Boston University Metropolitan College
Department of Computer Science

MET CS 685
NETWORK DESIGN & MANAGEMENT
SYLLABUS

Instructor Name: Thomas, **Goulding MS, PhD**
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Credits/Hours: 3

COURSE DESCRIPTION: This course covers all aspects of Top Down network design beginning with identifying customer business needs, analyzing technical goals and describing their existing network. You will learn to develop network designs that provide high bandwidth, low delay, high availability, and if time permits high security.

The course covers logical network design topologies, addressing, and protocols. In the latter half of the course we turn to Physical network design: selecting topologies and devices followed by testing, optimizing and documenting your network.

The end of the course will focus on network management with a focus on network monitoring and event reporting, trouble shooting and problem solving.

This course utilizes Problem Based Pedagogy (PBL) and as such a realistic design and network management business challenge will be addressed by small teams of students who will act as

competing network design and implementation contractors who are competing for a network implementation contract based on their proposed design.

BOOKS: Each week you will be studying and mastering material in the excellent textbooks published by P. Oppenheimer: *Top Down Network Design 3rd edition* and J Richard *Burke : Network Management: Concepts and Practice, A Hands on Approach*.

CLASS POLICIES:

- **Attendance:** This is an online class therefore the only attendance requirement is attendance at the weekly live sessions which the instructor will arrange. Attendance at these meetings is required.
- **Assignment Completion and Late Work:** There can be no late Assignments, exams and or presentations due to the collaborative nature of much of our work as well as the speed at which tasks must be accomplished.
- **Academic Conduct:** "Cheating and plagiarism is not tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code: : http://www.bu.edu/met/for-students/met-policies-procedures-resources/academic-conduct-code/his should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions.

GRADING CRITERIA: Your course grade will be based on:

1. A midterm (20%)
2. Final exam (20%)
3. Design Tools-Mini-Project#1 (5%)
4. Network Management Tools-Project#2 (5%)
5. Final Eldercare Campus Proposal (40%)
6. Discussion Question Participation (10%)
7. The following grade rubric will be used to assign course grade:

   A+ 100, A 96, A- 92, B+ 88, B 85, B- 82, C+ 78, C 75, C- 72, D 67, F 0

CLASS MEETINGS, LECTURES & ASSIGNMENTS

Week	Topics	Assignment
1	Analysis of Goals: Analyzing business & technical goals Characterizing a Network	READ: Chapters 1, 2 ,3 in text Top-Down Network Design WORK on Mini-Project 1 POST 3 times on discussion board REVIEW ELDERCARE Specification

		MEET TEAM MEMBERS and Start Project Discussion PARTICIPATE in LIVE session with the Owner-Operator (O-O) of the new Eldercare Facility
2	Network Topology & Addressing ! Hierarchical Networks ! Redundant Topologies ! Designing Campus and Enterprise Topologies ! Network layer addressing	READ: Chapters 5,6 in text Top-Down Network Design WORK on Mini-Project 1 DEVELOP Preliminary Eldercare Project and work Plan POST 3 times on discussion board PARTICIPATE in LIVE session with the Owner-Operator of the new Eldercare Facility
3	Protocols & Physical Design ! Switching Protocols ! Routing Protocols ! Cable Technologies ! Device Selection	READ: Chapters 7,10 in Oppenheimer Top-Down Network Design POST 3 times on discussion board MINI-PROJECT 1 DUE PRESENT Design Tools Mini 1 Project to O-O MIDTERM EXAM Due PARTICIPATE in Live O-O Session
4	Remote Access & WAN topologies ! LAN technologies ! LAN design Principles ! PPP, Modem, DSL access ! SONET, Frame Relay. ATM ! WAN design Principles	READ: Chapters 10,11 in Oppenheimer Top-Down Network Design START work on Mini-Project 2 FINALIZE Eldercare Design POST 3 times on discussion board PARTICIPATE in Live OO Session
5	Network Management I SNMP MIB	READ: Chapters 6,7 in Burke PRESENT Network Mgt Tools- Mini-Project #2 FINALIZE on Eldercare Network Mgt Plan POST 3 times on discussion board PARTICIPATE in Live Faculty Session with O-O
6	**Network Management II** ! Remote Monitoring 1 ! Remote Monitoring 11 ! PROPOSAL PRESENTATION	READ: Chapters 8,9 in Burke Network Management PRESENT Eldercare Proposal to O-O SUBMIT Final Exam

THE COURSE GROUP PROJECT: Three Student Groups will gain hands on experience by working as small technical groups to design a network and the NMS system for a new ***Multi-facility Eldercare Campus*.** At the bottom of this document you will find the preliminary specification of the Eldercare Campus Project: This specification, from the entrepreneur Owner-Operator (O-O), will kick off the project during week 1 and the O-O will conduct weekly technical and progress reviews with the student groups during the Live Weekly Sessions. The superior proposals will be "awarded" a project grade of "A" which should be viewed as equivalent to securing an implementation contract from the O-O.

GROUP PROGRESSASSIGNMENTS: Each small group will also work as a team on two Eldercare interim progress assignments to be submitted and graded separately. These mini-projects are necessary to successfully complete the ***Multi-facility Eldercare Campus*** **project.**

Mini-PROJECT 1- Selection and Mastery of ***Network Design Tools*** will be important to completing the Eldercare project.: Each Student Team, will search for, review and select from over a dozen freeware network design tools to complete the Eldercare project.. Members of the team will utilize the tools and create a series of five to severn-minute videos demonstrating each tool selected by the group. The video links will be embedded in a professional quality Power-point 12 slide presentation to the OO where the strengths or weaknesses that led to there selection or rejection for use on the Eldercare Project. Results are presented in the ***Week 3 Live Session.***

Mini-PROJECT 2- During the second half of the course students will focus on identifying, evaluating and selecting Network monitoring, Configuration and Alarm Reporting tools that will be installed and used at the Eldercare Campus. A 12 slide power-point presentation will be created to explain to the owner-operator the importance of NMS tools, include some demonstration videos and finally identify the tools you will be recommending as a part of your NMS strategy. Results are presented in the Week 5 Live Session with the O-O.

Mini-PROJECT 1 & 2 material will be incorporated into the Eldercare Final Proposal

GRADED DISCUSSION ASSIGNMENTS: Each week you will participate in and respond to discussion questions based on the text reading material, student posts and faculty mini lectures and videos.

FACULTY-STUDENT ENGAGEMENT: Each week you will participate in a 90-minute O-/-student ***Live Classroom*** where the O-O will field project questions. Project guidance will be provided by the O-O.

STUDY GUIDES and VIDEOS: ***Special Lectures and Videos*** each week on difficult topics or areas of special importance will be created by the instructor to complement the textbook reading material.. The extensive weekly textbook reading assignments will be a major challenge so digestible daily assignments will be provided.

COMMUNICATING WITH THE INSTRUCTOR: The instructor will usually respond to ***email*** within 24 hours. Always feel free to contact the instructor about course content questions as well as about unexpected personal or professional developments which may impact your participation in the class. In case of an emergency always feel free to ***telephone*** the instructor.

LEARNING OUTCOMES:

Understand the need for network analysis
Understand the elements of structured network design process
Understand the logical design process for core, distribution, and access networks
Understand how switching and routing requirements influence network design.
Understand how network monitoring, alarm reporting influence network designs
Understand the physical design process of device, infrastructure and protocol selection
Understand how technical proposals are developed and presented to senior executives.

PROCTORED FINAL EXAM

Dear Boston University Computer Science Online Student,

As part of our ongoing efforts to maintain the high academic standard of all Boston University programs, including our online MSCIS degree program, the Computer Science Department at Boston University's Metropolitan College requires that each of the online courses includes a proctored final examination. The midterm is not proctored and reference materials may be used to complete the examination.

By requiring proctored finals, we are ensuring the excellence and fairness of our program. The final exam is administered online, and the access will be available at the exam sites.

Specific information regarding final-exam scheduling will be provided approximately two weeks into the course. This early notification is being given so that you will have enough time to plan for where you will take the final exam.

I know that you recognize the value of your Boston University degree and that you will support the efforts of the University to maintain the highest standards in our online degree program. Thank you very much for your support with this important issue.

Regards,
Professor Lou Chitkushev, Ph.D. Associate Dean for Academic Affairs Boston University Metropolitan College

DISABILITY SERVICES

In accordance with University policy, every effort will be made to accommodate unique and special needs of students with respect to speech, hearing, vision, or other disabilities. Any student who feels he or she may need an accommodation for a documented disability should contact the Office of Disability Services at (617) 353-3658 or at access@bu.edu for review and approval of accommodation requests.

KEY CONTACTS

Your Facilitator. Our classes are divided into small groups, and each group has its own facilitator. We carefully select and train our facilitators for their expertise in the subject matter and their excellence in teaching. Your facilitator is responsible for stimulating discussions in pedagogically useful areas, for answering your questions, and for grading homework assignments, discussions, term projects, and any manually graded quiz or final-exam questions. If you ask your facilitator a question by email, you should get a response within 24 hours, and usually faster. If you need a question answered urgently, post your question to one of the urgent help topics, where everyone can see it and answer it.

Your Professor. The professor for your course has primary responsibility for the course. If you have any questions that your facilitator doesn't answer quickly and to your satisfaction, then send your professor an email in the course, with a cc to your facilitator so that your facilitator is aware of your question and your professor's response.

Your Senior Faculty and Student Support Administrator, Jennifer Sullivan. Jen is here to ensure you have a positive online experience. You will receive emails and announcements from Jen throughout the semester. Jen represents Boston University's university services and works for the Office of Distance Education. She prepares students for milestones such as course launch, final exams, and course evaluations. She is a resource to both students and faculty. For example, Jen can direct your university questions and concerns to the appropriate party. She also handles general questions regarding Online Campus functionality for students, faculty, and facilitators, but she does not provide tech support. She is enrolled in all classes and can be contacted within

Your Computer Science Department Online Program Coordinator, Peter Mirza. Peter administers the academic aspects of the program, including admissions and registration. You can ask him questions about the program, registration, course offerings, graduation, or any other program-related topic. He can be reached at metcsol@bu.edu or (617) 353-2566.

Your Computer Science Department Program Manager, Kim Richards. Kim is responsible for administering most aspects of the Computer Science Department. You can reach Kim at kimrich@bu.edu or (617) 353-2566.

Andrew Gorlin, Academic Advisor. Reviews requests for transfer credits and waivers and advises students on which courses to take to meet their career goals. He can be reached at asgorlin@bu.edu.

Your Faculty Coordinator of the MSCIS Online Program, Andrew Wolfe. Andrew is responsible for the MSCIS online program. Feel free to contact him at awolfe@bu.edu or (617) 358-1984

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Professor Anatoly Temkin, Computer Science Department Chairman. You can reach Professor Temkin at temkin@bu.edu or at 617-353-2566.

Professor Lou T. Chitkushev, Associate Dean for Academic Affairs, Metropolitan College. Dr. Chitkushev is responsible for the academic programs of Metropolitan College. Contact Professor Chitkushev with any issues that you feel have not been addressed adequately. The customary issue-escalation sequence after your course facilitator and course faculty is Andrew Wolfe, then Professor Temkin, and then Professor Chitkushev.

Professor Tanya Zlateva, Metropolitan College Dean Dr. Zlateva is responsible for the quality of all the academic programs at Boston University Metropolitan College.

The South BostonVille Eldercare Project Specification

OWNER-OPERATOR: Pepe Popeye MS, PhD

DANCEY HOUSE APARTMENTS »

KRESGE REHABILITATION AND SKILLED CARE CENTER »

The Big Picture: A new eldercare community is being constructed called ***South BostonianVille, Eldercare*** of Boston, Massachusetts. Your mission is to design a comprehensive network to support the all IT functions associated with this multi-tier, multi-facility eldercare community.

The community consists of 500+ residents some of whom live entirely independently, some who require various levels of daily assistance, some whom require 24 nursing care and others who suffer from dementia. but who are otherwise have good health and mobility. There is also an urgent care facility staffed 24hr/day by certified nurse practitioners who specialize in eldercare emergency care and especially in fall risk mitigation and treatment..

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THE GARDEN COT

TOWSLEY VILLAGE MEMORY CARE CENTER »

IMONS »

The South BostonianVille Eldercare facility will engage over 100 full time employees and several hundred part-time contract employees who are mostly certified nursing assistants and maintenance personnel. The facility will engage a small IT and Network support staff who will assume post installation responsibility for 24 hour support, on site maintenance, training, troubleshooting and equipment replacement. Both facility employees as well as resident will be supported by the network and the network staff. A suitable quantity of spare parts and equipment will be held in inventory to maximize network availability by minimizing downtime due to failures or excessive repair times.

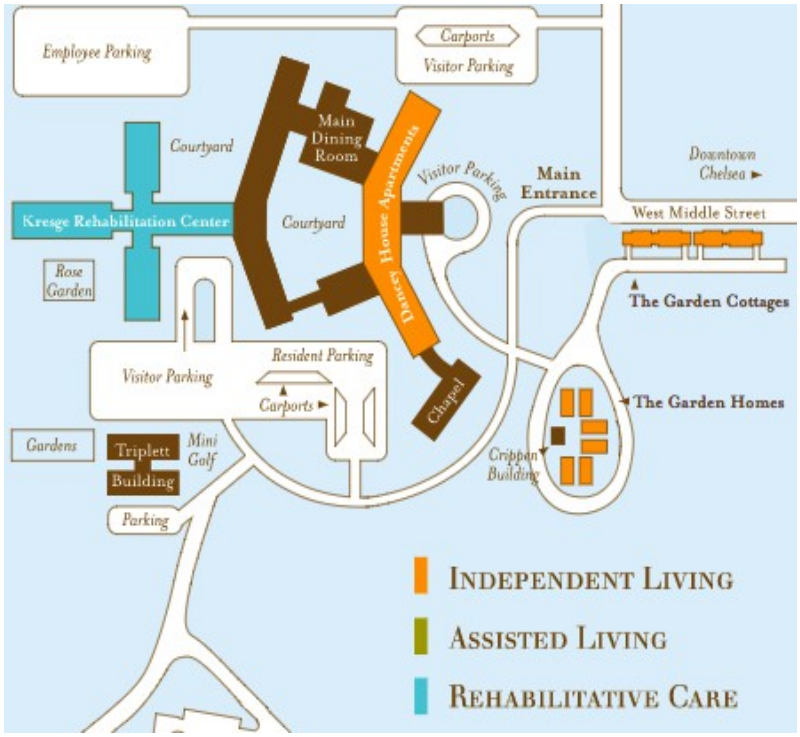
Your mission is to design and propose a high-reliability, fault tolerant network to support the IT, Security and Medical functions for the facility. The facility comprises two campus' colocated on 27 acres. Preliminary campus details are provided below.

You will provide the Owner-Operator:

THE PROPOSAL:

- A comprehensive Network Topology,
- An Equipment Location Map,
- Campus Addressing Plan,
- Complete Equipment list
- Cost Estimates for Follow on Contract:
  5.1 Project Management,
  5.2 Equipment Acquisition,
  5.3 Installation, and Training

NORTH CAMPUS



NORTH CAMPUS DETAILS

REHABILITAION FACILITY: The rehabilitation building consists of 2 floors.

Floor 1 Includes: North Wing Physical Therapy
West Wing Recreation Room
South Wing Maintenance, Storage, Staff Lockers
East Wing: Hallway, Wiring Closet(s), Bird Cage

Floor 2 Includes: North Wing 16 single resident rooms
West Wing 16 single resident rooms
South Wing 16 single resident rooms
East Wing Centralized Nurse Station, Cafeteria, Kitchen,
2 Centralized Resident Lounges and Game Room
Staff quarters, lockers and Lounge
LOCKED Entryways Cloud based egress tracking

DANCY HOUSE APARTMENTS:

Floors 2 & C
Floor 2 & 3 32 independent living apartments
Wireless Everywhere
1 3rd Floor Lounge, Bird Cage and Family Center
1 2nd Floor Lounge, Petting Zoo
FLOOR 1 – Staff Offices
CEO. COO, Director Accounting, Business Office. Marketing, Sales
IT Director, Director Quality, Medical Director, 5 Tech Staff Office
IT/Networking Center, Training Center,
Main Cafeteria, Kitchen, Staff Lounge and Changing Room
Storage, Equipment Maintenance and

DINING HALL and CORPORATE OFFICES (Brown Area on Map)

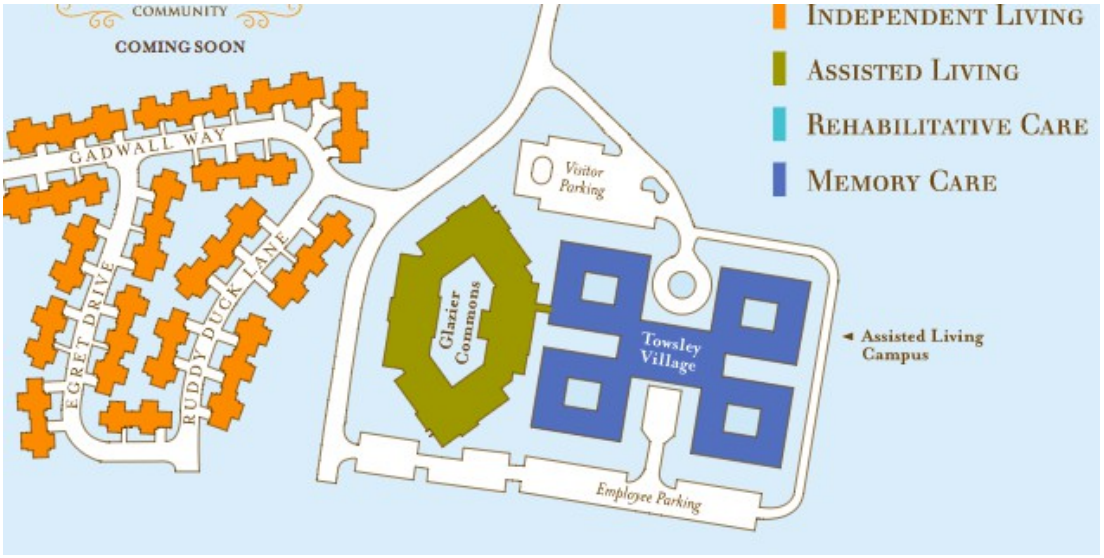
CRIPPEN
Wireless Coverage
Resident Manager Apt
Wiring Distribution Closet
1 Staff Office
1 Visitor Lounge/Center
1 Mini-Kitchen/Food Prep

GARDEN HOMES & COTTAGES:

20 Independent living "Condos"
Wireless for all "Condos"

TRIPLETT BUILDING Maintenance Building
Wireless

SOUTH CAMPUS



SOUTH CAMPUS DETAILS:

Praire Village (Orange):

40 Resident Client Apartments each with wireless access
1 Resident Manager Apartment
1 Equipment and Distribution closet

Towsley Village(Blue):

24 Memory Impaired Residents in individual rooms
Facility has wireless everywhere
1 Centralized Nursing Station
1 Cafeteria
1 Kitchen
1 Male Staff Changing and Locker Room
1 Female Staff Changin and Locker Room
1 Staff Break Room
1 Nursing Directors Office
1 Network Equipment & Wiring Closet
Access Points in Ceiling throughout the facility
10 Mobile Devices for Staff
Cloud Based Time and attendance an EHR
LOCKED facility with Cloud based egress tracking

Glacier Commons (Green)

2 Story, 48 Mini-Apartments – Assisted Living
No nursing care, Health care workers, CNAs
2 Centralized Staff Stations – 8 Assistants and 1 Supervisor/Shift
20 mobile Devices for Staff
1 Cafeteria -
1 Kitchen

1 Staff Lounge
1 Nursing Directors Office
1 Bird Sanctuary
1 Game/Recreation - room
1 Pet Exercise Room
1 Family Visitation/Resident Lounge
1 Directors Office.
1 IT/Networking staff Office
1 Marketing Office
1 Urgent Care/Nursing Directors Office

MEETINGS WITH THE O_O

Each team will meet with the O_O each week during the course live Session.
The Agenda for each weekly meeting is outlines below:

Week 1: Project Goals and Questions
Week 2: Network Topology Question
Week 3: Network Design Questions (Submit Network Design Tools Powerpoint)
Week 4: Preliminary Topology, Equipment Layout, Addressing Maps
Week 5. Network Management Plan, Tools and Map
Week 6; Final Report and Presentation.