Compiled & Shared By: ✨ Hassan Sardar Naveed

👨‍👨‍👧‍👧 “Please remember me and my family in your prayers.” 🌸

📚 Bachelor of Science in Computer Science

🎓 University of the People

📞 Contact

📧 Email: hassannaveed@my.uopeple.edu

📱 WhatsApp: https://wa.me/923022129236

🌐 GitHub: https://github.com/HassanSardarNaveed

Join UoPeople Students Community

https://chat.whatsapp.com/Kv0vstTEaMUHUrlNH9SOT4?mode=ac_t

Here you will find the syllabi and primary textbooks for all UoPeople courses. The Disclaimer for Use of the Repository can be found here.

Computer Science

CS 2204 Communications and Networking

UNIVERSITY OF THE PEOPLE
The Education Revolution

CS 2204: Communications and Networking

Credits: 3

Prerequisites: None

Course Description: This course aims to equip participants with vital skills in computer networking, covering network concepts, transmission mediums, and technologies. It facilitates a thorough grasp of data communication across various network environments, particularly focusing on the OSI model and TCP/IP protocol suite. Through the examination of network architectures, topologies, and protocols, participants gain insight into essential networking principles. By blending theoretical knowledge with applications in real-world scenarios, learners are equipped not only to analyze and design but also to implement effective communication solutions in modern computing environments, fostering a holistic approach to skill enhancement.

Required Textbook and Materials: UoPeople courses use open educational resources (OER) and other materials specifically donated to the University with free permissions for educational use. Therefore, students are not required to purchase any textbooks or sign up for any websites that have a cost associated with them. The main required textbook for this course is listed below and can be readily accessed using the provided link.

- This course does not contain a main textbook; resources to all required reading will be provided in the course Learning Guide for each week.

Learning Objectives and Outcomes:

By the end of this course students will be able to:

1. Analyze network architectures, topologies, and protocols to discern essential components and their relationships within diverse network environments.
2. Articulate the layers and functionalities of the OSI model and TCP/IP protocol suite, elucidating their role in facilitating data communication across networks.
3. Apply theoretical understanding of network concepts and technologies to real-world scenarios, crafting communication solutions suited to modern computing environments.
4. Demonstrate adeptness in assembling and configuring network components to ensure seamless data transmission and connectivity across heterogeneous computing environments.
5. Differentiate wire-based and wireless data transmission methods, while evaluating error detection and correction techniques, to enhance network performance across varied communication mediums.

Course Schedule and Topics: This course will cover the following topics in eight learning sessions, with one Unit per week. The Final Exam will take place during Week/Unit 9 (UoPeople time).

Week 1: Unit 1 - Introduction to Data Communication and Networking

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Explore the fundamental principles of data communication and explain the process involved in data transmission.
2. Employ various types of networks including LAN, WAN, MAN, PAN, and CAN.
3. Classify the layers and functionalities of the OSI Model and TCP/IP Model.
4. Estimate the role of key protocols and standards such as TCP, IP, HTTP, and Ethernet in facilitating communication across networks.

Week 2: Unit 2 - The Physical Layer and Transmission Media

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Visualize and analyze the transmission process and understand how data is encoded, transmitted, and received at the physical layer.
2. Associate different types of transmission media with their advantages, limitations, and appropriate use cases in networks.
3. Predict specific types of guided and unguided transmission media for different network environments.
4. Estimate the effectiveness of multiplexing techniques and establish spread spectrum modulation techniques.

Week 3: Unit 3 - Data Link Layer

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Explore various protocols and technologies used in the data link layer, such as Ethernet, HDLC, and PPP.
2. Diagnose and troubleshoot errors in data frames using error detection techniques such as CRC (Cyclic Redundancy Check).
3. Apply error control techniques such as ARQ (Automatic Repeat Request) and selective repeat to detect and recover from transmission errors, ensuring reliable data delivery.
4. Explore the differences between CSMA/CD and CSMA/CA in terms of collision detection and avoidance strategies.

Week 4: Unit 4 - Network Layer

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Predict the behavior and performance of routing algorithms, including Distance Vector, Link State, and BGP (Border Gateway Protocol).
2. Evaluate various congestion control methods.
3. Diagnose and troubleshoot IP addressing and subnetting issues, including addressing conflicts and subnet mask mismatches, demonstrating proficiency in designing and managing IPv4 and IPv6 address schemes.

Week 5: Unit 5 - Transport Layer

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Validate the selection of TCP or UDP as the transport protocol for different types of applications.
2. Describe the role of TCP/IP handshake mechanisms and TCP sliding window and relate their importance to ensure stable data transfer over the Internet.
3. Analyze the concept of Remote Procedure Call (RPC) to distributed computing environments.
4. Explain the fundamentals of TCP congestion management.

Week 6: Unit 6 - Session Layer and Presentation Layer

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Determine strategies for implementing session layer protocols.
2. Explore advanced data compression and encryption techniques used in the presentation layer.

Week 7: Unit 7 - The Application Layer and Network Security

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Assess the effectiveness and efficiency of DNS architecture.
2. Determine strategies for enhancing the performance, security, and scalability of HTTP-based web applications.
3. Evaluate SNMP-based network management solutions for monitoring, configuring, and troubleshooting network devices and services.
4. Assess the effectiveness of intrusion detection systems (IDS) in identifying and mitigating security breaches.

Week 8: Unit 8 - Introduction to Next-Generation Communication Technologies

Unit Learning Outcomes:

By the end of this Unit, you will be able to:

1. Relate the functionalities of Software-Defined Networking (SDN), Network Function Virtualization (NFV), Internet of Things (IoT) Networks, Content Delivery Networks (CDNs), and Cellular Networks.
2. Summarize how these technologies interact and complement each other within modern network ecosystems.

Week 9: Unit 9 - Course Review and Final Exam

Course Requirements:

Discussion Assignments & Response Posts/Ratings
Some units in this course require that you complete a Discussion Assignment. You are required to develop and post a substantive response to the Discussion Assignment in the Discussion Forum. A substantive response is one that fully answers the question that has been posted by the instructor. In addition, you must extend the discussion by responding to at least two (2) of your peers' postings in the Discussion Forum. Your discussion posts will be assessed by your instructor. Discussion Forums are only active for each current and relevant learning week, so it is not possible to contribute to the forum once the learning week has come to an end. Failure to participate in the Discussion Assignment by posting in the Discussion Forum and responding to peers as required may result in failure of the course.

Assignment Activities
The assignment activities are graded by your instructor. The grading rubric is listed under the assignment instructions. The grading rubric is a document that outlines the criteria that your instructor will use to grade your work.

Quizzes
This course will contain three types of quizzes – the Self-Quiz, the Graded Quiz, and the Review Quiz. These quizzes may contain multiple choice, true/false, or short answer questions. The results of the Self-Quiz will not count towards your final grade. However, it is highly recommended that you complete the Self-Quiz to ensure that you have adequately understood the course materials. Along with the Reading Assignments, the results of the Self-Quiz should be used as part of an iterative learning process, to thoroughly cover and test your understanding of course material. You should use the results of your Self-Quiz as a guide to go back and review relevant sections of the Reading Assignments. Likewise, the Review Quiz will not count towards your final grade, but should also be used to assist you in a comprehensive review and full understanding of all course material, in preparation for your Final Exam. Lastly, the results of the Graded Quiz will count towards your final grade. Specific instructions on the format and content of the Graded Quiz will be provided by your instructor.

Final Exam
The Final Exam will take place during the Thursday and Sunday of Week/Unit 9, following the completion of eight units of work. The format of the Final Exam is similar to that of the quizzes, and may contain a combination of different question types. You will have one attempt to take the exam, and it will be graded electronically. Specific instructions on how to prepare for and take the exam will be provided during Week/Unit 8.

Course Forum
The Course Forum is the place to raise issues and questions relating to the course. It is regularly monitored by the instructors and is a good place to meet fellow students taking the same course. While it is not required to participate in the Course Forum, it is highly recommended.

Class Introductions
This section is your opportunity to introduce yourself to your classmates and create a vibrant learning community. By sharing your background, interests, and goals, you can create meaningful connections and discover commonalities with your peers.

Course Policies:

Grading Components and Weights

Each graded component of the course will contribute some percentage to the final grading scale, as indicated here:

Items	Number of assignments	Weight
Discussion Forum	6	30%
Assignment Activities	5	40%
Graded Quiz (Unit 3 & Unit 6)	2	10%
Final Exam	1	20%

Grading Scale

This course will follow the standard 100-point grading scale defined by the University of the People, as indicated here:

Letter Grade	Grade Scale	Grade Points
A+	98-100	4.00
A	93-97	4.00
A-	90-92	3.67
B+	88-89	3.33
B	83-87	3.00
B-	80-82	2.67
C+	78-79	2.33
C	73-77	2.00
C-	70-72	1.67
D+	68-69	1.33
D	63-67	1.00
D-	60-62	0.67
F	Under 60	0.00

Grade Appeal

If you believe that the final grade you received for a course is erroneous, unjust, or unfair, please contact your course instructor. This must be done within seven days of the posted final grade. For more information on this topic, please review the Grade Appeal Procedure in the University Catalog.

Participation

Non-participation is characterized by lack of any assignment submissions, inadequate contributions to the Discussion Forums, and/or lack of peer feedback to Discussion/Written Assignments. Also, please note the following important points about course participation:

- Assignments must be submitted on or before the specified deadline. A course timeline is provided in the course schedule, and the instructor will specify deadlines for each assignment.
- Any student showing non-participation for two weeks (consecutive or non-consecutive) is likely to automatically fail the course.
- Occasionally there may be a legitimate reason for submitting an assignment late. Most of the time, late assignments will not be accepted and there will be no make-up assignments.
- All students are obligated to inform their instructor in advance of any known absences which may result in their non-participation.

Academic Honesty and Integrity

When you submit any work that requires research and writing, it is essential to cite and reference all source material. Failure to properly acknowledge your sources is known as “plagiarism” – which is effectively passing off an individual’s words or ideas as your own. University of the People adheres to a strict policy of academic honesty and integrity. Failure to comply with these guidelines may result in sanctions by the

University, including dismissal from the University or course failure. For more information on this topic, please review the Academic Integrity Policy in the University Catalog.

Any materials cited in this course should be referenced using the style guidelines established by the American Psychological Association (APA). The APA format is widely used in colleges and universities across the world and is one of several styles and citation formats required for publication in professional and academic journals. Refer to the UoPeople APA Tutorials in the LRC for help with APA citations. For help with using library, kindly refer to UoPeople Library.

Code of Conduct

University of the People expects that students conduct themselves in a respectful, collaborative, and honest manner at all times. Harassment, threatening behavior, or deliberate embarrassment of others will not be permitted. Any conduct that interferes with the quality of the educational experience is not allowed and may result in disciplinary action, such as course failure, probation, suspension, or dismissal. For more information on this topic, please review the Code of Conduct Policy in the University Catalog.