

# Network Technology (NET)

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## Network Technology (NET) Courses

### NET 1001 [0.5 credit]

#### Computer Technology Basics

Construction and function of PCs. Introduces technical concepts and terminology relating to system boards, system busses, input/output devices, memory, microprocessors and peripherals. Interaction of software and hardware; data storage; performance issues. Prerequisite(s): restricted to students in the B.I.T. degree program.

Lectures two hours a week, tutorial/laboratory two hours a week.

### NET 1002 [0.5 credit]

#### Networking Fundamentals

Foundation knowledge for computer networks and communications. Topics include basic network design, layered communications models, IP addressing and subnets, and industry standards for networking media and protocols, with an emphasis on TCP/IP protocol suite and Ethernet environments.

Prerequisite(s): restricted to students in the B.I.T. degree program.

Lectures three hours a week, tutorial/laboratory two hours a week.

### NET 1004 [0.5 credit]

#### Assembly and Machine Language

Structured approach to assembly language programming. Topics include data and address registers, data and address busses, condition code register and stack pointers, machine code format, instruction sizes, operand encoding, translation of source code into machine language, and how the processor executes instructions. Also listed as PLT 1007.

Prerequisite(s): restricted to students in the B.I.T. degree program.

Lectures three hours a week, tutorial/laboratory one hour a week.

### NET 1006 [0.5 credit]

#### Routing and Switching

Introduction to routing and switching concepts, VLANs and routing protocols with RIP and single-area OSPF as examples. Topics include configuring routers and switches and resolving common configuration and reachability issues.

Precludes additional credit for NET 1005 (no longer offered).

Prerequisite(s): NET 1002.

Lecture three hours a week, tutorial/laboratory three hours a week.

### NET 2000 [0.5 credit]

#### Intermediate Networking

Architecture, components and operations of routers and switches in larger and more complex networks. Topics include configuration and troubleshooting of OSPF (with introduction to multi-area), EIGRP, STP, redundancy techniques and WiFi in SOHO environments.

Prerequisite(s): NET 1006.

Lectures three hours a week, tutorial/laboratory two hours a week.

### NET 2001 [0.5 credit]

#### Wide Area Networking

Theory and technologies extending LANs to WANs including the relevant networking architectures and services. Data link protocols for WAN, network security, tunneling, VPNs and network monitoring, with a focus on implementation and troubleshooting.

Prerequisite(s): NET 2000.

Lectures three hours a week, tutorial/laboratory two hours a week.

### NET 2002 [0.5 credit]

#### Desktop & Server Environments

Using Windows Server, study features such as file system, system utilities, memory management, boot process troubleshooting and UI customizations. Client-server architecture is examined with a focus on server configuration and administration, connection to a domain, remote desktop, and services including DHCP, DNS and Active Directory.

Prerequisite(s): restricted to students in the B.I.T. degree program.

Lecture two hours a week, tutorial/laboratory two hours a week.

### NET 2003 [0.5 credit]

#### Linux Networking

Introduction to Unix and Linux operating systems, the command line, and network server operating environments. Students study Unix/Linux as a network server, including the configuration of services and protocols such as DNS, NTP, SSH, SMB, SMTP, POP3, IMAP, HTTP, and DHCP. Basic server security is introduced, including the creation of firewalls.

Prerequisite(s): NET 2002.

Lecture two hours a week, tutorial/laboratory two hours a week.

### NET 2004 [0.5 credit]

#### Communication Skills for NET

Development of competence in written and oral communication in relation to network design, development, and management. Focus on technical reports, proposals, and other related project documents; formal and informal oral presentations.

Prerequisite(s): restricted to students in the B.I.T. degree program.

Lecture and tutorial three hours a week.

**NET 2007 [0.5 credit]****Basics of Transmission Systems**

Introduction to the physical layer of digital communication. Coverage of the transmission media (copper, fiber, cable, wireless), modulation, coding, equalization and synchronization. Examples: dial up modems, ADSL, Ethernet, T-carrier, Cable modem, SONET and wireless LAN. Factors affecting transmission error rates. Lab and field test equipment.

Prerequisite(s): BIT 1003.

Lectures three hours a week, tutorial/laboratory three hours a week.

**NET 3000 [0.5 credit]****Database Concepts and SQL**

Concepts and fundamentals of relational database systems. Students learn how to design relational databases starting from a conceptual data model, following accepted logical and physical design principles. Topics include normalisation, referential integrity, SQL, DDL and SQL DML & ODBC and data extraction/ filtering techniques.

Prerequisite(s): second-year standing in the Networking program.

Lecture two hours a week, tutorial/laboratory two hours a week.

**NET 3001 [0.5 credit]****Real-time Systems**

Principles of event-driven systems, review of computer organization; parallel and serial interfaces; programmable timer; I/O methods; polling and interrupts. Real-time kernels. Critical design consideration: concurrency, dead lock, synchronization. Maintaining and improving system performance. Programming exercises in low and high level languages.

Prerequisite(s): NET 1004 and BIT 2400.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3004 [0.5 credit]****Data Structures**

Specification and design of abstract data types and their implementation as stacks, queues, trees, tables and graphs. Common and useful examples. Parsing and finite state machines. Analysis of algorithms, recursion, re-entrance. Special focus: abstraction, interface specification and hierarchical design using object-oriented programming.

Precludes additional credit for PLT 3010.

Prerequisite(s): BIT 2400.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3006 [0.5 credit]****Network Management and Measurements**

Network management fundamentals, standards, and protocols. The Simple Network Management Protocol (SNMP). Structure of Management Information and MIB. SNMP management challenges and the need for real-time measurements. Introduction to tools and applications for network measurements and monitoring.

Prerequisite(s): third-year standing in the Networking program.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3007 [0.5 credit]****Network Security**

Basics of Information Technology security. Students are introduced to the goals of IT security, common threats and countermeasures including firewalls, Intrusion Detection and Prevention Systems (IDPS) and virtual private networks. Several operating environments will be studied as examples. Also includes a section on computer ethics.

Prerequisite(s): NET 2001.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3008 [0.5 credit]****Advanced Network Routing**

Routing IP at the enterprise level, within and between, autonomous systems. Advanced control and optimization of routing protocols and manipulation of traffic paths with a focus on multi-area OSPF and EIGRP. Working knowledge of Internet reachability via BGP.

Prerequisite(s): NET 2001.

Lectures three hours a week, tutorial/laboratory three hours a week.

**NET 3010 [0.5 credit]****Web Programming**

Architectures, protocols and languages used to develop dynamic Web content, including HyperText Markup Language (HTML, DHTML), Universal Resource Identifiers (URI) and HyperText Transport Protocol (HTTP) and Common Gateway Interface (CGI). JavaScript and Java are used to model cross-platform Web programming.

Prerequisite(s): BIT 2400, NET 3000.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3011 [0.5 credit]****Advanced Network Switching**

VLANs and inter-VLAN routing in a multilayer switched environment. Variants of STP and the use of related enhancements. Techniques for network redundancy and load balancing. Securing a switched infrastructure. Architectures and techniques for delivering converged and multimedia traffic (voice, video) in the enterprise.

Prerequisite(s): NET 2001.

Lectures three hours a week, tutorial/laboratory three hours a week.

**NET 3012 [0.5 credit]****IP Architectures and Solutions**

An exploration of various deployment options that can be implemented atop an IP network core. The focus is on techniques, technologies and architectures that serve to enhance IP delivery and connectivity, or provide a service leveraging the IP infrastructure. Includes Layer 2 and 3 VPNs.

Prerequisite(s): NET 3008.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 3900 [0.5 credit]****Wireless Networks**

Study of 802.11 protocol family, Wi-Fi, and authentication protocols. Security and other design issues for WLANs. Deployment considerations for mobile networks, hotspots, bridges and access points. Wireless network management challenges.

Prerequisite(s): third-year standing in the Networking program.

Lectures two hours a week, tutorial/laboratory three hours a week.

**NET 4000 [0.5 credit]****Emerging Network Technologies**

Overview of technologies, protocols and techniques related to Information Technology networking that are either in their early stage of adoption or are not yet mainstream (i.e. beta or prototype stage). Focus will vary from year to year to reflect the evolutionary nature of this domain.

Prerequisite(s): fourth-year standing in the Networking program or permission of the instructor.

Also offered at the graduate level, with different requirements, as ITEC 5110, for which additional credit is precluded.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 4001 [0.5 credit]****Network Simulation**

Introduction to discrete event simulation; fundamental stochastic models for networking; queueing theory; deterministic algorithms for networking; confidence intervals; introduction to network modeling. Use of simulation tools to develop and test scenarios including traffic monitoring, congestion, routing protocols, resource utilization and growth planning.

Prerequisite(s): BIT 2000.

Also offered at the graduate level, with different requirements, as ITEC 5113, for which additional credit is precluded.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 4003 [0.5 credit]****Computer Systems Architecture**

History and evolution of computers. Models and functional descriptions of CPU, bus, memory, I/O. Internal data transfer and storage concepts. Bus protocols. Memory organization and cache principles. Digital logic and simple logic designs of CPU, buses, memory. Concepts of virtual machines, parallel computing, cloud computing.

Prerequisite(s): third year standing in the Networking program, NET 2003 and NET 3001.

Lectures three hours a week, tutorial/laboratory one hour a week.

**NET 4005 [0.5 credit]****Networked Applications**

Architectures for computing in modern data networks that adopt the Internet architecture. Topics covered include socket programming, RPC and RMI. Client-server and peer-to-peer models. Emerging application architectures.

Prerequisite(s): NET 3004 and NET 3010.

Also offered at the graduate level, with different requirements, as ITEC 5114, for which additional credit is precluded.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 4007 [0.5 credit]****Multimedia Networking**

Audio and video compression. H.261, JPEG, MPEG and DVI. Accessing audio and video from a web server. Real Time Streaming Protocol (RTSP). Multimedia operating systems. Multimedia database. Network support for multimedia applications. Multimedia synchronization.

Prerequisite(s): fourth-year standing in Networking program or permission of the instructor.

Also offered at the graduate level, with different requirements, as ITEC 5111, for which additional credit is precluded.

Lectures three hours a week, tutorial/laboratory two hours a week.

**NET 4009 [0.5 credit]****Troubleshooting IP Networks**

Integrates planned maintenance and troubleshooting techniques, including, tools, applications and formalized methodologies. Study of issues in focused areas (such as routed vs. switched environments, addressing services, performance, security, multimedia), culminating in problem resolution throughout a complex enterprise network.

Prerequisite(s): NET 3011, NET 3008.

Lectures three hours a week, tutorial/laboratory three hours a week.

**NET 4010 [0.5 credit]****Secure Mobile Networking**

The concept, principle and rationale of mobile networking. Mobile network architecture, protocols, mobility management, routing and mobile TCP/IP; Security challenges, vulnerabilities and threats in mobile networks; Security defense techniques and countermeasures in mobile networks.

Prerequisite(s): fourth-year standing in Networking program or permission of the instructor.

Also offered at the graduate level, with different requirements, as ITEC 5112, for which additional credit is precluded.

Lectures three hours a week, tutorial/laboratory one hour a week.

**NET 4901 [1.0 credit]****Network Technology Project**

This course provides the opportunity to apply knowledge gained in previous courses towards the design and implementation of a major Networking related project. Working in teams or as individuals under the direction of faculty members, students undertake projects internally or in collaboration with industry.

Prerequisite(s): fourth-year standing in the Networking program.

Tutorial hours arranged.

**Summer session:** some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at [central.carleton.ca](http://central.carleton.ca)