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London, ON, Canada

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The Students are

1.0 Faculty Information

Name: J.sushmitha

Email: j.sushmitha00302@gmail.com

2.0 Course Information

Course ID	ICT--A-C00349
Class days (For synchronous course)	Monday to Friday
Class time (For synchronous course)	7.30 Pm to 8.30 Pm IST
Course total contact hours	30 Hrs.
Class location	NSRIC online platform
Prerequisites and/or co-requisites	n/a
Level: A, C, E, H, I, K12, M, P, S, T, U, V, W	Undergraduate / U

Note: The below classification of courses is related any areas of knowledge:
A: Advanced level academic level courses; **C**: Canadian Immigration Training Program; **E**: Executive courses; **H**: Higher-level courses (i.e., graduate courses); **I**: Intermediate courses (i.e., university preparatory courses – Grade XII+); **K12**: Foundational, and lower-level courses; **M**: Mid-level courses (i.e., undergraduate courses); **P**: Professional courses; **S**: Short/seminar courses; **T**: Training courses; **U:** Tutorial Courses; **V:** Vocational training courses; and **W**: Workshop courses.

3.0 Professor Information

Name	J.Sushmitha
Title	Instructor
Contact Information	Email: j.sushmitha00302@gmail.com
Office Location	NSRIC online platform
Office Hours	xxxxxx

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4.0 Course Description

The architecture and operation of computer networks, including protocol stacking and physical level communication, are introduced to the students.

It imparts knowledge of networking system basics, including their architecture, operation, and function, as well as how these fundamentals are reflected in contemporary network technologies. Students will gain knowledge of the underlying concepts of networks as well as how these ideas are applied (or not) to the existing network protocols and systems.

They are also aimed to provide a deeper grasp of the elements needed to construct a network and an analysis of its performance. The Open Systems Interconnection (OSI) communication model, error detection and recovery, the functions of different networks, such as local area networks (LAN), wide area networks (WAN), and metropolitan area networks (MAN), bridges, routers, and gateways, as well as network naming and addressing, are also introduced to the students. Additionally, the TCP/IC Protocol, local and remote processes, and ISO organization will all be covered in this course.

Through this course, the students will become familiar with various network topologies. This course is a prerequisite for everyone interested in studying abroad

Module I:

Beginners who are prepared to master the fundamentals of computer networking should take this subject. The students are helped by this lesson to comprehend the fundamentals of networking topologies and their configuration. This module also includes basic networking models for switching and transmission types, like circuit switched networks and packet switched networks. After that, the students are exposed to both analogue and digital transmission methods. Each of the four modules (Modules I through IV) of the course consists of seven lectures.

Students will be given detailed explanations of each concept with illustrations to help them grasp it better. Individuals and students who need to comprehend the fundamentals of computer networking should take this session. 20 to 35 PowerPoint slides and pdf documents are used in each class. Additionally, the course is set up with one assignment and one quiz. To understand the course material, it is strongly advised that students finish Prof. J. Sushmitha's "Fundamentals of Computer Networking (Module I - IV)" course at the NSRIC Platform.

Keywords:

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching – Analog Transmission – Digital Transmission

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Module - II

Beginners who are ready to study the fundamentals of Media Access and the Data Link Layer should take this subject. This module focuses on the Layered Architecture of the ISO Organisation, the ARPANET, as well as the TCP/IP Protocol and OSI Model functionalities.

A straightforward demo of stacked functions will also be presented. The course material for Module II is covered in seven lectures. Each of the four modules (Modules I through IV) of the course consists of seven lectures. To fully grasp the material of this course, it is strongly required that students finish the bundled courses programme "Computer Networking" by Prof. J. Sushmitha at NSRIC Platform.

Keywords:

ISO Organization- OSI Model – Ethernet- Wireless LAN –Link Layer Addressing- TCP/IP protocol – ARPANET –Switching- Topology – Transmission Mode- Media Access – Data Link Layer.

Module III:

This module is designed for novices who are eager to understand the fundamentals of many types of protocols and their client and server models. Its primary focus is on the Internet's architecture and network security, which includes cryptography. Additionally, transmission control protocols including IP, HTTP, FTP, and ARP were discussed. Detailed explanation on the error detection and correction is implemented is explained in this module.

It also elaborates on identifying node failure during transmission.

Each of the course's four modules, numbered I through IV, consists of six lectures. It is highly recommended that students take the bundled courses programme titled "Computer Networking" at Information and communication technology by Prof. J. Sushmitha at NSRIC Platform in order to gain the in-depth knowledge of the course material.

Keywords:

FTP-ARP- Cryptography – Network security- HTTP –TCP- IP-Client and Server Model- Configuration of network security- Error Detection & Correction-Switching – Bridging.

Module IV:

Beginners who are prepared to master the fundamentals of the application layer should take this programme. The purpose of this module is to enable students to apply it in the real world. It also covers applications like SNMP, Telenet, and email.

Students are exposed to a case study on Traditional and Modern Cyphers, including RSA and Security Services, in order to broaden their expertise. Each of the four modules (Modules I through IV) of the course consists of seven lectures.

It is highly recommended that students take the bundled courses programme titled "Computer Networking" at Information and communication technology by Prof. J. Sushmitha at NSRIC Platform in order to thoroughly understand the course material.

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Keywords:
Network routing security – Design routing algorithm-Application Layer - Real time application - Email – Telenet- SNMP- RSA – Security services – Modern Ciphers .

5.0 Course Learning Outcomes
Upon successful completion of this course, students will be able to:

Module I

1. CLO1: Become familiar with layered communication architectures (OSI and TCP/IP)
2. CLO2: Understand the client/server model and key application layer protocols**.**
3. CLO 3 : Understand the basics of how data flows from one node to another.
4. CLO4 : Learn the principles of routing and the semantics and syntax of IP.

Module II

5. CLO5: Ability to understand the basics of error detection including parity, checksums, and CRC.
6. CLO6 : Analyze the layered architecture and its applications
7. CLO7 : Analyze the Addressing in Link layer
8. CLO 8: Examine the concepts of error in the network

Module III

9. CLO 9: Ability to identify the concepts of Switching and bridging.
10. C70 10: Apply the error detection and correction in the networks
11. CLO 11 : Ability to Configure the network security
12. CLO 12 : Ability to identify the different types of Protocols used in the client & sever protocol model

Module IV

13. CLO 13 :Apply the concept of network security in application layer.
14. CLO 14 : Analyze and design routing alogorithm
15. CLO 15 : List and discuss the various routing algorithm
16. CLO 16 : Apply the concept of security in network nodes.

Online course materials
1) Online PowerPoint presentation slides in pdf form, and video/audio recording of lectures
2) Google Classrooms for regular updation of course materials, Submission of Assignments and quizzes through G-forms.

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Textbook and resources (If any)

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. "Data Communication and Networking" by Behrouz A Forouzan
3. "Computer Networks" by Andrew S Tanenbaum
4. "Internetworking with TCP/IP, Volume 1" by Douglas Comer
5. "TCP/IP Illustrated" by W Richard Stevens
6. "Computer Networking" by James F Kurose and Keith W Ross
7. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.

7.0 Academic Integrity

Students are encouraged to have a look at the NSRIC's statement of academic integrity at NSRIC website. It is noted that by signing this syllabus, you will acknowledge that you have understood that any detected plagiarism should be reported.

8.0 Assessment for Grade

The course grade is only related to the academic courses (i.e., K12, and university level courses) based on individual and team performance as shown in Table 1:

Table 1: NSRIC grading system

Type of Assessment	Grade %
Participation/Engagement/Performance	10%
Assignments	15%
Quizzes	10%
Research Project	20%
Midterm Exam I	15%
Midterm Exam II	15%
Final Exam	15%
Total	**100%**

Important Note:

i) The below classified courses (i.e., academic courses) will only be evaluated based on the grade system shown in Table 2. A grade and certificate will be issued for the student(s) and participant(s).

> **A**: Advanced level academic level courses; **H**: Higher-level courses (i.e., graduate courses); **I**: Intermediate courses (i.e., university preparatory courses – Grade XII+); **K12**: Foundational, and lower-level courses; **M**: Mid-level courses (i.e., undergraduate courses).

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ii) The below classified courses will **not** be evaluated based on the grade system shown in Table 2. A certificate will be issued for the student(s) and participant(s).

E: Executive courses; **P**: Professional courses; **S**: Short/seminar courses; **T**: Training courses; **U:** Tutorial Courses; **V**: Vocational training courses; and **W**: Workshop courses.

Participation/Engagement/Performance

Your participation in every aspect of the course is important for the learning process. Your engagement in every discussion in the course, due delivery of all assignments, quizzes, and research projects will be fruitful. These efforts from your side will reflect your performance in the course delivery and your commitments. This performance is the reflection of your dream grade!!

Assignments

You will be given **5 assignments** during the course delivery. The due dates for assignments are specified in the course content and schedule section. The assignments will be given time to time to solve/answer during the term. Assignments will be posted through NSRIC online platform at least one week before they are due. Due dates are given in course schedule (tentative schedule). However, in case of any special circumstance, the date will be posted beforehand or announced in class.

Quizzes

A Maximum of five quizzes (maximum of **five MCQ @ five** minute) will be taken based on class lectures and performance. The quiz will be taken in the beginning of the lecture through NSRIC online platform. If you miss the quiz without any valid official excuse, your will receive **zero** for the non-attended quiz. If any student fails to attend the quiz, he/she must submit a valid reason to the instructor. In such case, he/she should appear another quiz or may be averaged on the quizzes that he/she attended. It will depend on the situation and instructor.

Research Project and presentation

Each student will be assigned a topic related to the course material by the instructor. Each student will submit a research project report. The student will present his/her work during the class (5 min presentation + 5 min discussion). Additional information is available at term project guideline.

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Midterm and Final Exams

Two midterm exams and one final exam will be taken according to the NSRIC policies and guideline. The exams would be through NSRIC online platform. The midterm and final exams dates would be announced by the course instructor/NSRIC administration.

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9.0 Grading Scale of the Course

Important Note:

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ii) The below classified courses will **not** be evaluated based on the grade system shown in Table 2. A certificate will be issued for the student(s) and participant(s).

E: Executive courses; **P**: Professional courses; **S**: Short/seminar courses; **T**: Training courses; **U:** Tutorial Courses; **V**: Vocational training courses; and **W**: Workshop courses.

At the end of the term, the below Table 2 will be used for translating your marks into a "Latter Grade" based on NSRIC grading policy.

Table 2: NSRIC grading system

Marks	Letter Grade	Points	Description
≥ 93	A+	4.00	Outstanding
≥ 90	A	3.75	
≥ 87	A-	3.50	Excellent
≥ 84	B+	3.25	Very good
≥ 81	B	3.0	
≥ 78	B-	2.75	Moderately Good
≥ 75	C+	2.50	Good
≥ 72	C	2.25	
≥ 69	C-	2.0	Moderately Good
≥ 66	D+	1.75	Pass
≥ 63	D	1.50	
≥ 60	D-	1.25	Poor Pass
< 60	F	0	Failing

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10.0 Advice and additional requirements

I advise you to:
o   Please contact me if you need any help.
o   Students are expected to attend all scheduled online lecture classes.
o   Students are expected to study from the course materials and/or textbooks which will help to easily read and understand.
o   Students are encouraged to write their own notes during lectures/presentations (pdf PowerPoint presentations, and additional materials if any).
o   Students are encouraged to attend online platform classes on time because late-attendee disrupts the flow of the class for both the instructor and the other students.

Additional information (During Online Course offering Period)
o   The PowerPoint course materials, and video lectures will be available at the NSRIC Platform.
o   There will be scheduled discussion/tutorial sessions on **every Sunday** at the class scheduled time. All students must attend this session.
o   There will be an office hour for students on Sunday from 1:00 pm – 2:00 pm, Toronto, Canada time. Students need to send an email request so that a zoom meeting can be arranged. In addition, any time student can set up an online appointment (i.e., phone, zoom, and/or other mode of communications) based on availability of the course instructor. However, student should send an email request for setting up this type of meeting.

11.0 Course Topics

o   Introduction to Data Communication – Applications- Protocols & Standards.
o   Network Topologies and Transmission Mode.
o   Analog and Digital Transmission
o   Modems and their standards.
o   ISO organization – Layered Architecture.
o   TCP/IP reference Model
o   Introduction to Internet & IP Address class.
o   Internet Protocol
o   Basic concepts of Network security.
o   Cryptography – Symmetric and Asymmetric

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12.0 Course Contents and Schedule

Lec No.	Module	Topics	Remarks
		MODULE-1	
01	Introduction	Course overview and outcome .Basics of Data Communication.	
02	Computer Networks	Introduction to Data Communication – Applications- Protocols & Standards.	
03	Computer Networks	Network Topologies and Transmission Mode.	
04	Computer Networks	Configuration and Topologies	
05	Computer Networks	Switching – Circuit-switched Networks – Packet Switching.	Quiz 1 through G-Forms
06	Computer Networks	Summary & Quiz on Completed sessions.	
07	Computer Networks	Analog and Digital Transmission	Assignment 1 due
		MODULE-2	
08	Transmission of Digital Data	Modems and their standards	
09	The OSI Model	ISO organization – Layered Architecture.	Quiz 2
10		**Mid Term Exam 1**	
11	The OSI Model	functions of the layers	
12	TCP/IP Model & Protocols	The TCP/IP reference model	Assignment 2 due
13	TCP/IP Model & Protocols	comparison of TCP/IP & OSI	
14	TCP/IP Model & Protocols	Internet-Models and Protocols.	
15	TCP/IP Model & Protocols	Summary of the module , Clarification of doubts & Quiz	Quiz 3

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MODULE-3			
16	ARPANET	Architecture of Internet	
17	Protocols	Protocols: IP, HTTP	Assignment 3 due
18	Protocols	Transmission Control Proctocol	
19	Protocols	File Transfer Protocol	
20	Protocols	Address Resolution Protocol	
21	Client & Server Model	WWW, Summary of the module	
22	Client & Server Model	Summary of the module , Clarification of doubts & Quiz	Quiz 4
23		**Mid Term Exam 2**	
MODULE-4			
24	Network Security	Introduction of Network Security and it's importance.	
25	Cryptography	Definitions and types	Assignment 4 due
26	Symmetric Key Cryptography	Traditional Ciphers, Simple modern Ciphers	
27	Asymmetric Key Cryptography	RSA, Security Services	
28	Asymmetric Key Cryptography	Digital Signatures	
29	Case study	Case study on cryptography	Assignment 5 due
30	Summary	Summary of the module , Clarification of doubts & Quiz	Quiz 5
	Final Exam	**TBA**	

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o Students are expected to study from the course materials and/or textbooks which will help to easily read and understand.
o Students are encouraged to write their own notes during lectures/presentations (pdf PowerPoint presentations, and additional materials if any).
o Students are encouraged to attend online platform classes on time because late-attendee disrupts the flow of the class for both the instructor and the other students. Additional information (During Online Course offering Period)

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o There will be scheduled discussion/tutorial sessions on every Sunday at the class scheduled time.
 o All students must attend this session.

Bundled Program Description:
The audiences who are interested in learning the fundamentals of computer networks in ICT (information and communication technology) operations should take these bundled courses. The course material is intended for those who are new to networking and want to learn about its many layers. Networking topologies, fundamental data transmission principles, OSI Model concepts, TCP/IP Protocol models, client and server models, network security (symmetric and asymmetric), Unicast routing algorithm, and Interior and Exterior Gateway Routing Protocol are all covered in this course. Each module also covers real-time applications including multimedia - video & audio compressions, static and dynamic web content, and real-time apps. Each of the four modules (Modules I through IV) of the course consists of seven lectures. We strongly urge students the students to complete all four modules.

Materials Included
o All lectures are in pdf PowerPoint presentation slides
o Pdf form assignments and quizzes in the MLS system
o Pdf reading materials

Requirements/Instructions:
 Students are advised to register all 4 Module.