1. **Course number and name:** CSCI 5332 Data Communications and Networking

2. **Credits and contact hours:** 3 credit, 3 contact

3. **Instructor’s or course coordinator’s name:** Wenjia Li, PhD

   a. **Other supplemental materials:** None

5. **Specific course information**
   a. **Brief description of the content of the course (Catalog Description)**
      Digital logic: transistors, circuits, sensors, robotic control; registers and register banks; arithmetic-logic units; data representation: big-endian and little-endian integers; one and twos complement arithmetic; signed and unsigned values; Von-Neumann architecture and bottleneck; instruction sets; RISC and CISC designs; instruction pipelines and stalls; rearranging code; memory and address spaces; physical and virtual memory; interleaving; page tables; memory caches; bus architecture; polling and interrupts; DMA; sensor and device programming; assembly language; optimizations; parallelism; data pipelining. Graduate students will be given extra assignments determined by the instructor that undergraduates will not be required to do.

   **Prerequisites:** A minimum grade of “C” in CSCI 3232 and STAT 2231.

   b. **Indicate whether a required, elective, or selected elective course in the program**
      Required course for BS-CS.

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**

<table>
<thead>
<tr>
<th>Course Learning Outcomes</th>
<th>Student Outcomes</th>
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<tbody>
<tr>
<td>Understand uses of Computer networks</td>
<td>1a, 2a</td>
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<tr>
<td>Understand different types of Network Hardware</td>
<td>1a, 2a</td>
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<tr>
<td>Understand the layered concept of various reference models (OSI, TCP/IP)</td>
<td>1a, 2a</td>
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<tr>
<td>Understand different transmission media used in data communication and networking</td>
<td>1a, 2a</td>
</tr>
<tr>
<td>Understand Data Link Layer design issues</td>
<td>1a, 1b, 1i, 2b</td>
</tr>
<tr>
<td>Understand various error detection and correction techniques</td>
<td>1a, 1c, 2a</td>
</tr>
<tr>
<td>Understand various Data Link protocols</td>
<td>1a, 2a</td>
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<td>Understand different protocols used in the MAC sub-layer</td>
<td>1a, 2a</td>
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<tr>
<td>Understand Ethernet and various Data Link layer switching techniques</td>
<td>1a, 1b, 2a</td>
</tr>
<tr>
<td>Understand various Network Layer design issues</td>
<td>1a, 1b, 1i, 2a</td>
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<tr>
<td>Understand prominent routing algorithms such as shortest path, distance vector, link state, etc.</td>
<td>1a, 2a</td>
</tr>
</tbody>
</table>
Understand Network Layer protocols and services used in the Internet  | 1a, 2a
---|---
Understand elements and services of Transport Layer Protocols | 1a, 2a
Understand and apply Internet transport protocols such as TCP and UDP | 1a, 1b, 1c, 1i, 2a, 2b
Understand basic concepts of domain name systems | 1a, 2a
Understand basic concepts about the World Wide Web and the application layer protocols | 1a, 2a
Understand common application layer data representation standards | 1a, 2a, 1i, 2b

b. Student Outcomes:

- 1a: An ability to apply knowledge of computing and mathematics appropriate to the discipline
- 1b: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- 1c: An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
- 1i: An ability to use current techniques, skills, and tools necessary for computing practice
- 2a: 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
- 2b: An ability to apply design and development principles in the construction of software systems of varying complexity

7. Brief list of topics to be covered

- Applications of Computer Networks
- The Physical Layer
- Data Link Layer
- The Medium Access Control
- The Network Layer
- The Transport Layer
- The Application Layer
- Network Security