • Integrate multiple mail boxes.
<p>PE2: Use e-mail to share files and documents.</p>	<ul style="list-style-type: none"> • Open attachments for available applications. 	<ul style="list-style-type: none"> • Access (open or detach) attached files and documents from e-mail messages. • Attach files, documents, and links to messages. 	<ul style="list-style-type: none"> • Open (or detach) and save attachments to the intended location. • Select appropriate strategy (attachment vs. link) for sharing information. • Use appropriate e-mail security measures (e.g., use virus scan to check for viruses, do not download attachments from unknown sources). 	<ul style="list-style-type: none"> • Recognize compressed files and when to send a file or document in compressed form.

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3. Internet Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1: Access and navigate the Internet (e.g., use a web browser).</p>	<ul style="list-style-type: none"> • Access a given web site using an Internet browser. • Navigate within a web site using basic browser software functions (e.g., back, forward). 	<ul style="list-style-type: none"> • Use additional browser functions (e.g., refresh, history, bookmarks). • Complete and submit web forms. • Organize bookmarks for frequently used or important web sites. 	<ul style="list-style-type: none"> • Navigate between and within web sites. • Access and use multiple browser windows. • Differentiate between secure and non-secure web sites. • Download a file from a web site to the desired location. 	<ul style="list-style-type: none"> • Troubleshoot problems with a given URL (e.g., a specific file has moved in the domain). • Use FTP to upload and download files to a remote computer. • Configure Internet browser (e.g., clear history and cache, set security levels...).
<p>PE2: Search for information and resources.</p>	<ul style="list-style-type: none"> • Use directory services (e.g., Yahoo, MSN, Netscape, or Google directory). • Use search function in portals (such as excite.com, netscape.com). 	<ul style="list-style-type: none"> • Use one search engine. • Conduct simple keyword search. • Access search results (identified web sites). • Use a search function within a web site. 	<ul style="list-style-type: none"> • Select search engine(s) appropriate for desired information. • Identify and articulate an information search. • Use phrase search and simple Boolean logic (AND, OR, NOT, NEAR). • Refine search by modifying search terms. 	<ul style="list-style-type: none"> • Refine search terms by using selection criteria (e.g., languages, file format, domain).
<p>PE3: Evaluate Internet resources.</p> <p>(Evaluation of Internet resources is a critical skill that requires the ability to distinguish between relevant and irrelevant information relative to the purpose and subject of the search.)</p>	<ul style="list-style-type: none"> • Rely on search engine/directory service to identify and appropriately prioritize information related to your search. • Rely on limited search attempts. • Accepts information provided as published. 	<ul style="list-style-type: none"> • Use knowledge of topic to assess relevance of Internet information. • Verify accuracy of information (e.g., up-to-date, credentials of the author, the host site, ability to get more information, caliber of writing...). • Identify what results support search criteria. 	<ul style="list-style-type: none"> • Prioritize Internet resources against search criteria. • Look for corroboration and independent validation of information (e.g., Do different sites reference each other? Is the information consistent?). • Take action to clarify ambiguous or incomplete information. 	<ul style="list-style-type: none"> • Take action to access highly dependable sites. • Gather a collection of highly reliable portal sites, libraries, and search engines as a starting point for research. • Aware of industry-validated sites (e.g., refereed journals, ERIC archives, commercial information services). • Develop personal search protocols and procedures for conducting Internet research following recognized information evaluation criteria (accuracy, validity, currency of information...).

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4. Writing/Publishing Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1: Prepare simple documents and other business communications.</p>	<ul style="list-style-type: none"> • Create documents using default template. • Rely on formatting defaults built into template. • Employ spell check. 	<ul style="list-style-type: none"> • Create documents using additional templates. • Apply basic formatting to text (font face, color and size, alignment). • Employ word processing utilities such as grammar check or print preview. 	<ul style="list-style-type: none"> • Create documents (letters, memos, reports) both with and without templates.* • Format text using basic formatting functions (e.g., paragraph spacing, margins, bullets, numbering...)* • Employ word processing utility tools (e.g., track changes or thesaurus)* 	<ul style="list-style-type: none"> • Create and use new templates, forms, and style sheets to make documents. • Format text using advanced formatting functions (e.g., borders and shading, indents and spacing...). • Use word processing utility or add-ins to share documents (e.g., fax, print to file, create a PDF...). • Customize the user environment, such as adding/removing toolbars, changing menus, adding utilities.
<p>PE2: Prepare reports and other business communications, integrating graphics and other non-text elements.</p>	<ul style="list-style-type: none"> • Use automatic page numbering function. • Copy existing table and modify contents. • Do not integrate graphics electronically into text document (e.g., a chart is printed as a separate document for the final product). 	<ul style="list-style-type: none"> • Use header and footer function. • Create new tables with default formatting. • Paste graphics into document with no adjustment to text formatting. • Use automated table of contents. 	<ul style="list-style-type: none"> • Use advanced formatting features (headers, footers, page numbering, styles)* • Customize tables (add borders and shading, merge rows and columns, adjust row/column sizes). • Use insert picture/object function to place graphics in document and adjust text formatting accordingly. • Employ document organization tools (e.g., outline, footnotes, and endnotes...). 	<ul style="list-style-type: none"> • Use section and column functions. • Use anchors and groupings for tables and graphics. • Enhance publications using paint and draw functions. • Employ additional document organization tools (e.g., indexing and cross-references...).
<p>PE3: Prepare complex publications.</p>	<ul style="list-style-type: none"> • Add content to an existing formatted publication, using desktop publishing software (e.g., Publisher, PageMaker, Quark Xpress, FrameMaker)* • Enter content directly into publication (does not import prepared text). 	<ul style="list-style-type: none"> • Create a new version of an existing complex publication with no formatting changes (e.g., a new issue of a newsletter). • Import content from other applications (e.g., text, graphics, photos...). 	<ul style="list-style-type: none"> • Make changes to format or layout of an existing complex publication or template (e.g., 8-page, 2-color newsletter with columns, sidebars, photos and graphics, multi-color output...). • Organize content and standardize format from various sources. • Create non-print output for publication (e.g., PDF, postscript...). 	<ul style="list-style-type: none"> • Create a new complex publication. • Customize the publication software to personal preferences, such as styles, adding/removing toolbars, changing menus, adding utilities.

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5. Presentation Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
PE1: Prepare presentations for training, sales, and information sharing.	<ul style="list-style-type: none"> • Create a new presentation using default slide layout and design. • Edit text elements in an existing presentation. • Does not use animations. 	<ul style="list-style-type: none"> • Create a new presentation using text layouts. • Select a slide design for the presentation. • Add text elements to an existing presentation. • Add content (e.g., table, chart, graph, clip art, picture) using automated content wizard. • Edit existing slide transitions. 	<ul style="list-style-type: none"> • Create a new presentation using both text and content layouts. • Change color scheme for a slide design. • Create and edit external graphic elements (e.g., a scanned photo or drawing) in a slide. • Create new animations and action buttons. • Create new slide transitions. 	<ul style="list-style-type: none"> • Create a new presentation template. • Modify slide masters (e.g., fonts, graphic elements, colors, layout) for a presentation. • Add audio (e.g., voice or music) to a slide.
PE2: Deliver presentations with supporting materials.	<ul style="list-style-type: none"> • Use slide format exclusively. • Print an entire presentation in slide format. • Run a slide show manually (e.g., using the mouse). 	<ul style="list-style-type: none"> • Create and distribute presentation outline. • Print either key slides or an entire presentation in slide or outline format. • Start an automated slide show. 	<ul style="list-style-type: none"> • Create and distribute presentation handouts or speaker notes. • Print either key slides or an entire presentation in handout or notes format. • Create an automated slide show. 	<ul style="list-style-type: none"> • Distribute presentation materials using the WWW (e.g., create a web page) or in a PDF.

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6. Spreadsheet Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
PE1: Create spreadsheet.	<ul style="list-style-type: none"> • Input numeric or text data to an existing spreadsheet or template. • Edit existing spreadsheet(s) using basic edit functions (cut, copy, paste, find-and-replace). • Adjust rows and columns to accommodate data. • Apply formatting options for clear display of data (e.g., cell alignment, wrap text, bold, borders and shading...). • Print worksheet so that output is readable. 	<ul style="list-style-type: none"> • Create new spreadsheet based on given tables of data. • Apply cell type formatting (e.g., date, dollar, text, decimal...) appropriate to data type. • Add document identification (e.g., page numbers, dates, and titles) in headers and footers. • Print only relevant data so that it is readable (e.g., use set print area to fit into one or multiple pages). 	<ul style="list-style-type: none"> • Create new spreadsheet based on a set of data where you must identify the appropriate structure (e.g., rows and columns) for data display and analysis. • Create new worksheets within the same file for related analyses. • Save spreadsheets in multiple formats (e.g., CSV, text-delimited, SYLK...) to share data with other applications or colleagues. • Edit existing spreadsheet(s) using program functions (series auto-fill, repeat, clear). • Hide columns and rows. • Print requested data so that it is legible, accurately labeled, and aligned well in the page. 	<ul style="list-style-type: none"> • Create new spreadsheet by importing data from data files or other spreadsheet programs. • Apply protection to worksheet data elements and/or workbook using protection tools. • Define a range name for a cell, a range of cells, formula, and/or a constant value. • Record a new macro for a repeated action.
PE2: Perform calculations and analysis on data.	<ul style="list-style-type: none"> • Do not create graphs or charts. • Build a simple calculation using two cells or values and one operand (+, -, *, /). • Create a simple database by making a list on a worksheet. 	<ul style="list-style-type: none"> • Use chart wizard to create a chart or graph from an adjacent selection with appropriate chart type. • Build calculations using the formula wizard. • Use sort functions to organize data by columns in a list. 	<ul style="list-style-type: none"> • Write simple formulas. • Use chart wizard to create a chart or graph from adjacent selections with appropriate chart type and labels. • Use filter and comparison criteria to find specific values in rows in a list. • Link data between two or more worksheets in a single file. 	<ul style="list-style-type: none"> • Create a chart or graph independently from adjacent or non-adjacent selections (different worksheets or files) with appropriate chart type and labels. • Build calculations independently using the correct function and data references. • Create a simple pivot table based on a list created in a spreadsheet program or database. • Link data between two or more files.

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7. Database Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
PE1: Design, create, and test a database.	<ul style="list-style-type: none"> • Open/exit an existing simple database application. • View database objects – tables, forms, queries, reports. • Enter data using a simple form. • Interpret customer needs and translate into simple data tables. 	<ul style="list-style-type: none"> • Create new database with table and define appropriate fields. • Process data using pre-existing functions defined by the database administrator. • Edit existing data using basic functions (insert, delete, sort, copy, and paste). • Interpret customer needs and translate into a logical, interrelated organization of data. • Locate/replace data using search and replace functions.* 	<ul style="list-style-type: none"> • Create a new form for data entry. • Create a query by linking two or more tables. • Test database by performing data entry and table queries; verify accuracy of output. • Create new relationships in an existing relational database. • Modify database (e.g., field format, keys, attributes, relationships). 	<ul style="list-style-type: none"> • Create forms and menus for novice users. • Apply validation rules to fields and database form. • Write or modify simple code to customize a form or report. • Setup security protection for a database. • Create a new database with two or more tables and multiple relationships.
PE2: Manage, analyze, and report on interrelated data elements.	<ul style="list-style-type: none"> • Search database for record by scrolling or stepping through database records. • Understand data and reporting needs by defining the table to be created and the number and type of fields within the table. 	<ul style="list-style-type: none"> • Search database for a record using “find” function. • Produce database report by printing section of database using simple functions (e.g., menu choices) defined by the database administrator. 	<ul style="list-style-type: none"> • Search a database table to locate records using more than one method.* • Sort data using single- and multiple- field sorts. • Perform single and multiple table queries (e.g., create, run, save).* • Print forms, reports, and results of queries and verify accuracy of output.* 	<ul style="list-style-type: none"> • Sort and group records in report. • Query database using more than one criterion. • Analyze data and place statistics summarizing data in report. • Write a simple SQL statement (e.g., a select statement).

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8. Groupware/Collaboration Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1: Facilitate group work through management of shared schedule and contact information.</p>	<ul style="list-style-type: none"> • Access a shared schedule. • Look up contact information in a shared address book. 	<ul style="list-style-type: none"> • Add group events (e.g., select a meeting time or project deadline) to a shared schedule. • Accept or decline a meeting request or task assignment. • Edit contact information in a shared address book. 	<ul style="list-style-type: none"> • Add, delete, and edit group schedule. Use features such as recurring events, multiple-day, and reminders. • Create a meeting request or task assignment. • Add or delete contacts in a shared address book. 	<ul style="list-style-type: none"> • Integrate the information from personal PIM and Groupware. • Counter-offer or request more information about a meeting request. • Synchronize personal and shared address books.
<p>PE2: Facilitate group work through management of shared files and online information.</p>	<ul style="list-style-type: none"> • Follow a document link. • Look up contact information in a shared address book. 	<ul style="list-style-type: none"> • Access shared files on a network folder. • Access shared files in a document library or database. • Use a website to read messages and access shared files. 	<ul style="list-style-type: none"> • Organize, store, and share files in network directories. • Organize, store, and share files using a document library or database. • Organize, store, and share files using web sites. 	<ul style="list-style-type: none"> • Manage documents in multiple shared files and/or network directories. • Define specifications for a new document library or database. • Moderate or manage a project web site.
<p>PE3: Facilitate group work through instant messaging or virtual meetings.</p>	<ul style="list-style-type: none"> • Can describe a virtual meeting, but has not participated in one. • Can describe what an instant message is, but does not use it. 	<ul style="list-style-type: none"> • Participate in a virtual presentation (e.g., a speaker with or without a visual presentation). • Respond to an instant message. 	<ul style="list-style-type: none"> • Participate in virtual group discussions and meetings. • Send or respond to an instant message from a group list. 	<ul style="list-style-type: none"> • Initiate and lead a virtual meeting. • Send or respond to an instant message to a new IM address.

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9. Operating System and Data Management Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
PE1: Manage computer operations.	<ul style="list-style-type: none"> Power on the computer and peripherals. Start an application (such as word processor, Internet browser, e-mail) from desktop icon or the menu bar. Use features of an application simply by using the mouse, keyboard, and the application's menu bar. 	<ul style="list-style-type: none"> Connect ports of the computer to peripherals. Install/uninstall an application. Interrupt and restart applications or the computer when the application and/or operating system freeze. 	<ul style="list-style-type: none"> Configure desktop environment and applications for efficient operation (e.g., create short cuts, customize monitor size and menu bars). Apply basic commands of operating system software (e.g., create, rename, and delete directories).* Employ desktop operating skills (e.g., use mouse buttons and keyboard shortcuts).* 	<ul style="list-style-type: none"> Perform simple testing and diagnostics of devices (e.g., sound card, serial port, disk surface test). Modify configuration of devices (e.g., modem, monitor). Partition hard disk for data and application sharing. Perform disk clean up and disk defragmenter tasks.
PE2: Manage file storage.	<ul style="list-style-type: none"> Maintain all files on local hard drive. Put all data files in a single level directory or in one folder. Distinguish file versions by different names. 	<ul style="list-style-type: none"> Put data files in different level directories or folders. Backup data to CD, disk, network, or server. Use folders or directories with meaningful names to store related files. 	<ul style="list-style-type: none"> Use appropriate system tools to optimize memory and disk space usage (e.g., backup, disk cleanup, disk defrag). Determine file organization (e.g., use of appropriate directory structures and names).* 	<ul style="list-style-type: none"> Perform scheduled systematic backup procedure. Recover, as much as possible, erased or corrupted data. Demonstrate knowledge of the system utilities used for file management (e.g., change protection modes, rename, delete).
PE3: Compress or alter files.	<ul style="list-style-type: none"> Uncompress files using add-ons to applications (e.g., viewing JPeg files in the browser). Save file as the application's default type. Open file only with the application that created the file. 	<ul style="list-style-type: none"> Uncompress files using compression software. Convert files by using "save as" feature of an application (e.g., text file to word processor file; MS Word doc file to RTF file). 	<ul style="list-style-type: none"> Compress and uncompress files/folders using compression software. Convert file formats (e.g., convert Excel or Word format file to PDF format).* Convert existing files using utilities provided by the software. 	<ul style="list-style-type: none"> Select and use compression software to improve compression ratio.

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10. Computer-Based Equipment Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
PE1: Operate computer driven equipment and machines.	<ul style="list-style-type: none"> Power-up and log-on with assistance. Operate equipment and machine under guidance of an instructor or fellow worker. Needs help to log-off and power-down. 	<ul style="list-style-type: none"> Power-up without following procedures and safety policy. Operate equipment and machine independently using inappropriate procedures or without adhering to safe use practice. Power-down without following established procedures. 	<ul style="list-style-type: none"> Follow power-up and log-on procedures.* Secure needed supplies and resources.* Run applications/jobs in accordance with processing procedures.* Interact with/respond to system messages using console device.* Follow log-off and power-down procedures.* 	<ul style="list-style-type: none"> Provide feedback to improve operating procedures. Design new operating procedures to suit working environment.
PE2: Use installation and operation manuals.	<ul style="list-style-type: none"> Unfamiliar with equipment information and reference material. 	<ul style="list-style-type: none"> Access information from appropriate reference material with assistance. Information accessed is incomplete or inappropriate. 	<ul style="list-style-type: none"> Access needed information using appropriate reference materials.* 	<ul style="list-style-type: none"> Access additional information not included in equipment manufacturer's reference materials. Customize equipment manufacturer's manuals for in-house practices.
PE3: Troubleshoot computer driven equipment and machines and access support as needed.	<ul style="list-style-type: none"> Test and replace simple equipment following instructions from instructor or fellow worker. Does not fill out failure/trouble report. 	<ul style="list-style-type: none"> Test and replace simple hardware following procedure or with assistance from experts. Partially recover data and software. Restore system to partial operating condition. Failure/trouble reports are incomplete. 	<ul style="list-style-type: none"> Test system using diagnostic tools/software.* Repair/replace malfunctioning hardware.* Make adjustments as needed to restore system to normal operating standards (e.g., recover data and/or files, reprogram or reinstall software). Complete failure/trouble reports correctly. Access in-house or external support as needed. 	<ul style="list-style-type: none"> Develop new testing procedures for failures not included in equipment manual and documentation. Develop new software and data recovery procedure. Develop new system recovery procedure.

Rubrics to Assess Basic IT User Skills

11. Global Positioning/Geographic Information (GPS/GIS) Applications

Performance Element (PE)	Level 1 Novice	Level 2 Approaching Proficiency	Level 3 Proficiency	Level 4 Above Proficiency
<p>PE1 (GPS): <i>Data Collection</i> Use GPS for basic functions of location, navigation, speed/direction calculation, and data collection.</p>	<ul style="list-style-type: none"> Allow the acquisition of satellites and acquire a coordinate position (e.g., a 2D or 3D lock). Determine/read a latitude/longitude coordinate position from a GPS receiver. Determine/read a speed (e.g., mph or kmph) and a nominal direction from GPS receiver. 	<ul style="list-style-type: none"> Use a navigation screen to navigate to a saved waypoint. Change the measurement units used for speed and time from metric to U.S. units (e.g., inches, feet, miles or other). Change the position format from latitude and longitude to Universal Transverse Mercator (UTM) or other coordinate system. Convert latitude and longitude coordinates from decimal degrees (DD.DD), degrees and decimal minutes (DD:MM.MM) or degrees, minutes, and decimal seconds (DD:MM:SS.SS). 	<ul style="list-style-type: none"> Save (record) current location in GPS receiver as a waypoint. Enter a previously recorded waypoint into a GPS receiver. Determine direction using an azimuthal value. (Azimuth: The horizontal direction of a line measured clockwise from a reference plane, usually the meridian.‡) Use a navigation screen to navigate previously saved routes. Record and save GPS trac log. 	<ul style="list-style-type: none"> Create, record, and save GPS attribute information. Retrieve GPS attribute information. Determine circular probability of error for a GPS receiver (i.e., the accuracy of a receiver).
<p>PE2 (GPS/GIS): <i>Integration</i> Collect and validate GIS data for use in mapping.</p>	<ul style="list-style-type: none"> Transfer collected data from handheld GPS receiver to computer. Identify various GIS data formats (e.g., shape files, arcinfo files, etc.). Locate Internet website to acquire GIS data (e.g., terraserver). Understand concepts of map scale and projections. 	<ul style="list-style-type: none"> View collected GPS data on computer in tabular data format (e.g., a delimited text file). Convert GIS data from various formats to another. Download and save GIS data from the Internet relevant to data collected with GPS receiver. Understand differences between vector (points, lines, and polygons) and raster (grid cells) data concepts. 	<ul style="list-style-type: none"> Convert data from format used by GPS receiver to format used by GIS software. Locate and view metadata for downloaded GIS data. Identify different types of vector and raster data sets. 	<ul style="list-style-type: none"> Validate collected GPS data for possible spatial outliers (i.e., data collection errors). Trouble shoot and change map projections to align layers. Evaluate and validate metadata for downloaded GIS data.
<p>PE3: Perform basic GIS mapping functions.</p>	<ul style="list-style-type: none"> Add map layers. Zoom in and out of a map to change map scale. Open a theme table and view attribute data. Sort attribute data within a table. Identify features on a map. 	<ul style="list-style-type: none"> View map layers in different projections. Change symbology for map features. Label map features. Classify feature data. 	<ul style="list-style-type: none"> Query data in a database to identify, select, and find features of attributes. Edit and add tabular attribute data in a table. Join and relate tables. Add an attribute field to a table. Calculate distance and area for map features. 	<ul style="list-style-type: none"> Calculate attribute values. Buffer attribute features. Edit map layers based on feature attributes. Create new map layers. Create a map for a presentation. Create new features in a map layer.