

Computer Repair, Operations and Maintenance (C-ROM) Level I

Course Description

Computer Repair, Operations and Maintenance (C-ROM) I is a course designed to help students understand the basic, underlying concepts of the knowledge, skills and practices of the computer support industry by learning about its history, career opportunities, business ethics, health and safety, computer systems and troubleshooting skills.

Computer Repair, Operations and Maintenance (C-ROM) I is a five (5) credit course that spans four (4) units and meets daily for forty (40) minutes for the entire school year, or an equivalent with an alternate scheduling system. This course represents the first level of a three-year sequence of the program and targets 9th and 10th grade students interested in this field.

Computer Repair, Operations and Maintenance (C-ROM) Level I

Pacing Guide		
Unit	Topic	Suggested Timing
Unit 1	IT Careers and Internet Safety	approx. 10 weeks
Unit 2	Computer Components and Repair Tools	approx. 7 weeks
Unit 3	Computer System Repair and Upgrade Issues	approx. 10 weeks
Unit 4	Website and Video Making Skills	approx. 8 weeks

Educational Technology Standards

8.2.12.A.2, 8.1.12.A.4, 8.1.12.A.5, 8.1.12.E.1, 8.2.12.E.1, 8.2.12.E.2

- **Technology Operations and Concepts**
 - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
- **Creativity and Innovation**
 - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
- **Communication and Collaboration**
 - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
- **Digital Citizenship**
 - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
- **Research and Information Literacy**
 - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
- **Critical Thinking, Problem Solving, Decision Making**
 - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.

Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready

Career Ready Practices

individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.

Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing

Career Ready Practices

strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.

Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Differentiated Instruction

Strategies to Accommodate Students Based on Individual Needs

<u>Time/General</u>	<u>Processing</u>	<u>Comprehension</u>	<u>Recall</u>
<ul style="list-style-type: none"> Extra time for assigned tasks Adjust length of assignment Timeline with due dates for reports and projects Communication system between home and school Provide lecture notes/outline 	<ul style="list-style-type: none"> Extra Response time Have students verbalize steps Repeat, clarify or reword directions Mini-breaks between tasks Provide a warning for transitions Reading partners 	<ul style="list-style-type: none"> Precise step-by-step directions Short manageable tasks Brief and concrete directions Provide immediate feedback Small group instruction Emphasize multi-sensory learning 	<ul style="list-style-type: none"> Teacher-made checklist Use visual graphic organizers Reference resources to promote independence Visual and verbal reminders Graphic organizers
<u>Assistive Technology</u>	<u>Tests/Quizzes/Grading</u>	<u>Behavior/Attention</u>	<u>Organization</u>
<ul style="list-style-type: none"> Computer/whiteboard Camera phone Spell-checker Online Translation Software 	<ul style="list-style-type: none"> Extended time Study guides Shortened tests Read directions aloud 	<ul style="list-style-type: none"> Consistent daily structured routine Simple and clear classroom rules Frequent feedback 	<ul style="list-style-type: none"> Individual daily planner Display a written agenda Note-taking assistance Color code materials

Enrichment

Strategies Used to Accommodate Based on Students Individual Needs:

- Adaption of Material and Requirements
- Evaluate Vocabulary
- Elevated Text Complexity
- Additional Projects
- Independent Student Options
- Projects completed individual or with Partners
- Self Selection of Research
- Tiered/Multilevel Activities
- Learning Centers
- Individual Response Board
- Independent Book Studies
- Open-ended activities
- Community/Subject expert mentorships

Assessments

Suggested Formative/Summative Classroom Assessments

- Timelines, Maps, Charts, Graphic Organizers
- Teacher-created Unit Assessments, Chapter Assessments, Quizzes
- Teacher-created DBQs, Essays, Short Answer
- Accountable Talk, Debate, Oral Report, Role Playing, Think Pair, and Share
- Projects, Portfolio, Presentations, Prezi, Gallery Walks
- Homework
- Concept Mapping
- Primary and Secondary Source analysis
- Photo, Video, Political Cartoon, Radio, Song Analysis
- Create an Original Song, Film, or Poem
- Glogster to make Electronic Posters
- Weebly to create a Website/Online Portfolio

Interdisciplinary Connections

English Language Arts

- Close reading of industry-related content
- Create a brochure for a specific industry

Social Studies

- Research the history of a given industry/profession
- Research prominent historical individuals in a given industry/profession

World Language

- Translate industry-content
- Create a translated index of industry vocabulary

Math

- Research industry salaries for a geographic area and juxtapose against local cost of living
- Track and track various data, such as industry's impact on the GDP, career opportunities or among of individuals currently occupying careers

Fine & Performing Arts

- Create a poster recruiting young people to focus their studies on a specific career or industry
- Design a flag or logo to represent a given career field

Science

- Research the environmental impact of a given career or industry
- Research latest developments in industry technology
- Investigate applicable-careers in STEM fields

New Jersey Student Learning Standards

8.1- Educational Technology

- 8.1.12.A.4: Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
- 8.1.12.A.5: Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
- 8.1.12.D.2: Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.
- 8.1.12.E.1: Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.2 Technology Education, Engineering, Design, and Computational Thinking

- 8.2.12.A.2: Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
- 8.2.12.C.2: Analyze a product and how it has changed or might change over time to meet human needs and wants.
- 8.2.12.E.1: Demonstrate an understanding of the problem-solving capacity of computers in our world.
- 8.2.12.E.2: Analyze the relationships between internal and external computer components.

9.3 Career and Technical Education: Information Technology Career Cluster

- 9.3.IT.6: Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3.IT.8: Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 9.3.IT.9: Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
- 9.3.IT.12: Demonstrate knowledge of the hardware components associated with information systems.

Common Career Technical Core (CCTC) **Career Cluster Education & Training**

TI 10 – Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.

- TI 10.3 – Identify criminal activity in relationship to cybercrime, the Internet and Internet trafficking.

IT 11 – Demonstrate knowledge of the hardware components associated with information systems.

TI SUP 03 – Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.

- TI SUP 03.1 – Identify the purpose of computer components (e.g. current and new technologies as they arrive).
- TI SUP 03.2 – Demonstrate knowledge to build or install computer system.

TI SUP 09 – Employ technical writing and documentation skills in support of an information system.

- TI SUP 09.3 – Design technical documentation.

Common Core State Standards

English Language Arts

Key Ideas and Details:

- CCSS.ELA-LITERACY.RI.11-12.3 Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Text Types and Purposes:

- CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

Mathematics

Building Functions:

- CCSS.MATH.CONTENT.HSF.BF.A.1.A
Determine an explicit expression, a recursive process, or steps for calculation from a context.

Modeling with Geometry:

- CCSS.MATH.CONTENT.HSG.MG.A.1
Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

Course: C-ROM Unit: II – Computer Components and Repair Tools Grade Level: 9-12	Unit Overview: Unit 2 will provide students with an understanding of the different computer hardware components. Then, students will practice computer safety and accident prevention measures. Finally, students will explore computer software basics.
New Jersey Student Learning Standards (NJSLS): 8.1.12.A.4, 8.1.12.A.5, 8.1.12.D.2, 8.1.12.E.1, 8.2.12.A.2, 8.2.12.C.2, 8.2.12.E.1, 8.2.12.E.2, 9.3.IT.6, 9.3.IT.8, 9.3.IT.9, 9.3.IT.12	
Common Career Technical Core (CCTC): TI 10.3, TI 11, TI SUP 03.1, TI SUP 03.2	
Common Core State Standards (CCSS): RI.11-12.3, W.11-12.2, HSF.BF.A.1.A, HSG.MG.A.1	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
Explore internet safety tips and how computer cookies track information. NJSLS: 8.1.12.D.2, 9.3.IT.8 CCTC: TI 10.3 CCSS: W.11-12.2	How do websites know what ads to show you? How do websites remember your login information? How can you remove cookies from your web browser? How do different cookies affect your computer?	<ul style="list-style-type: none"> ▪ Remove cookies from web browser. ▪ Define different types of web cookies. ▪ Define the purpose cookies were created. ▪ Determine pros and cons of cookies today. ▪ Use incognito mode. ▪ Use different tools to avoid cookies. 	Graphic Organizer List pros and cons of cookies today. Remove Cookies Remove cookies from web browser. Digital Poster Create a poster to warn your peers about the different cookies on the web and how to avoid them.	Cookies Video https://www.youtube.com/watch?v=IPQhME1UYQU Cookies Video https://www.youtube.com/watch?v=I01XMRo2ESg Disable/Delete Cookies https://www.youtube.com/watch?v=urKcVcW7Sas

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>Understand the different computer hardware components, internal and external.</p> <p>NJSLS: 8.2.12.E.1, 8.2.12.E.2, 9.3.IT.12</p> <p>CCTC: TI SUP 03.1, TI SUP 03.2, TI 11</p> <p>CCSS: W.11-12.2, HSG.MG.A.1</p>	<p>What is a PC?</p> <p>What are components that make up a system?</p> <p>What are some considerations required for disassembling a computer?</p> <p>How does a computer understand a mouse click, or a keyboard entry?</p> <p>How does it store information, short term and long term?</p>	<ul style="list-style-type: none"> ▪ Understand the purpose of different computer hardware components. ▪ Understand how BIOS works. ▪ Disassemble and reassemble computer tower. ▪ Understand input and output. ▪ Identify different tools required for handling components of the tower. 	<p>Presentation Students research a hardware component and present their findings.</p> <p>Hands-on Students use a repair kit to disassemble and reassemble a computer tower.</p> <p>Draw-it Students draw a sketch of the inside of a computer tower.</p>	<p>Video: Inside Your Computer https://www.youtube.com/watch?v=AkFi90IZmXA</p> <p>Video: Taking it Apart https://www.youtube.com/watch?v=FIEEDT9wcTg</p> <p>Learning About Computers Resource http://www.learning-about-computers.com/</p>
<p>Practice Accident Prevention & Computer Safety.</p> <p>NJSLS: 8.1.12.E.1, 9.3.IT.9</p> <p>CCTC: TI 11</p> <p>CCSS: W.11-12.2</p>	<p>What is the proper way to lift a computer/printer?</p> <p>What are some safety tips to be aware of in the computer lab?</p> <p>What are some ways we can prevent accidents with computers?</p>	<ul style="list-style-type: none"> ▪ Understand importance of using your back to lift. ▪ Understand the importance of keeping drinks away from computer hardware. ▪ Identify common accidents in the lab. ▪ Identify ways to 	<p>What to do? Give students example scenarios of accidents in the lab and ask them what could have been done to prevent it and what should be done now.</p> <p>Group Video Make a video that depicts important</p>	<p>Resource https://grouplcrajaaida.wordpress.com/assignment/72-2/</p> <p>Article http://www.onlinetechnologyworld.com/4-computer-accidents-and-how-to-prevent-them/</p> <p>Teacher Resource http://www.ilocis.org/docum</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
		<p>prevent computer accidents.</p>	<p>accident prevention tips in the lab.</p> <p>Digital Poster Make a poster that shows 5 computer accidents and how to prevent them.</p>	<p>ents/chpt56e.htm</p>
<p>Understand computer memory and introduction to binary code.</p> <p>NJSLS: 8.2.12.E.1, 8.2.12.E.2, 9.3.IT.12</p> <p>CCTC: TI SUP 03.1, TI SUP 03.2, TI 11</p> <p>CCSS: W.11-12.2, HSG.MG.A.1</p>	<p>What is considered “good” storage for a computer?</p> <p>What takes up a lot of storage in a computer?</p> <p>How can you find out how much storage you used/have left on your computer?</p> <p>How does the computer understand what we type?</p>	<ul style="list-style-type: none"> ▪ Understand how binary code works. ▪ Understand the relationship between bytes, MB, GB, KB, etc. ▪ Determine how much storage is needed for different types of users. ▪ Describe the difference between storage and memory. 	<p>Write your name Write your name in binary code.</p> <p>Decode the Message Decode the binary code message.</p> <p>How Much Storage Should I Buy? Give students a list of different potential computer users and ask them to state how much RAM they should buy on a computer and why.</p> <p>Computer Buying Give each student a different user specs and</p>	<p>Video: Binary Code https://www.youtube.com/watch?v=7cPbOioXTS0</p> <p>ASCII Table: Binary http://web.alfredstate.edu/w/eimandn/miscellaneous/ascii/ASCII%20Conversion%20Chart.pdf</p> <p>Storage vs Memory Video https://www.youtube.com/watch?v=8ytkCp8bWD0</p> <p>Computer Memory Video https://www.youtube.com/watch?v=p3q5zWCw8J4</p> <p>Hard Drive Video</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
			have them choose a computer for purchase.	https://www.youtube.com/watch?v=wteUW2sL7bc
<p>Perform math functions and shortcut equations on EXCEL.</p> <p>NJSLS: 8.1.12.A.4, 8.1.12.A.5</p> <p>CCTC: TI SUP 09.3</p> <p>CCSS: RI.11-12.3, W.11-12.2, HSF.BF.A.1.A</p>	<p>How can I do math on excel?</p> <p>Is Excel just an organizing program?</p> <p>How can I use Excel to make Graphs?</p>	<ul style="list-style-type: none"> ▪ Calculate averages on Excel. ▪ Create a bar graph. ▪ Create a sum on Excel. ▪ Understand the use of Excel in different career clusters. 	<p>Reading/Research Read article about different jobs that require Excel and/or do research.</p> <p>Class Average Have students find their class average using Excel.</p> <p>Reading/Research Read article about different jobs that require Excel and/or do research.</p>	<p>Average/Bar Graph Activity http://faculty.kutztown.edu/schaeffe/Excel/Rickert/Rickert_Excel.pdf</p> <p>Jobs Requiring Excel http://www.skilledup.com/articles/jobs-excel-power-users</p> <p>Excel Training Online https://support.office.com/en-us/article/Excel-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb?ui=en-US&rs=en-US&ad=US</p>
<p>Understand computer software, ways to download, and price comparisons.</p> <p>NJSLS: 8.2.12.A.2; 8.1.12.D.2, 9.3.IT.6</p> <p>CCTC: TI 10.3</p>	<p>What differentiates software from hardware?</p> <p>How can you download a program from online?</p> <p>What is an operating system?</p>	<ul style="list-style-type: none"> ▪ Understand basics of Software. ▪ Understand the legal issues involving pirating. ▪ Name software programs students use. ▪ Understand how to 	<p>Cost Analysis Microsoft Office vs Google Apps, which is cheaper/more popular?</p> <p>Create an App If you could create any software application (phone or computer)</p>	<p>Software Video https://www.youtube.com/watch?v=VumBNb6gcBk</p> <p>Software Resource http://cs.sru.edu/~mullins/cpsc100book/module02_introduction/module02-03_introduction.html</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>CCSS: RI.11-12.3, W.11-12.2</p>		<p>download software.</p>	<p>what would it be, why?</p> <p>Close Reading Research the difference between system software and application software and give examples.</p> <p>Trends What are the trends now in software for smartphones and/or computers?</p>	

Unit 2 Vocabulary

Bytes
Binary Code
BIOS
Cache Memory
Circuits
Cookies
CPU
Gigabyte
Hard drive
Hardware
Input
Kilobyte

Megabyte
Motherboard
Output
PC
Persistent Cookie
RAM
Secure Cookie
Software
Terabyte
Tracking Cookie
Transistor
Zombie Cookie

Suggested Unit Projects

Choose At Least One

Create the next popular smartphone app that will help students your age. Make it something that would be considered “revolutionary,” identify why it would be so important and useful.

Write a letter to your Mayor in binary code discussing the issues students in Paterson face and any suggestions you have to better your community.

Suggested Structured Learning Experiences

InfoAge
 2201 Marconi Road
 Wall, New Jersey
<http://infoage.org/wp/infoage/exhibits/>

Liberty Science Center
 Liberty State Park
 222 Jersey City Boulevard
 Jersey City, NJ 07305
 Phone: 201-200-1000
<http://lsc.org/>

Military Technology Museum of New Jersey
 2201 Marconi Rd
 Wall, New Jersey
 Phone: 330-703-9902
<http://militarytechnj.wixsite.com/main/home>