**UNIVERSITY OF THE CORDILLERAS**

**College of Information Technology and Computer Science**

**Course Syllabus in CCS1112 – Network Fundamentals**

**Third Trimester, SY 2015 – 2016**

1. **Course Code:** CCS1112– Network Fundamentals

2 units lecture, 1 unit laboratory

Lecture: 2 times a week – 2 hours and 50 minutes x 12 weeks

Laboratory: 3 times a week – 4 hours and 15 minutes x 12 weeks

1. **Course Description:**

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. It uses the OSI and TCP layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. Labs use a “model Internet” to allow students to analyze real data without affecting production networks. Packet Tracer (PT) activities help students analyze protocol and network operation and build small networks in a simulated environment. At the end of the course, students build simple LAN topologies by applying basic principles of cabling, performing basic configurations of network devices such as routers and switches, and implementing IP addressing schemes.

1. **Prerequisites:**

None

1. **Course Outcomes:**

|  |  |  |
| --- | --- | --- |
| **ATTRIBUTES OF GRADUATES OF UC-CITCS** | | |
| **Attributes** | **Code** | **Description** |
| Analytical Skills | AG1 | ITE Knowledge and Skills |
| Flexible | AG2 | Adapt to changes |
| Innovative | AG3 | Creative |
| Team Work | AG4 | Work productively in teams and leadership skills |
| Ethical Behavior & Practices | AG5 | Ethical behaviour |

|  |  |  |  |
| --- | --- | --- | --- |
| **PROGRAM EDUCATIONAL OUTCOMES/OBJECTIVES** | | | |
| **Graduate Attribute** | **Graduate Outcomes Code** | **Graduate Outcomes** | **Attributes of Graduates of UC-CITCS** |
| Knowledge for Solving Computing Problems | IT1 | Apply knowledge of computing, science, and mathematics appropriate to the discipline. | AG1 |
| IT2 | Understanding best practices and standards and their applications. | AG1 |
| Problem Analysis | IT3 | Analyze complex problems, and identify and define the computing requirements appropriate to its solution. | AG1, AG2 |
| IT4 | Identify and analyze user needs and take them into account in the selection, creation, evaluation, and administration of computer-based systems. | AG1, AG2, AG3 |
| Design/Development of Solutions | IT5 | Design, implement, and evaluate computer-based systems, processes, components, or programs to meet desired needs and requirements under various constraints. | AG1, AG2 |
| IT6 | Integrate IT-based solutions into the user environment effectively. | AG1, AG2 |
| Modern Tool Usage | IT7 | Apply knowledge through the use of current techniques, skills, tools, and practices necessary for the IT profession. | AG1, AG2 |
| Individual and Team Work | IT8 | Function effectively as a member or leader of a development team recognizing the different roles within a team to accomplish a common goal. | AG3 |
| IT9 | Assist in the creation of an effective IT project plan. | AG1, AG2, AG3 |
| Communication | IT10 | Communicate effectively with the computing community and with society at large about complex computing activities through logical writing, presentations, and clear instructions. | AG1, AG2, AG3 |
| Computing Professionalism and Social Responsibility | IT11 | Analyze the logical and global impact of computing information technology on individuals, organizations, and society. | AG1, AG2, AG3, AG4 |
| IT12 | Understand professional, ethical, security and social issues, and responsibilities in the utilization of information technology. | AG1, AG4 |
| Life-Long Learning | IT13 | Recognize the need for and engage in planning self-learning and improving performance as a foundation for continuing professional development. | AG3, AG5 |

|  |  |  |  |
| --- | --- | --- | --- |
| **PROGRAM EDUCATIONAL OUTCOMES/OBJECTIVES** | | | |
| **Graduate Attribute** | **Graduate Outcomes Code** | **Graduate Outcomes** | **Attributes of Graduates of UC-CITCS** |
| Knowledge for Solving Computing Problems | CS1 | Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements. | AG1 |
| Problem Analysis | CS2 | Identify, analyze, formulate, research literature, and solve complex computing problems and requirements reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines. | AG1, AG2 |
| Design/Development of Solutions | CS3 | Design, implement, and evaluate computer-based systems, processes, components, or programs to meet desired needs and requirements under various constraints. | AG1, AG2 |
| CS4 | An ability to apply mathematical foundations, algorithmic principles and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. | AG1, AG2 |
| CS5 | Knowledge and understanding of information security issues in relation to the design, development, and use of information systems. | AG1, AG5 |
| Modern Tool Usage | CS6 | Create, select, adapt and apply appropriate techniques, resources and modern computing tools to complex computing activities, with an understanding of the multidisciplinary settings. | AG1, AG2 |
| Individual and Team Work | CS7 | Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. | AG3 |
| Communication | CS8 | Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documents, make effective presentations, and give and understand clear instructions. | AG1, AG2, AG3 |
| Computing Professionalism and Social Responsibility | CS9 | The ability to recognize the legal, social, ethical and professional issues involved in the utilization of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices. | AG1, AG2, AG3, AG4 |
| Life-Long Learning | CS10 | Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional. | AG3, AG5 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **COURSE LEARNING OUTCOMES** | | | | | | | | | | | | | | |
| **Course Outcomes** | **Course Outcomes Code** | **Program Educational Outcomes** | | | | | | | | | | | | |
| The curriculum discusses networking concepts in depth and uses language that allows for integration with engineering concepts, providing a deep, theoretical understanding of networking concepts for experienced learners with advanced problem-solving and analytical skills. | CO1 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| E | E | E | D | E | I | E | I | I | I | E | I | I |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| E | E |  | E | E | D | E | I | D | I |
| Courses emphasize critical thinking, problem solving, collaboration, and the practical  application of skill | CO2 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| E | D | D | E | E | E | D | E | E | I | D | D | D |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| E | D | E | D | D | D | D | E |  | E |
| Rich multimedia content, including Flash  -based interactive activities, videos, games, and quizzes, addresses a variety of learning styles and help stimulate learning and increase | CO3 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| D | E | D | E | D | E | D | I | D | E | D | D | D |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| D | D | E | D | I | E | I | E | I | D |
| Innovative assessments provide immediate feedback to support the evaluation of  knowledge and acquired skills | CO4 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| D | E | E | E | D |  | I | E | I | E | I | E | E |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| E | D | D | D | I | D | E |  | D | D |
| Describe the importance of addressing and naming schemes at various layers of data  Networks | CO5 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| E | D | D | D | D | D | D |  | E | E | E | I | I |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| D | D | D | E |  | E | I | D | E | D |
| Analyze the operations and feature of network layer protocols and services and explain the fundamental concepts of routing | CO6 | **BSIT** | | | | | | | | | | | | |
| **IT1** | **IT2** | **IT3** | **IT4** | **IT5** | **IT6** | **IT7** | **IT8** | **IT9** | **IT10** | **IT11** | **IT12** | **IT13** |
| D | E |  | E | E | I | D |  | E | E |  | D | I |
| **BSCS** | | | | | | | | | | | | |
| **CS1** | **CS2** | **CS3** | **CS4** | **CS5** | **CS6** | **CS7** | **CS8** | **CS9** | **CS10** |  | | |
| D | D | E | D | D | E | E | D | D | D |
| **Legend: I – Introduction E – Enabling D - Demonstation** | | | | | | | | | | | | | | |

1. **Bases of Evaluation:**
2. Quizzes, Recitations, Assignments, Seatwork, Problem Sets
3. Prelim, midterm and final major examinations.
4. The standard grading system of the University.

**VI. Grading System:**

1. Prelim Score = 50% Prelim Class Standing + 50% Prelim Exam
2. Midterm Score = 50% Prelim Score + 50% Tentative Midterm Score
   1. Tentative Midterm Score = 50% Midterm Class Standing + 50% Midterm Exam
3. Final Score = 50% Midterm Score + 50% Tentative Final Score
   1. Tentative Final Score = 50% Final Class Standing + 50% Final Exam

**Note:** 1. CS is composed of the course requirements and the required online courses.

2. Scores are transmuted to an equivalent grade where a score of 50% is needed to get a passing grade of 75.

**VII. Course Content:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TOPICS** | **RESOURCES** | **TIME FRAME (HOURS, WEEK AND GRADING PERIOD)** | **INSTRUCTIONAL MODE** | **ACTIVITIES AND RUBRICS** | **LEARNING OUTCOMES** |
| Chapter 1 Computer Networks and the Internet   * 1. What Is the Internet?   2. The Network Edge   3. The Network Core   4. Delay, Loss, and Throughput in Packet-Switched Networks   5. Protocol Layers and Their Service Models   6. Networks Under Attack   7. History of Computer Networking and the Internet | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W1, W3, W4, W5, W6, W7, W8 | **Hours:**  7 hours 5 minutes  **Week:**  Week 1 and 2 | 1. Lecture-discussion   1. Drill Lesson | Act. 1 Research on Internet History  Act. 2 Wireshark Familiarization  Act3. Wireshark: HTTP | CO1  CO2  CO3  CO4  CO5  CO6 |
| Unit 2 Application Layer   * 1. Principles of Network Applications   2. The Web and HTTP   3. File Transfer: FTP   4. Electronic Mail in the Internet   5. DNS—The Internet’s Directory Service   6. Peer-to-Peer Applications   7. Socket Programming: Creating Network Applications | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W2, W3, W4, W5, W6, W7, W8 | **Hours:**  8 hours 30 minutes  **Week:**  Week 3 and 4 | 1. Lecture-discussion  2. Lecture-drill | Act. 4 Group Activity: Examples related to Application Layer  Act 5. Wireshark: DNS | CO1  CO2  CO3  CO4  CO5  CO6 |
| **PRELIM EXAMINATION:1 hour 25 minutes** | | | | | |
| Unit 3 Transport Layer  3.1 Introduction and Transport-Layer Services  3.2 Multiplexing and Demultiplexing  3.3 Connectionless Transport: UDP  3.4 Principles of Reliable Data Transfer  3.5 Connection-Oriented Transport: TCP  3.6 Principles of Congestion Control  3.7 TCP Congestion Control | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W3, W4, W5, W6, W7, W8 | **Hours:**  5 hours 40 minutes  **Weeks:**  Week 5 and 6 | 1. Lecture-discussion  2. Lecture-drill | Act. 6 Simulation for the transport layer.  Act 7: Wireshark Activity: TCP | CO1  CO2  CO3  CO4  CO5  CO6 |
| Unit 4. The Network Layer  4.2 Virtual Circuit and Datagram Networks  4.3 What’s Inside a Router?  4.4 The Internet Protocol (IP): Forwarding and Addressing in the Internet  4.5 Routing Algorithms  4.6 Routing in the Internet | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W3, W4, W5, W6, W7, W8 | **Hours:**  4 hours 15 minutes  **Weeks:**  Week 6 and 7 | 1. Lecture – drill  2. Lecture-discussion | Act 8: Wireshark Activity: UDP | CO1  CO2  CO3  CO4  CO5  CO6 |
| Unit 5 The Link Layer: Links, Access Networks, and LANs  5.1 Introduction to the Link Layer  5.2 Error-Detection and -Correction Techniques  5.3 Multiple Access Links and Protocols  5.4 Switched Local Area Networks  5.5 Link Virtualization: A Network as a Link Layer  5.6 Data Center Networking  5.7 Retrospective: A Day in the Life of a Web Page Request | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W3, W4, W5, W6, W7, W8 | **Hours:**  5 hours 40 minutes  **Weeks:**  Week 7 and 8 | 1. Lecture – drill  2. Lecture-discussion | Act 9: Wireshark Activity: IP  Act 10: Wireshark Activity: ICMP  Act 11: Wireshark Activity: Ethernet and ARP | CO1  CO2  CO3  CO4  CO5  CO6 |
| **MIDTERM EXAMINATION:1 hour 25 minutes** | | | | | |
| Unit 6 Wireless and Mobile Networks  6.1 Introduction: Wireless Links and Network Characteristics  6.4 Cellular Internet Access  6.5 Mobility Management: Principles  6.6 Mobile IP  6.7 Managing Mobility in Cellular Networks  6.8 Wireless and Mobility: Impact on Higher-Layer Protocols | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W1, W3, W4, W5, W6, W7, W8 | **Hours:**  7hours 30 minutes  **Weeks:**  Week 9 and 10 | 1. Lecture-discussion  2. Lecture-drill | Act 12: Wireshark Activity: DHCP  Act 13: Wireshark Activity: 802.11 | CO1  CO2  CO3  CO4  CO5  CO6 |
| Unit 7 Multimedia Networking  7.1 Multimedia Networking Applications  7.2 Streaming Stored Video  7.3 Voice-over-IP  7.4 Protocols for Real-Time Conversational Applications  7.5 Network Support for Multimedia | B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, W1, W3, W4, W5, W6, W7, W8 | **Hours:**  7 hours 30 minutes  **Weeks:**  Week 11 and 12 | 1. Lecture-discussion  2. Lecture-drill | Act 14: Wireshark Activity: SSL | CO1  CO2  CO3  CO4  CO5  CO6 |
| **FINAL EXAMINATION: 1 hour 25 minutes** | | | | | |

**VIII. References:**

|  |  |  |
| --- | --- | --- |
| **RESOURCE TYPE** | **RESOURCE CODE** | **RESOURCES** |
| Books | B1 | Aufmann, Richard N. (2010). Beginning algebra with applications.7th ed., media enhanced ed.. Boston Mass: Brooks/Cole Cengage Learning |
| B2 | Aufmann, Richard N. (2010). Intermediate algebra with applications. 7th ed. Belmont: Brooks/Cole. |
| B3 | Baratto, Stefan. ( 2008). Elementary and intermediate algebra : a unified approach. 3rd ed. Boston : McGraw. |
| B4 | Barnett, Raymond A. (2011). College algebra with trigonometry. 9th ed. McGraw-hill Companies. New York. |
| B5 | Barnett, Raymond A. (2008). College algebra with trigonometry. 8th ed. Boston: McGraw-Hill Higher Education. |
| B6 | Coburn, John W. (2010). Algebra and trigonometry. 2nd ed. Boston: McGraw-Hill Higher Education. |
| B7 | Coburn, John. (2010). Precalculus. 2nd ed. Boston: McGraw-Hill Higher Education. |
| B8 | Gustafson, David & Frisk P. (2010). College Algebra. 10th ed. Brooks/Cole, CENGAGE Learning. |
| B9 | Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. (2010). Algebra 1: concepts and skills. (Teacher’s ed.). Orlando, Flor: Holt Mcdougal |
| B10 | Leithold, Louis. (2002). College algebra and trigonometry. Singapore: Pearson Education Asia. |
| B11 | Swokowski / Oole (2007), Algebra and trigonometry with analytic geometry 12th ed.Thompson Learning Asia, |
| Websites | W1 | Algebra | Worked problems. Retrieved June 20, 2013 from http://www.khanacademy.org/ |
| W2 | Algebraic expressions. Retrieved Oct. 5, 2013 from <http://www.themathpage.com/alg/algebraic-expressions.htm> |
| W3 | Brennan, James W. Understanding algebra. Retrieved Oct. 10, 2013 from <http://www.jamesbrennan.org/algebra/> |
| W4 | College algebra. Retrieved Oct. 13, 2013 from <http://freevideolectures.com/Course/2485/College-Algebra> |
| W5 | Dawkins, Paul. College algebra. Retrieved Oct. 1, 2013 from<http://tutorial.math.lamar.edu/pdf/Alg/Alg_Complete.pdf> |
| W6 | Felder, Kenny M. Advanced Algebra II: Conceptual Explanations. Retrieved Oct. 13, 2013 from <http://cnx.org/content/col10624/latest/> |
| W7 | Paul’s online math notes. Retrieved Oct. 1, 2013 fromhttp://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx |
| W8 | Stitz, Carl & Zeager, Jeff. College algebra. Retrieved Oct. 10, 2013 from <http://www.stitz-zeager.com/Precalculus/Stitz_Zeager_Open_Source_Precalculus_files/SZCA07152011.pdf> |

|  |  |  |  |
| --- | --- | --- | --- |
| Prepared by  Leonard Prim Francis G. Reyes, MIT  Instructor | Evaluated by  Anna Rhodora M. Quitaleg, MIT  Dept. Head | Approved by  Nancy M. Flores, MIM  Dean, CITCS | Noted by  Cleofas M. Basaen, Ed. D  VP Academic Affairs |