



School District of Marshfield Course Syllabus

Course Name: Computer Networking I/II

Length of Course: 1 Year

Credit: 1 each

Program Goal(s):

Empower learners to be college and career ready through standards-based experiences in the classroom and career-based learning experiences with business and industry partners. Learners will engage through technology in design, building, problem-solving, repair or service, in a collaborative environment through theory and hands-on experiences.

Course Description:

Develop an understanding of computer networking concepts including network design, hardware wiring systems, and IP addressing. Receive hands-on training in the assembly and configuration of networking components. Emphasis will be placed on the basic operation of routers, routing protocols and switching. This course follows guidelines established by Cisco Networking Academy and may assist you in obtaining a CCNA (Certified Cisco Networking Associate) certification. First year students register for Computer Networking I (927). Second year students register for Computer Networking II (928).

Standards:

Wisconsin Technology & Engineering Broad Based (BB)		
Standard	Learning Priority	Performance Indicators
<p>BB1: Students will analyze the core concepts of technology.</p>	<p>BB1.a: Analyze and use technological systems.</p>	<p>BB1.a.3.m: Identify inputs, processes, outputs and, at times, feedback components for technological systems.</p> <p>BB1.a.4.m: Explain how common energy, power and transportation systems have provisions that detect, bypass or compensate for failures within a system.</p> <p>BB1.a.5.h: Describe how systems can fail because of design flaws, defect parts, poorly matched parts or they were used beyond their design capabilities.</p> <p>BB1.a.6.h: Describe how the outputs of one subsystem are the inputs of another subsystem given a prominent energy, power and transportation system.</p>
	<p>BB1.b: Analyze and use tools and materials.</p>	<p>BB1.b.3.m: Students will describe how resources are the things needed to complete a task (e.g., tools, machines, materials, information, energy, people, capital and time).</p> <p>BB1.b.5.h: Select appropriate resources and explain how trade-offs between competing values, such as availability, cost, desirability and waste influenced their decision.</p>
	<p>BB1.d: Analyze and use electricity and electronic systems.</p>	<p>BB1.d.2.m: Define basic electrical concepts (i.e., voltage, direct and alternating current, resistance, power, polarity, conductor, insulator, series circuit, parallel circuit, series-parallel circuit, inductance, capacitance, continuity, digital, analog).</p> <p>BB1.d.3.m: Measure current, voltage and resistance in series, parallel and series-parallel circuits and components.</p> <p>BB1.d.5.h: Describe the role of thermal, optical and mechanical transducers in sending electrical control signals to modify how a system performs.</p> <p>BB1.d.7.h: Inspect and test components such as switches, connectors, relays, solid state devices and conductors and take appropriate action.</p>

	<p>BB1.e: Analyze, explain and use control systems.</p>	<p>BB1.e.3.m: Explain how control systems sense what is happening in a system, compare it to what people want to happen within the system and trigger subsystems that will make needed adjustments. BB1.e.4.m: Explain how quality control is a planned process to ensure that a product, service or system meets established criteria. BB1.e.5.h: Identify the multiple controls that sense information from a number of areas, evaluate the system and act accordingly given a flawed complex system. BB1.e.6.h: Select and perform an appropriate maintenance is the process in order for the product or system to continue functioning properly, to extend its life or to upgrade its capability given a flawed product or system.</p>
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Wisconsin Technology & Engineering- Information and Communication Technologies (ICT)

Standard	Learning Priority	Performance Indicators
<p>Standard: ICT1: Students will analyze, select and use information and communication technologies.</p>	<p>ICT1.a: Analyze how communication happens, the different forms of communication and how it affects society.</p>	<p>ICT1.a.7.m: Dramatize how information and communication systems allow information to be transferred from human to human, human to machine and machine to human. ICT1.a.8.m: Diagram how communication systems are made up of a source, encoder, transmitter, receiver, decoder and destination. ICT1.a.9.m: Discuss how the design of a message is influenced by such factors as the intended audience, medium, purpose and nature of the message. ICT1.a.10.m: Analyze how the use of symbols, measurements and drawings promotes clear communication by providing a common language to express ideas. ICT1.a.11.m: Evaluate print and electronic sources of knowledge for their validity and accuracy. ICT1.a.13.h: Assess how information and communication technologies include the inputs, processes and outputs associated with sending and receiving information. ICT1.a.14.h: Predict how information and communication</p>

		<p>systems allow information to be transferred in the future.</p> <p>ICT1.a.15.h: Evaluate how information and communication systems can be used to inform, persuade, entertain, control, manage and educate.</p> <p>ICT1.a.16.h: Predict how communication systems could evolve in the future to facilitate understandings in a common language.</p>
	<p>ICT1.b: Describe how communication is an ever evolving process.</p>	<p>ICT1.b.5.m: Analyze how communication can be initiated.</p> <p>ICT1.b.6.m: Illustrate how communication we use daily has grown through the years.</p> <p>ICT1.b.7.m: Predict how communication will change in the future.</p> <p>ICT1.b.8.m: Identify what constitutes communication.</p> <p>ICT1.b.9.h: Asses how communications can be used to manipulate people.</p> <p>ICT1.b.10.h: Predict how communication will change in the future.</p> <p>ICT1.b.11.h: Contrast one type of designed communication of today with another.</p>
	<p>ICT1.c: Analyze graphic communications in an ever increasingly technological world.</p>	<p>ICT1.c.6.m: Examine how we send messages without speaking.</p>
	<p>ICT1.e: Analyze and use various technologies to design and develop websites.</p>	<p>ICT1.e.5.m: Install various wireless components.</p> <p>ICT1.e.6.m: Install various network devices.</p> <p>ICT1.e.7.m: Discuss the importance of troubleshooting and technical support in technical devices and networks.</p> <p>ICT1.e.8.m: Install software on a device.</p> <p>ICT1.e.9.h: Explain various licensing requirements.</p> <p>ICT1.e.10.h: Compare the differences between local area networks and wide area networks.</p> <p>ICT1.e.11.h: Identify the need for security measures with networks to protect privacy and data.</p> <p>ICT1.e.12.h: Install various networking technology equipment (i.e., routers, switches, hubs, etc.).</p>

		<p>ICT1.e.13.h: Explain the relationship between hardware and software, taking into account e-mail, the internet, etc.</p> <p>ICT1.e.14.h: Design a network system (include power needs, bandwidth requirements, hardware, software, etc.).</p> <p>ICT1.e.15.h: Perform the functions of a network administrator (i.e., maintaining a network system, management, user login management, system user policies, etc.).</p> <p>ICT1.e.16.h: Predict how networking will change in the future.</p>
	ICT1.f: Analyze, select various technologies, design and develop websites	<p>ICT1.f.3.m: Analyze the effects of the internet on society.</p> <p>ICT1.f.4.m: Define internet terminology.</p>
	ICT1.g: Analyze and use various technologies to produce graphic communication products.	<p>ICT1.g.5.h: Identify what type of printing produced a specific product.</p> <p>ICT1.g.7.h: Predict how printing will change in the future.</p>
	ICT1.h: Analyze and use various technologies in the telecommunication area.	<p>ICT1.h.5.m: Describe how messages can be broadcast over long distances.</p> <p>ICT1.h.6.m: Predict how telecommunications will be used in the future.</p> <p>ICT1.h.7.m: Predict how telecommunications will be broadcast in the future.</p> <p>ICT1.h.8.m: Create a basic animation.</p> <p>ICT1.h.9.h: Create a broadcast program to send over a long distance.</p> <p>ICT1.h.10.h: Create a presentation which proposes what the future could look like in the telecommunications field.</p> <p>ICT1.h.11.h: Create a quality digital animation which could be used in various types of communications.</p>

Wisconsin Common Career Technical Standards (WCCTS)-Creativity, Critical Thinking, Communication and Collaboration (C)

Standard	Learning Priority	Performance Indicators
Standard: 4C1: Students will think and work creatively to develop innovative solutions to problems and opportunities.	4C1.a: Develop original solutions, products and services to meet a given need.	4C1.a.4.m: Analyze elements of a problem to develop creative solutions.

		<p>4C1.a.6.m: Describe how past experiences can inform current problem solving.</p> <p>4C1.a.7.h: Develop original ways to solve a given problem.</p> <p>4C1.a.8.h: Design a product or service that could fulfill a human need or desire.</p> <p>4C1.a.9.h: Apply past experiences to current problems in developing innovative solutions.</p>
	<p>4C1.b: Work creatively with others to develop solutions, products and services.</p>	<p>4C1.b.4.m: Explain how multiple people can develop better solutions than an individual.</p> <p>4C1.b.5.m: Explain how multiple people and perspectives can develop better ideas than an individual.</p> <p>4C1.b.6.m: Explain how multiple people and perspectives can improve an existing product or process better than an individual.</p> <p>4C1.b.7.h: Incorporate the skills and experiences of others to develop a new solution to a problem.</p> <p>4C1.b.8.h: Work as part of a team to design a product or service that could fulfill a human need or desire.</p> <p>4C1.b.9.h: Work as part of a team to improve an existing product or process.</p>
<p>Standard: 4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.</p>	<p>4C2.a: Develop effective resolutions for a given problem, decision or opportunity using available information.</p>	<p>4C2.a.5.m: Analyze symptoms to identify the root cause of a problem.</p> <p>4C2.a.6.m: Develop multiple resolutions for a given problem, decision or opportunity.</p> <p>4C2.a.7.m: Identify problems that became worse due to poorly thought out or poorly informed solutions.</p> <p>4C2.a.8.m: Explain how implementation of a solution or action may affect one or more corresponding systems.</p> <p>4C2.a.9.m: Explain how different resolutions may be appropriate under different circumstances.</p> <p>4C2.a.10.m: Explain the process for choosing an action or making a decision.</p> <p>4C2.a.11.h: Determine the information needed to address an identified problem.</p>

		<p>4C2.a.12.h: Contrast the benefits and drawbacks of various proposed resolutions to a given situation.</p> <p>4C2.a.13.h: Predict how an action could result in unintended consequences, both positive and negative.</p> <p>4C2.a.14.h: Analyze the impact of a decision using a systems thinking model.</p> <p>4C2.a.15.h: Determine the best resolution for a problem, decision or opportunity based on given criteria.</p> <p>4C2.a.16.h: Defend an action taken or a decision implemented.</p>
	<p>4C2.b: Develop and implement a resolution for a new situation using personal knowledge and experience.</p>	<p>4C2.b.3.m: Analyze problems to determine what past experiences might be related and relevant.</p> <p>4C2.b.4.m: Analyze a problem to determine how it relates to existing knowledge.</p> <p>4C2.b.5.h: Apply past experience to develop a course of action for a new situation.</p> <p>4C2.b.6.h: Use existing knowledge to develop a resolution for a new situation, problem or opportunity.</p>
<p>Standard: 4C3: Students will communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.</p>	<p>4C3.a: Communicate thoughts and feelings with others using verbal and non-verbal language.</p>	<p>4C3.a.8.m: Implement effective listening skills in resolving a situation.</p> <p>4C3.a.9.h: Develop a mutually acceptable response to a question or problem.</p> <p>4C3.a.11.h: Communicate effectively in the presence of a language barrier.</p> <p>4C3.a.12.h: Utilize effective listening skills in creating consensus in a group.</p>
	<p>4C3.b: Work collaboratively with others.</p>	<p>4C3.b.4.m: Use idea generating practices as part of a group.</p> <p>4C3.b.5.m: Describe ways to facilitate group collaboration.</p> <p>4C3.b.6.m: Demonstrate the use of various tools to communicate effectively with an individual or a group.</p> <p>4C3.b.7.h: Participate in group processes to generate consensus.</p> <p>4C3.b.8.h: Lead group processes to generate consensus.</p>
	<p>4C3.c: Use interpersonal skills to resolve conflicts with others in an ethical manner.</p>	<p>4C3.c.5.m: Contribute to resolving conflicts that occur within a team or group.</p>

		<p>4C3.c.6.m: Explore the ethical considerations of a current or historical action or decision.</p> <p>4C3.c.7.h: Resolve conflicts productively with individuals as they arise.</p> <p>4C3.c.8.h: Lead a team or group through a conflict resolution process to reach a productive outcome.</p>
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Wisconsin Common Career Technical Standards (WCCTS)-Career Development (CD)

Standard	Learning Priority	Performance Indicators
Standard: CD1: Students will consider, analyze and apply an awareness of self, identity and culture to identify skills and talents.	CD1.a: Identify person strengths, aptitudes and passions.	<p>CD1.a.2.m: Assess personal strengths, aptitudes and passions related to potential future careers</p> <p>CD1.a.3.h: Evaluate various occupations and career pathways to identify personal, academic and career goals based on personal strengths, aptitudes and passions.</p>
	CD1.b: Demonstrate effective decision-making, problem solving and goal setting.	<p>CD1.b.4.m: Identify long and short-term goals.</p> <p>CD1.b.5.h: Use a decision-making and problem-solving model.</p>
	CD1.c: Interact effectively with others in similar and diverse teams.	<p>CD1.c.7.m: Display cooperative behavior and identify personal strengths and assets in groups.</p> <p>CD1.c.11.h: Evaluate how the personal strengths and assets of others contribute to a cooperative group atmosphere.</p> <p>CD1.c.12.h: Assess how respect and appreciation for individual and cultural differences impacts group processes.</p>
	CD1.d: Apply a range of relevant decision-making strategies.	<p>CD1.d.4.m: Apply decision-making strategies to personal and team interactions.</p> <p>CD1.d.5.h: Predict the outcome of various decisions on personal, social and career success.</p> <p>CD1.d.6.h: Evaluate the impact of personal decision-making strategies on specific outcomes.</p>
Standard: CD2: Students will identify the connection between educational achievement and work opportunities in order to reach personal and career goals.	CD2.a: Apply academic experiences to the world of work, inter-relationships and the community.	<p>CD2.a.2.m: Describe a diverse range of opportunities available beyond high school.</p> <p>CD2.a.3.h: Evaluate how performance and connections within the learning community enhance future opportunities.</p> <p>CD2.a.4.h: Determine those opportunities that best support attainment of a specific career goal.</p>

	<p>CD2.b: Assess attitudes and skills that contribute to successful learning in school and across the life span.</p>	<p>CD2.b.5.m: Apply academic information from a variety of sources to enhance career preparedness and lifelong learning. CD2.b.6.m: Research local and regional labor market and job growth information to analyze career opportunities. CD2.b.7.h: Interpret and analyze the impact of current education, training and work trends on life, learning and career plans. CD2.b.8.h: Assess education and training opportunities to acquire new skills necessary for career advancement. CD2.b.9.h: Analyze local and regional labor market and job growth information to select a career pathway for potential advancement.</p>
<p>Standard: CD3: Students will create and manage a flexible and responsive individualized learning plan to meet their career goals.</p>	<p>CD3.a: Investigate the world of work in order to gain knowledge of self in order to make informed career decisions.</p>	<p>CD3.a.5.m: Demonstrate the ability to use technology to retrieve and manage career information that inspires educational achievement. CD3.a.6.m: Build an ongoing awareness of personal abilities, skills, interests and motivation and determine how these fit with chosen career pathway. CD3.a.7.m: Develop an individual learning plan to enhance educational achievement and attain career goals based on a career pathway. CD3.a.9.m: Use assessment results in educational planning including career awareness. CD3.a.10.h: Analyze how career plans may be affected by personal growth, external events and changes in motivations and aspirations. CD3.a.11.h: Apply academic and employment readiness skills in work-based learning situations such as internships, shadowing and/or mentoring experiences. CD3.a.12.h: Evaluate changes in local, national and global employment trends, societal needs and economic conditions related to career planning. CD3.a.14.h: Implement an individual learning plan to</p>

		maximize academic ability and achievement.
	CD3.b: Examine and evaluate opportunities that could enhance life and career plans and articulate plan to guide decisions and actions.	CD3.b.2.m: Describe educational levels (e.g., work-based learning, certificate, two-year, four-year and professional degrees) and performance skills needed to attain personal and career goals. CD3.b.3.m: Demonstrate openness to exploring a wide range of occupations and career pathways. CD3.b.4.h: Implement strategies for responding to transition and change with flexibility and adaptability. CD3.b.5.h: Evaluate the relationship between educational achievement and career development.
	CD3.c: Employ career management strategies to achieve future career success and satisfaction.	CD3.c.3.m: Identify work values and needs. CD3.c.4.m: Define adaptability and flexibility in the world of work. CD3.c.5.h: Determine how principles of equal opportunity, equity, respect, inclusiveness and fairness, affect career planning and management. CD3.c.6.h: Discuss how adaptability and flexibility, especially when initiating or responding to change, contributes to career success.
Standard: CD4: Students will identify and apply employability skills.	CD4.a: Identify and demonstrate positive work behaviors and personal qualities needed to be employable.	CD4.a.4.m: Demonstrate flexibility and willingness to learn new knowledge and skills. CD4.a.5.m: Identify positive work-qualities typically desired in each of the career cluster’s pathways. CD4.a.6.h: Evaluate how self-discipline, self-worth, positive attitude and integrity displayed in a work situation affect employment status. CD4.a.7.h: Assess how flexibility and willingness to learn new knowledge and skills affect employment status. CD4.a.8.h: Apply communication strategies when adapting to a culturally diverse environment. CD4.a.9.h: Use positive work-qualities typically desired in each of the career cluster’s pathways. CD4.a.10.h: Manage work roles and responsibilities to balance them

		with other life roles and responsibilities.
	CD4.b: Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.	<p>CD4.b.3.m: Use technology to assist in career exploration and job-seeking activities.</p> <p>CD4.b.4.m: Compare and contrast personal attributes with employment needs and trends.</p> <p>CD4.b.5.h: Use multiple resources to locate job opportunities.</p> <p>CD4.b.6.h: Prepare a resume, cover letter, employment application.</p> <p>CD4.b.7.h: Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer in an interview.</p>
	CD4.c: Identify and exhibit traits for retaining employment.	<p>CD4.c.3.m: Distinguish between appropriate behaviors in a social vs. professional setting.</p> <p>CD4.c.4.h: Model behaviors that demonstrate reliability and dependability.</p> <p>CD4.c.5.h: Maintain appropriate dress and behavior for the job to contribute to a safe and effective workplace/jobsite.</p> <p>CD4.c.6.h: Complete required employment forms and documentation.</p> <p>CD4.c.7.h: Summarize key activities necessary to retain a job in an industry.</p>
	CD4.d: Develop positive relationships with others.	<p>CD4.d.4.m: Use cooperative behavior in helping peers accomplish goals and tasks.</p> <p>CD4.d.5.h: Participate in co-curricular and community activities to enhance the school experience.</p> <p>CD4.d.6.h: Evaluate the best method to assist co-workers in accomplishing goals and tasks.</p> <p>CD4.d.7.h: Examine the skills required to enable students to successfully transition to post-secondary opportunities.</p> <p>CD4.d.8.h: Use a systematic approach to academic and career planning for students to achieve their learning, socio-cultural and work goals.</p>

Key Vocabulary:			
1000BASE-T	decapsulation	Network Layer (3)	Spanning Tree Protocol (STP)
100BASE-T	enable mode	networking model	startup-config file
10BASE-T	encapsulation	packet	store-and-forward switching
access interface	Ethernet	packet switching	straight-through cable
access link	Fast-ethernet	Physical Layer (1)	switch
adjacent-layer interaction	flooding	pinout	switched Ethernet
Application Layer (7)	fragment-free switching	Point-to-Point Protocol (PPP)	Transport Layer (4)
broadcast domain	frame	Presentation Layer (6)	trunk interface
broadcast frame	Frame Relay	protocol data unit (PDU)	twisted pair
carrier sense multiple access with collision avoidance (CSMA/CD)	fiber	protocol type	unicast frame
Coaxial Cable	firewall	Router	user mode
collision domain	full duplex	running-config file	virtual LAN (VLAN)
command-line interface (CLI)	Gigabit ethernet	Secure Shell (SSH)	
configuration mode	half duplex	segmentation	
crossover cable	High-Level Data Link Control (HDLC)	serial connection	
cut-through switching	hub	Session Layer (5)	
Data Link Layer (2)	microsegmentation	setup mode	

Topics/Content Outline- Units and Themes:

Networking I

Quarter 1:

- Chapter 1: Explore the Network
- Chapter 2: Configure a Network Operating System
- Chapter 3: Network Protocols and Communications

Quarter 2:

- Chapter 4: Network Access
- Chapter 5: Ethernet

Quarter 3:

- Chapter 6: Network Layer
- Chapter 7: IP Addressing
- Chapter 8: Subnetting IP Networks

Quarter 4:

- Chapter 9: Transport Layer
- Chapter 10: Application Layer
- Chapter 11: Build a Small Network

Networking II

Quarter 1:

- Chapter 1: Routing Concepts
- Chapter 2: Static Routing
- Chapter 3: Dynamic Routing

Quarter 2:

- Chapter 4: Switched Networks
- Chapter 5: Switch Configuration

Quarter 3:

- Chapter 6: VLANs
- Chapter 7: Access Control Lists
- Chapter 8: DHCP

Quarter 4:

- Chapter 9: NAT for IPv4
- Chapter 10: Device Discovery, Management, and Maintenance

Primary Resource(s):

- Cisco Networking Academy- [netacad.com](https://www.netacad.com)

