



# Course Specification

## (Bachelor)

Course Title: **Network Programming**

Course Code: **303CCN-3**

Program: **Bachelor of Science in Computer Networks**

Department: **Networks and Communications Engineering**

College: **Computer Science and Information Systems**

Institution: **Najran University**

Version: **1.0**

Last Revision Date: **Feb 2025**



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## A. General information about the course:

### 1. Course Identification

**1. Credit hours: ( ..... )**

**3 (2, 2, 1) [Theory, Lab, Tutorial]**

**2. Course type**

A.  University  College  Department  Track  Others

B.  Required  Elective

**3. Level/year at which this course is offered: (Level 6 / Year 3)**

**4. Course general Description:**

Java I/O streams; Internet Addresses; URL class; The socket interface and Communication primitives; Protocols Design; Protocol specification; Protocol implementation; Processes; Threads and synchronization; Multithreaded clients and servers; Interthread communication; UDP and TCP Java network programming API is used to implement the practical aspects.

**5. Pre-requirements for this course (if any):**

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**6. Co-requisites for this course (if any):**

N/A

**7. Course Main Objective(s):**

Upon the successful completion of this course, students will be able to:

- Discuss the basic concepts involved with network programming.
- Assess how protocols are implemented.
- Examine the advantages of multithreaded applications.
- Analyze and compare the advantages/disadvantages of different transport layer protocols and justify their usage by some application protocols.
- Manage Java Input/output streams and Java exception handling.
- Develop practical network protocols, for client and server side, using Java networking APIs.

**2. Teaching mode** (mark all that apply)





No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> <li>Traditional classroom</li> <li>E-learning</li> </ul>		
4	Distance learning		

### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures [2 contact hours ' 15 weeks]	30
2.	Laboratory/Studio [2 contact hours ' 15 weeks]	30
3.	Field	
4.	Tutorial [1 contact hour ' 15 weeks]	15
5.	Others (specify)	
<b>Total</b>		<b>75</b>

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	Discuss the basic concepts involved with network programming.	K1, K2	Lectures, Small Group Work, Small Group Discussion, Lab	Quiz 1, Midterm Exam, Final Exam, Lab Assignment, Lab Final Exam
1.2	Assess how protocols are implemented.	K1, K2	Lectures, Small Group Work, Small Group Discussion, Lab	Quiz 1, Midterm Exam, Final Exam Lab Assignment, Lab Final Exam





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Examine the advantages of multithreaded applications.	K2	Lectures, Small Group Work, Small Group Discussion, Lab	Quiz 1, Midterm Exam, Final Exam Lab Assignment, Lab Final Exam
...				
<b>2.0</b>	<b>Skills</b>			
2.1	Analyze and compare the advantages/disadvantages of different transport layer protocols and justify their usage by some application protocols.	S6, S4	Lectures, Small Group Work, Small Group Discussion, Lab	Quiz 1, Midterm Exam, Final Exam Lab Assignment, Lab Final Exam
2.2				
...				
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Developing oral presentation skills.	V2	Lectures, Small Group Work, Small Group Discussion	Group Assignment.
3.2	To illustrate the important components of communication skills based on developing critical skills, observations, experiments, and feedback.	V2	Lectures, Small Group Work, Small Group Discussion	Group Assignment.
...				

### C. Course Content

No	List of Topics	Contact Hours
1.	Networking review. What Is a Network? How Do Networks Communicate?	15



	What is a protocol? Communication across Layers. Advantages of Layering. TCP/IP Protocol Suite Layers.	
2.	Java Overview The Java Programming Language. Exception Handling. Files and Streams Multithreading Synchronization. Deadlock and Interthread Communication.	10
3.	Internet Addressing and URL class. Internet Protocol Addresses and DNS Internet Addressing with Java. URL class	10
4.	Socket Programming (TCP) Socket for clients. Socket for servers.	15
5.	User Datagram Protocol. DatagramPacket and DatagramSocket Class. Listening for UDP and sending UDP Packets. User Datagram Protocol Example. Building a UDP Client/Server.	10
6.	Network Programmability and Automation	15
<b>Total</b>		<b>75</b>

#### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz and Assignment	2	10%
2.	Midterm Examination \	6	30%
3.	Lab Activities	8	10%
4.	Lab Final Examination	11	10%
5.	Final Examination	12-13	40%
...			

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

#### E. Learning Resources and Facilities

##### 1. References and Learning Resources





<b>Essential References</b>	Chou, Eric. <i>Mastering Python Networking: Your one-stop solution to using Python for network automation, programmability, and DevOps</i> . Packt Publishing Ltd, 2020.
<b>Supportive References</b>	<ol style="list-style-type: none"> <li>1. Introduction to Java Programming, Comprehensive Version, Liang, 10th edition.</li> <li>2. Java™ Network Programming and Distributed Computing, David Reilly and Michael Reilly, M ISBN: 0-201-71037-4, Publisher: Addison Wesley Professional, 2002.</li> <li>3. Java Network Programming, Elliotte Rusty Harold, O'Reilly, Fourth Edition, 2013.</li> </ol>
<b>Electronic Materials</b>	Available in Blackboard
<b>Other Learning Materials</b>	

## 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Rooms with 20 seats with smart table, Mic, Speaker, PC, Auto Projector with Screen and a white board or a smart board (male Section).
<b>Technology equipment</b> (projector, smart board, software)	<ol style="list-style-type: none"> <li>1. Desktop/ Laptop computer Multimedia Projector</li> <li>2. The laboratory contains enough number of PC to accommodate all students with Java-related software like JCreator, J2SE , NetBeans, Eclipse and JRE-licensed version with network package should be installed.</li> </ol>
<b>Other equipment</b> (depending on the nature of the specialty)	1. A File cabinet to keep class stuff, papers and students' files, and a printer to print program screenshots.

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, instructors and peer review	<ul style="list-style-type: none"> <li>- Online course survey: By the end of each semester, students give their opinions about many factors in the course. They give feedback about teaching strategies, assessment methods, textbooks, instructors, etc.</li> <li>- Feedback about Course Learning Outcomes (CLOs): A course survey is</li> </ul>





Assessment Areas/Issues	Assessor	Assessment Methods
		distributed to students to get their opinions about the CLOs.
Effectiveness of students' assessment	Instructor, faculty, and student	<ul style="list-style-type: none"> <li>- Discussion with other faculty members about students' understanding and the best way of teaching them.</li> <li>- Peer consultation on teaching</li> <li>- Discussions within the group of faculties teaching the same course before</li> </ul>
Quality of learning resources	Instructor and Faculty	<ul style="list-style-type: none"> <li>- Describe the relationship between the course's topics and CLOs.</li> <li>- Course syllabus must be distributed in the first week. It should contain the necessary information about the course (CLOs, assessment methods, descriptions, etc.)</li> <li>- Feedback from the students about the understanding of lectures in academic advising hours.</li> <li>- Analysis of the critical topics with real-life examples and preparation of good effective PPT slides.</li> <li>- By suggesting good teaching methodologies</li> <li>- Ensure that all students participate in the class.</li> <li>- Encourage students to attend during office hours to clarify their doubts.</li> </ul>
The extent to which CLOs have been achieved	Peer and instructor	<ul style="list-style-type: none"> <li>- The course coordinator has to approve the exams and grades of students in exams.</li> <li>- The curriculum committee will review all courses by the end of each semester and approve actions and improvements plan to be carried out.</li> <li>- Getting feedback from the students who will pass the course and work in the practical field.</li> <li>- The vice dean and the dean of the college have to approve the final grades.</li> </ul>
the planning arrangements for periodically reviewing course effectiveness and planning for improvement	Instructor	<ul style="list-style-type: none"> <li>- Each semester, the instructor has to teach the course according to the previous course materials (Course specification, report, improvement plan, etc.).</li> <li>- By the end of each semester, the instructor must prepare a course file which contains all activities and practices taken in the course. Achievements of CLOs can be used if the students' levels improved or not</li> </ul>

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)





## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	NETWORK AND COMMUNICATIONS ENGINEERING DEPARTMENT COUNCIL
<b>REFERENCE NO.</b>	14450824-0482-00014
<b>DATE</b>	5/3/2024

