

## **Syllabus**

**Course Title: Management of Enterprise Networks**

**Course Number: CN 478**

### **Course Description:**

Explores datacenter support and management requiring the integration of servers, applications and data storage with business operations and goals. Examines the impact of recent ethical, governance and legal concerns on business operations.

### **Prerequisite Courses:**

CN 410 Voice & Video Networks and CN 461 Fundamentals of E-Security II

### **Course Overview**

The goal of this course is to use a top-down design methodology in order to design a network that is not only cost effective and secure, but meets the customer's business and technical goals. This course provides you with an opportunity to apply the learning you have gained within this Computer Networking program.

The global economy is one of the major reasons for driving this change. Companies and employees must be flexible and adapt to changing technology and financial changes in today's environment. The major issue is to reduce the time to develop and market products. This issue is requiring companies to have networks that are scalable, provide remote access, and be reliable. Security goals are also critical as companies expand in Asia, Europe, and Africa. Network designers are challenged to provide a state-of-the-art network that is also cost effective.

This course is the last in the series of the Computer Networking program. You have gone from a building a foundation (CN 311) to designing an enterprise network (CN 478). In completing this course, you will draw on most, if not all, of the techniques you have learned in your previous course work, including system analysis and design, the principals of network addressing and routing, capacity planning, and the establishment and implementation of information security policies and practices.

Key concepts to be covered in this course include:

- Top-down design methodology – business requirements and constraints
- Characterizing network traffic
- Logical network design
- Physical network design

- Testing, optimizing, and documenting network design
- Network security and management strategies
- Economics of network design
- Enterprise networks

### Course Outcomes:

Upon completion of this course, learners should be able to:

- Create a network design using the entire top down design process.
- Design a small enterprise network that is secure and meets the needs of the user organization.
- Document a network design, sufficient for efficient management supervision and easy operation.
- Evaluate the capacity needs of the network user, and translate this into a network with sufficient resources to meet all normal capacity requirements.
- Evaluate a network design for its cost efficiency with respect to the user organization's needs.

### Course Materials:

#### Required Texts:

Oppenheimer, P. (2010). *Top-Down Network Design, Third Edition*. Indianapolis: Cisco Press ISBN 13: 978-1-58720-283-4.

Oppenheimer Text Companion Website, <http://www.topdownbook.com/>. The resources that you will be using can be found under the Content and Design Resources links.

American Psychological Association. (2010). *Publication Manual of the American Psychological Association (6th ed.)*. Washington, DC: American Psychological Association. ISBN 1433805618, 978-1433805615. Companion website: <http://www.apastyle.org>.

#### Required Resources:

Becchi, M. (n.d.). *From Poisson Process to Self-Similarity: A Survey of Network Traffic Models*. Retrieved from [http://www.cse.wustl.edu/~jain/cse567-06/ftp/traffic\\_models1/index.html](http://www.cse.wustl.edu/~jain/cse567-06/ftp/traffic_models1/index.html). (if broken link, contact [mbecchi@wustl.edu](mailto:mbecchi@wustl.edu))

Bejtlich, R. (2007). Top Seven Network Traffic Monitoring Challenges. *TechTarget: SearchNetworking.co.UK*. Retrieved from <http://searchnetworking.techtarget.co.uk/tip/Top-seven-network-traffic-monitoring-challenges>.

Cisco. (2012). *Internetwork Design Guide*. Cisco Press. Retrieved from [http://docwiki.cisco.com/wiki/Internetwork\\_Design\\_Guide](http://docwiki.cisco.com/wiki/Internetwork_Design_Guide).

- Cisco. (2010). Quality of Service Overview (QOS). In *Cisco IOS Quality of Service Solutions Configuration Guide*. Cisco Press. Retrieved from [http://www.cisco.com/en/US/docs/ios/12\\_2/qos/configuration/guide/qcfintro.html](http://www.cisco.com/en/US/docs/ios/12_2/qos/configuration/guide/qcfintro.html)
- Dabcc.com (n.d.) Five Best Practices for Selecting the Right WAN Optimization for Your Business. Retrieved from [www.dabcc.com/article.aspx?id=4084](http://www.dabcc.com/article.aspx?id=4084).
- HP (2009). *HP ProCurve Business White Paper: Redefining the Economics of Networking*. Hewlett-Packard Development Company. Retrieved from [http://hp.sharedvue.net/sharedvue/resources/networking-wp-redefining\\_economics\\_networking.pdf](http://hp.sharedvue.net/sharedvue/resources/networking-wp-redefining_economics_networking.pdf).
- How to Baseline and Document Networks (n.d). *Network Dictionary*. Retrieved from [www.networkdictionary.com/howto/BaselineandDocument.php](http://www.networkdictionary.com/howto/BaselineandDocument.php). (search keywords: tricks and tutorials in networking, computing and telecom)
- Kernel, V. (2011). How to Baseline & Document Networks. *Natural Dictionary*. Retrieved from [www.networkdictionary.com/howto/BaselineandDocument.php](http://www.networkdictionary.com/howto/BaselineandDocument.php). (search keywords: tricks and tutorials in networking, computing and telecom).
- Riverbed Technologies White Paper. (2009). *Three Barriers to IT Infrastructure Consolidation: A Focus on Government Organizations*. Retrieved from [http://www.riverbed.com/us/assets/media/documents/whitepapers/WhitePaper-Riverbed-RemoteITConsolidation\\_Govt.pdf](http://www.riverbed.com/us/assets/media/documents/whitepapers/WhitePaper-Riverbed-RemoteITConsolidation_Govt.pdf)
- Schneier, B. (2005). *Managed Security Monitoring: Network Security for the 21st Century*. Counterpane Internet Security. Retrieved from <http://bt.counterpane.com/msm.pdf>.
- Solution Matrix (2011). *Cost Benefit Analysis: Return on Investment (ROI)*. Original source: Schmidt, M. J. (2011) Encyclopedia of Business Terms and Methods. [www.solutionmatrix.com/return-on-investment.html](http://www.solutionmatrix.com/return-on-investment.html).
- TechTarget (2008). "Scenarios for meeting customer network design requirements." *Cisco Press*. Retrieved from <http://searchnetworkingchannel.techtarget.com/feature/Scenarios-for-meeting-customer-network-design-requirements>. If link is broken, search on the article title as keywords.

#### **Video Resources:**

- 3cxvoip (2008). *How an IP PBX works and its Benefits*. (duration 5:16 minutes duration), [http://www.youtube.com/watch?v=6eVEI\\_ORfmw&feature=related](http://www.youtube.com/watch?v=6eVEI_ORfmw&feature=related).
- aiequipment (2011). *How to Calculate Return on Investment (ROI) for a Process Improvement Project*, Advanced Industrial Equipment (1:58 minutes duration). <http://www.youtube.com/watch?v=u2aZ9pt5Mk4&feature=related>
- Butterscotch.com (2010). *How to monitor traffic on your router*. (2:58 minutes duration) <http://www.youtube.com/watch?v=tutiTJhBbdI&feature=related>.
- HighT3chDad (2008). *Cloud Computing Explained* (5:23 minutes duration). <http://www.youtube.com/watch?v=QJncFirhjPg>
- MyWorkHome (May 14, 2011). Cisco Quality of Service QOS. Parts 1-4 below. (Search keywords: Quality of Service Tutorial in YouTube.)

[http://www.youtube.com/results?search\\_query=quality+of+service+tutorial&aq=1&oq=quality+of+service](http://www.youtube.com/results?search_query=quality+of+service+tutorial&aq=1&oq=quality+of+service) View parts 1-4

O'ReillyMedia (2010). Christopher Brown (VP of Engineering, Opscode, Inc.) interviewed at Web 2.0 Expo SF 2010 (2:40 minutes duration).

<http://www.youtube.com/watch?v=eOD4NdiC8wE>

SetpointSystems (2009). *Return on Investment Calculator Tool* (5:18 minutes duration).

<http://www.youtube.com/watch?v=DVvWgJQ3EiE>

sfdcMktg (2009). What is Cloud Computing? (3:20 minutes duration).

[http://www.youtube.com/watch?v=ae\\_DKNwK\\_ms](http://www.youtube.com/watch?v=ae_DKNwK_ms)

### **Optional Materials:**

Economide, N. (2010). Economics of networking. *Economist*. New York University: NY.

[www.stern.nyu.edu/networks/site.html](http://www.stern.nyu.edu/networks/site.html).

Kurose, J.F., Ross, K. W. (2010). *Computer Networking A Top-Down Approach, 5th Edition*. Boston: Pearson Addison Wesley. Chapter 7 Multimedia Networking presentation

(4/28/10). Retrieved from <http://www.eng.utah.edu/~cs5480/notes/chapter7.pdf>.

Money. (2010). Ethics and Integrity in Your Business. *Money Magazine*, at

[http://www.ehow.com/info\\_7754722\\_ethics-integrity-business.html](http://www.ehow.com/info_7754722_ethics-integrity-business.html).

Search Network Design. (2010). Network-planning & design. *Tech Target*. Retrieved from

<http://searchnetworkingchannel.techtarget.com/resources/Network-Planning-and-Design>.

Smashing Magazine. (2011). Social networking design: Examples and best practices.

*Smashing Magazine*. Retrieved from

<http://www.smashingmagazine.com/2009/07/13/social-network-design-examples-and-best-practices/>.

Tech Republic. (2011). Configure IT: Design the best security topology for your firewall.

*Tech Republic*. Retrieved from <http://www.techrepublic.com/article/configure-it-design-the-best-security-topology-for-your-firewall/1039779>.

### **Pre-Assignment:**

**Online Format:** Sign on to D2L (Home Page) and become familiar with the course navigation of the Web Curriculum. Read chapters 1-3 from the textbook, Oppenheimer (2010). Read the Riverbed Technologies White Paper (2009). The link to this paper can be found in the reading list above.

**Classroom-based Format:** Read chapters 1-3 from the textbook, Oppenheimer (2010). Read the Riverbed Technologies White Paper (2009). The link to this paper can be found in the reading list above.

### **Pre-Assignment Due Dates:**

**Classroom-based Format:** This assignment is due the first night of class.

**Online Format:** The instructor will specify the due date for this assignment.

**Course Assignments and Activities:**

	Topics	Readings	Activities Assignments and Associated Points
1	Top-Down Design Methodology – Business Requirements and Constraints	Text : Chapters , 2 & 3 Article: Riverbed White Paper	Class Discussion: <ul style="list-style-type: none"> <li>• Introductions</li> <li>• Problem-Solving Skills Exercise (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Business Requirements and Constraints (50 pts)</li> <li>• Quiz 1 (15 pts)</li> </ul>
2	Characterizing Network Usage	Text: Chapter 4 Articles: Becchi, M. (n.d.), Bejtlich, R. (2007), Cisco. (2010B), Kernel, V. (2011). Video (optional): Butterscotch.com (2010).	Class Discussion: <ul style="list-style-type: none"> <li>• Quality of Service (QoS) (10 pts)</li> <li>• Extensions and Challenges (25 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Traffic Analysis -Characterizing Network Usage (50 pts)</li> <li>• Critical Analysis Paper (50 pts)</li> <li>• Quiz 2 (15 pts)</li> </ul>
3	Logical Network Design	Text: Chapters 5, 6 & 7	Class Discussion: <ul style="list-style-type: none"> <li>• Logical Network Design (10 pts)</li> <li>• Routing Algorithm Exercise (20 pts)</li> <li>• IP Addressing and Naming Sample (10 pts)</li> <li>• IP Subnetting Exercise (10 pts)</li> <li>• Extensions &amp; Challenges (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Routing Protocols (50 pts)</li> <li>• IP Addressing Scheme for Course Project (50 pts)</li> <li>• Logical Network Design (50 pts)</li> </ul>
4	Physical Network Design	Text: Chapters 10 & 11 Articles: Dabcc.com (n.d.), Cisco. (2010A).	Class Discussion: <ul style="list-style-type: none"> <li>• Enterprise Architecture Exercise (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Physical Network Design (50 pts)</li> <li>• Quiz 3 (15 pts)</li> </ul>

5	Testing, Optimizing, and Documenting Network Design	Text: Chapters 12, 13 & 14 Videos (optional): sfdcMktg (2009), Cisco (2010C), O'ReillyMedia (2010), HighT3chDad (2008).	Class Discussion: <ul style="list-style-type: none"> <li>• Network Roadmap (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Testing, Optimizing, and Document Network Design (50 pts)</li> <li>• Course Project Paper Outline (50 pts)</li> <li>• Extensions and challenges – Cloud Computing (optional) (25 bonus pts)</li> </ul>
6	Network Security and Management Strategies	Text : Chapters 8 & 9 Articles: Schneier, B. (2005)	Class Discussion: <ul style="list-style-type: none"> <li>• Network Security and Management Strategies (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Network Security and Network Management Strategies (50 pts)</li> <li>• Quiz 4 (15 pts)</li> </ul>
7	Economics of Network Design	Articles: HP (2009), Solution Matrix (2011). Videos (optional): aiequipment (2011), SetpointSystems (2009).	Class Discussion: <ul style="list-style-type: none"> <li>• Economics of Network Design (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Calculating ROI and Cash Flow (50 pts)</li> <li>• Course Project Paper (200 pts)</li> </ul> Course Project Presentation (50 pts)
8	Enterprise Networks	Text: Review all. Articles: Kurose & Ross (2010). Videos (optional): 3cxvoip (2008).	Class Discussion: <ul style="list-style-type: none"> <li>• Enterprise Networks (10 pts)</li> <li>• Course Project Feedback (10 pts)</li> </ul> Written Assignment: <ul style="list-style-type: none"> <li>• Peer Evaluations (50 pts)</li> <li>• Confidential Feedback about Peer Evaluator (required) (25 pts)</li> </ul>
			<b>Maximum Points Possible: 1000</b>

## Course Policies and Procedures:

### CC&IS Grading Scale

Letter Grade	Percentage	Grade Point
A	93 to 100	4.00
A–	90 to less than 93	3.67
B+	87 to less than 90	3.33
B	83 to less than 87	3.00
B–	80 to less than 83	2.67
C+	77 to less than 80	2.33
C	73 to less than 77	2.00
C–	70 to less than 73	1.67
D+	67 to less than 70	1.33
D	63 to less than 67	1.00
D-	60 to less than 63	.67
F	Less than 60	0

Additional information about grading can be found in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx>.

### CC&IS Policies and Procedures

Each of the following CC&IS Policies & Procedures is incorporated here by reference. Students are expected to review this information each term, and agree to the policies and procedures as identified here and specified in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx> or at the link provided.

- The CC&IS Academic Integrity Policy.
- The Student Honor Code and Student Standards of Conduct.
- Incomplete Grade Policy, Pass / No Pass Grades, Grade Reports.
- The Information Privacy policy and FERPA. For more information regarding FERPA, visit the [U.S. Department of Education](http://www.ed.gov).
- The HIPAA policies for protected health information. The complete Regis University HIPAA Privacy & Security policy can be found here: <http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx>.
- The Human Subjects Institutional Review Board (IRB) procedures. More information about the IRB and its processes can be found here: <http://regis.edu/Academics/Academic-Grants/Proposals/Regis-Information/IRB.aspx>.

The CC&IS Policies & Procedures Syllabus Addendum summarizes additional important policies including, Diversity, Equal Access, Disability Services, and Attendance & Participation that apply to every course offered by the College of Computer & Information Sciences at Regis University. A copy of the CC&IS Policies & Procedures Syllabus Addendum can be found here: <https://in2.regis.edu/sites/ccis/policies/Repository/CCIS%20Syllabus%20Addendum.docx>.