



IT Troubleshooting

PEIMS Code: N1302815

Abbreviation: ITTROUB

Grade Level(s): 10-12

Award of Credit: 1.0

Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to [TAC §74.13](#) for guidance on endorsements.

Course Description:

The Information Technology (IT) Troubleshooting course is about applying logic over technical components to identify and resolve problems. The course focuses on developing a methodical approach in IT troubleshooting and leveraging those skills in a workplace environment. In this course, students will learn and use proven troubleshooting methods and apply those in a collaborative workplace setting. Students will develop personal success skills, including time management and personal accountability measures, strategies for collaboration and teamwork, and effective written and verbal communication skills. The knowledge and skills acquired in the course will allow students to use IT resources, information, and data safely, ethically, and following legal guidelines. Students will work within a service level model that helps them to interpret, clarify, and diagnose issues with hardware, software, and networking.

Essential Knowledge and Skills:

- (a) General Requirements. This course is recommended for students in *grades 10-12*. Recommended prerequisites: *Principles of Information Technology* and *Computer Maintenance/Lab*. Students shall be awarded *one credit* for successful completion of this course.
- (b) Introduction.
 - (1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
 - (2) The Information Technology (IT) Career Cluster focuses on building linkages in IT occupations for entry-level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.

IT Troubleshooting

- (3) The *IT Troubleshooting* course is about applying logic over technical components to identify and resolve problems. The course focuses on developing a methodical approach in IT troubleshooting and leveraging those skills in a workplace environment. In this course, students will learn and use proven troubleshooting methods and apply those in a collaborative workplace setting. Students will develop personal success skills, including time management and personal accountability measures, strategies for collaboration and teamwork, and effective written and verbal communication skills. The knowledge and skills acquired in the course will allow students to use information technology (IT) resources, information, and data safely, ethically, and following legal guidelines. Students will work within a service level model that helps them to interpret, clarify, and diagnose issues with hardware, software, and networking.
 - (4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.
 - (5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.
- (c) Knowledge and Skills.
- (1) The student demonstrates personal success factors and professional employability skills. The student is expected to:
 - (A) describe the benefits of effective time management and explain how to manage the use of one's time efficiently;
 - (B) identify and employ the behaviors of an effective team member;
 - (C) explain the importance of emotional intelligence to the role of an IT Support Specialist;
 - (D) describe a protocol for handling an emotional hijack, or variance in reasoning skills, either of oneself or another;
 - (E) describe and apply strategies to resolve conflicts when they arise;
 - (F) employ active listening skills, including paraphrasing and asking questions for clarification;
 - (G) communicate effectively when writing to and speaking with team members, clients/customers, and others;
 - (H) follow best practices for email communications;
 - (I) interpret technical language, documents, and diagrams and translate them into lay terminology when needed;
 - (J) demonstrate the use of proper grammar, spelling, and capture complete thoughts in communications and documentation; and
 - (K) investigate potential IT career pathways to becoming IT Support Specialist.
 - (2) The student develops and models customer-service skills. The student is expected to:
 - (A) identify and model the characteristics of excellent customer service;
 - (B) list and demonstrate the steps for opening and greeting a contact;
 - (C) explain the benefits of using a client's name;

IT Troubleshooting

- (D) identify habits and situations to avoid when interacting with a client;
 - (E) explain the importance of keeping clients informed of status changes and list the steps for putting a client on hold or transferring a call;
 - (F) identify techniques and strategies for diffusing difficult calls and customers; and
 - (G) document all communications and process outcomes clearly and appropriately.
- (3) The student applies procedures for various support interaction types. The student is expected to:
- (A) describe the primary responsibilities and top skills of an IT Support Specialist and identify how a professional can deliver consistent, quality service;
 - (B) explain and demonstrate safety procedures for unpacking, handling, and repacking replacement parts;
 - (C) demonstrate fluency with methods and technologies such as in-person, email, phone, web, or remote access used for delivering support and describe which support delivery methods for different types of support;
 - (D) demonstrate the use of remote access technologies to troubleshoot an issue; and
 - (E) describe the purpose and value of the security management process and the IT Support Specialist's role in that process.
- (4) The student implements proven troubleshooting methods and strategies within the context of a service level model. The student is expected to:
- (A) apply a troubleshooting process for diagnosing issues with hardware, software, and the network;
 - (B) explain the importance of clearly documenting progress through the troubleshooting process;
 - (C) describe activities common to a Help Desk Service Level Model (Incident Management) process;
 - (D) interpret and clarify different types of incidents, problems, and events submitted in the Help Desk Service Model or trouble ticketing system;
 - (E) describe an operational level agreement (OLA) and the role of the IT Support Specialist related to an OLA;
 - (F) describe what is meant by escalation and the reasons an incident may be escalated;
 - (G) access and apply relevant system updates for supported devices; and
 - (H) describe service and support center metrics, including a service level target, and the IT Support Specialist's role in monitoring and reviewing data related to these metrics.
- (5) The student describes and applies best practices for the safe, ethical, and legal use of resources and information. The student is expected to:
- (A) demonstrate and promote positive digital citizenship and acceptable use in all interactions when using digital resources;

IT Troubleshooting

- (B) describe best practices for creating passwords such as increasing password length, password complexity, password blacklists, password resets, limiting attempts, or multi-factor authentication;
 - (C) examine and adhere to guidelines for using media, information, and applications protected by copyright;
 - (D) compare copyright, Fair Use, Public Domain, and Creative Commons licensing;
 - (E) apply and enforce licensing guidelines for software, media, and other resources;
 - (F) explain the importance and uses of encryption;
 - (G) describe and follow principles for handling confidential information;
 - (H) analyze cyber threats and social engineering vulnerabilities and ways to prevent them;
 - (I) describe various types of security policies and summarize the importance of physical security measures and logical security concepts;
 - (J) explain the importance of reporting security compromises such as addressing prohibited content and activity; and
 - (K) determine and implement appropriate data destruction and disposal methods relevant to a given scenario.
- (6) The student applies foundational knowledge and skills for the installation, configuration, operation, and maintenance of desktops and workstations. The student is expected to:
- (A) explain the procedure used to install and configure motherboards, central processing units (CPUs), and add-on cards relevant to a given scenario, such as a custom PC configuration to meet customer specifications;
 - (B) describe how to implement security best practices to secure a workstation, including software-based computer protection tools such as software firewalls, antivirus software, and anti-spyware;
 - (C) demonstrate how to identify symptoms or error codes, including no power, no POST, no BOOT, and no video that indicate device issues and explain how to troubleshoot them;
 - (D) describe the process used to install, troubleshoot, or replace RAM types and data storage;
 - (E) describe how to troubleshoot, clean, repair, or replace internal components, including heat sink units and thermal paste; exhaust vents and fans; power supply units, power adapters, and batteries; and wireless and wireless wide area network (WWAN) antenna routing;
 - (F) explain the importance of conducting periodic system maintenance, including both physical and electronic cleaning, disk checks, routine reboots, data dumps, and testing; and
 - (G) describe and demonstrate how to prevent, detect, and remove malware using appropriate tools and methods.

IT Troubleshooting

- (7) The student applies foundational knowledge and skills about the installation, configuration, operation, and maintenance of operating systems (OS) and software. The student is expected to:
 - (A) demonstrate the use of OS features and tools relevant to given scenarios;
 - (B) demonstrate the use of OS utilities relevant to given scenarios;
 - (C) execute OS command-line tools such as, ipconfig, netstat, dir, nbtstat;
 - (D) troubleshoot OS problems relevant to a given scenario;
 - (E) demonstrate how to use features and tools of the Mac OS, Linux, and Chrome client/desktop operating systems;
 - (F) explain troubleshoot problems in the Mac OS, Linux, and Chrome Client/desktop operating systems; and
 - (G) explain database concepts and the purpose of a database.
- (8) The student installs, configures, operates, maintains, and troubleshoots issues related to peripheral devices relevant to a given scenario. The student is expected to:
 - (A) explain and demonstrate how to install, configure, maintain, and troubleshoot storage devices;
 - (B) explain and demonstrate how to install, configure, maintain, and troubleshoot printers, copiers, and scanners, including Small Office Home Office (SOHO) multifunction devices and printers;
 - (C) explain and demonstrate how to install, configure, maintain, and troubleshoot video, projector, and displays; and
 - (D) explain and demonstrate how to install, configure, maintain, and troubleshoot multimedia devices, such as sound cards, speakers, microphones, and webcams.
- (9) The student monitors current issues related to the installation, configuration, operation, and maintenance of laptops, tablets, and other mobile devices, including Internet of Things (IoT) devices. The student is expected to:
 - (A) explain and demonstrate how to install and configure laptop and netbook hardware and components as well as a custom configuration to meet customer specifications;
 - (B) explain and demonstrate how to install components within the display of a laptop;
 - (C) explain and demonstrate how to connect and configure accessories and ports of mobile devices;
 - (D) analyze and apply methods used to secure mobile devices;
 - (E) configure mobile device network connectivity and application support;
 - (F) demonstrate, apply, and implement methods to perform mobile device synchronization, such as to a laptop or desktop computer; and
 - (G) explain and demonstrate how to troubleshoot mobile device, OS, and application issues relevant to a given device.

IT Troubleshooting

- (10) The student troubleshoots issues with wired and wireless networks and cloud computing resources. The student is expected to:
- (A) explain and demonstrate how to install, configure, and secure a wired network;
 - (B) explain and demonstrate how to install, configure, and secure a basic wired network;
 - (C) compare and describe wireless security protocols and authentication methods;
 - (D) analyze and describe troubleshoot wired and wireless network problems;
 - (E) demonstrate the use of appropriate networking tools safely to fix network issues;
 - (F) explain how computing devices such as laptops and cell phones connect and share data; and
 - (G) describe the components of cloud-computing architectures and features of cloud-computing platforms.

Recommended Resources and Materials:

Pengella, James, and Pamela J. Taylor. *The Official CompTIA A+ Core 1 & Core 2 Instructor Guide: Exams 220-1001 and 220-1002*. IL: CompTIA, Inc., 2018.

- ITProTV. <https://www.itpro.tv>
- Professor Messor, <https://www.professormessor.com>
- Technology Gee, <https://www.technologygee.com>
- Pearson VUE, <https://home.pearsonvue.com>
- TestOut PC Pro Courseware <https://w3.testout.com/courses/pc-pro>
- North Carolina Student Connect <https://ncbce.org/narrative/install/>
- Cisco Networking Academy *Networking Essentials* <https://netacad.com>

Recommended Course Activities:

- When addressing inter-and intrapersonal skills, teachers can consider a range of role-playing situations in which students use checklists, sentence stems, talking points, or other resources to develop and practice skills like active listening, questioning techniques, and conflict resolution strategies. Role-playing is also helpful for practicing customer service skills, such as initiating conversations, greeting people and using their names, and closing conversations of different types.
- A simulated workplace environment is appropriate for exploring and implementing standard operating procedures, especially using a knowledge base or trouble-ticket system or implementing a service-level model.
- Students can explore potential IT career pathways and prepare reports for each other that include data on prerequisite skills, certifications, career pathways, potential salaries, and other factors of interest.
- Students can interview IT professionals or use a variety of web resources, including the Career Pathways from CompTIA.
- Reports can be verbal, written, or incorporate a combination of images or video.
- Students can explore licensing agreements for software and web resources adopted by the district to better understand acceptable and unacceptable use.

IT Troubleshooting

- Much of the installation, configuration, maintenance, and troubleshooting of hardware, software, and networking is best accomplished through hands-on activities. Students can be provided scenarios in which students study parameters, propose solutions, and then implement them, documenting their progress with written and visual (images and video) in a knowledge base.

Suggested methods for evaluating student outcomes:

- Inter- and intrapersonal skills are best assessed through application in scenarios or work products.
- Role-playing activities can be conducted in person or on video.
- Assessment and feedback can be accomplished through checklists, rubrics, or written or verbal feedback to students following role-playing or the presentation of products.
- Students should be familiar with using and contributing to a knowledge base.
- Create a shared folder to document that students are providing comments.
- Work independently or in small groups to create products or projects that represent their learning. Many of the installations, configurations, and troubleshooting activities represent appropriate, real-world problems that students can investigate.
- Encourage students to document their progress troubleshooting and resolving issues that can then be integrated into the knowledge base.
- Create flashcards (e.g., Quizlet), knowledge checks (e.g., Kahoot! or Quizziz), Frayer diagrams, and other means to practice and use vocabulary. Vocabulary and other comprehension/recall tasks can be accomplished with a variety of forced-choice assessments, written, or online.
- Implement the use of item banks or curricula software with test items that are aligned to the course objectives as both practice tests and summative assessments of foundational knowledge and skills.

Teacher qualifications:

- Computer Science (Grades 8-12)
- Secondary Industrial Arts (Grades 6-12)
- Secondary Industrial Technology (Grades 6-12)
- Technology Education (Grades 6-12)
- Technology Applications (Early Childhood-Grade 12)
- Technology Applications (Grades 8-12)
- Trade and Industrial Education (Grades 6-12) This assignment requires appropriate work approval.
- Trade and Industrial Education (Grades 8-12) This assignment requires appropriate work approval.
- Vocational Trades and Industry This assignment requires appropriate work approval.

Additional information: