Fall 2019

IT 445  Advanced Networking Principles II

Syllabus  Revised 07/16/2019

Section DL1:  Asynchronous Distance Learning Section
Instructor:  Pouyan Ahmadi
Email:  pahmadi@gmu.edu
Office:  KJH 102B; SciTech Campus
Office Hours:  Tuesday 2:00 pm to 3:30 pm, by appointment

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Office:  Engineering Building 5503
Office Hours:  Tuesdays 10 AM to 12 PM
Email:  sveerabh@gmu.edu

* Asynchronous Distance Learning Section:

This is an online asynchronous distance learning section. Students will meet twice at SciTech campus on the following dates and times in order to take the Skills Exams. The Date and Time for the exams are as follows:
Skills Exam 1 on Oct 1, 2019 from 11:00 AM – 1:30 PM in KJH259
Skills Exam 2 on Dec 3, 2019 from 11:00 AM – 1:30 PM in KJH259

Prerequisite:

IT101, IT106 or IT108, IT212, Math108, and IT341

Description:

This course consists of two modules. Throughout the first module (Introduction to Scaling Networks) the focus will be on describing the use of the hierarchical network for a small business and the components of a wireless LAN infrastructure. Also, to describe recommendations for designing a network that is scalable, concepts such as LAN redundancy and link aggregation will
be discussed. In the area of routing protocols, more advanced concepts like adjusting and troubleshooting Single/Multi Area OSPF or EIGRP complex configurations will be covered in this course.

In the second module (Connecting Networks) the focus will be on the need for business network architectures that are designed to address emerging trends in IT. In this manner, the purpose of using WAN and various private/public WAN technologies, Point-to-Point connections, Frame Relay and Network/Port Address Translation (NAT/PAT) will be covered. Additionally, to get familiar with the benefits of VPN technology, IPsec framework along with GRE tunnel will be explained. At the end of this module important monitoring protocols such as SNMP, Syslog, and Netflow as well as some general troubleshooting guidelines will be described.

**Learning Outcomes:**

1. Design router and switch architecture and configurations
2. Wireless LAN configuration and troubleshooting
3. Configuration and troubleshooting of Single and Multiple Area OSPF
4. Configuration and troubleshooting of EIGRP networks
5. Network design models
6. Describe all types of WAN technologies
7. Design Network Address and Port Address Translation (NAT & PAT)
8. Understand, design, and configure Frame Relay networks and Point to Point Protocol (PPP)
9. Understand the concepts and processes related to VPNs, as well as the benefits of VPN implementations and the underlying protocols required to configure VPNs
10. Network Management tools for QoS
11. Learn the general process of troubleshooting

**Lecture Textbooks:**

*Scaling Networks V6 Companion Guide*

*Connecting Networks V6 Companion Guide*
Slides:
Class lectures
Course Materials at:

https://mymasonportal.gmu.edu

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Lab Assignments-</td>
<td>15%</td>
</tr>
<tr>
<td>Skills Exam 1 -</td>
<td>15%</td>
</tr>
<tr>
<td>Skills Exam 2 -</td>
<td>15%</td>
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<tr>
<td>Quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>NetAcad Online Exam 1</td>
<td>7.5%</td>
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<tr>
<td>NetAcad Online Exam 2</td>
<td>7.5%</td>
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<tr>
<td>Midterm Exam -</td>
<td>15%</td>
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<tr>
<td>Final Exam -</td>
<td>20%</td>
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Grades will be awarded in accordance with the GMU Grading System for undergraduate students. For details, refer to: http://catalog.gmu.edu/policies/academic/grading/#text

GMU does not dictate a grading scale:
https://registrar.gmu.edu/topics/grading-scale/

This course uses the grading scale below but the scale may vary at instructor's discretion.

Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>97 – 100%</td>
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<tr>
<td>A</td>
<td>93 – 96%</td>
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<tr>
<td>A-</td>
<td>90 – 92%</td>
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<tr>
<td>B+</td>
<td>87 – 89%</td>
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<tr>
<td>B</td>
<td>83 – 86%</td>
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<tr>
<td>B-</td>
<td>80 – 82%</td>
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<tr>
<td>C+</td>
<td>76 – 79%</td>
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<tr>
<td>C</td>
<td>70 – 75%</td>
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<tr>
<td>D</td>
<td>60 – 69%</td>
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<tr>
<td>F</td>
<td>0 – 59%</td>
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</table>
Raw scores may be adjusted by the Instructor to calculate final grades.

**Lab Assignments**

Lab assignments are available in Blackboard. In each lab session, you practice the lecture materials in Cisco innovative network simulation program, Packet Tracer. Acceptance of late assignment, will be at the sole discretion of the Instructor. Each lab assignment will be released for viewing 7 days prior to the due date. Late assignment, will not be accepted – if accepted, a penalty will be applied.

**NetAcad Online Final Exams**

Netacad final exams are conducted online (one for each module) at the Cisco Networking Academy (NetAcad) website. Retake of missed online NetAcad exams will be at the sole discretion of the Instructor. Missed NetAcad final exams will not be accepted.

**Weekly Quizzes:**

The quizzes will cover materials discussed during last lectures and will be conducted on NetAcad website.

**Skills Exams:**

Skills exams are conducted in class (one for each module) using Cisco Packet Tracer. These exams are mostly concerned with router/switch configurations which you will learn through your lab assignments. All necessary commands will be given to you during the exams.

**Midterm Exam:**

The midterm exam will cover materials discussed up to Session 6. The midterm exam will be “closed book” – no reference materials will be permitted. This exam will be conducted on Blackboard using Respondus LockDown Browser/Monitor.

**Final Exam:**

The final exam will cover materials discussed primarily during Sessions 7 thru 15. The final exam will be “closed book” – no reference materials will be permitted. This exam will be conducted on Blackboard using Respondus LockDown Browser/Monitor.
### Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Released on:</th>
<th>Due:</th>
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| **1** | **Week of Aug 25** | Review of Data Communications and Networking Principles  
Ch 1 – LAN Design | **Aug 25**  
- Lab Session 1 (IT 341 Review - Connecting Devices)  
- Lab Session 2 (IT 341 Review - Configuring IP Addresses) | **Sep 1**  
- Lab Session 1  
- Lab Session 2 |
| **2** | **Week of Sep 1** | Ch 2 – VLAN  
Ch 3 - STP | **Sep 1**  
- Lab Session 3.1 Examining a Redundant Design | **Sep 1**  
- Lab Session 1  
- Lab Session 2 |
| **3** | **Week of Sep 8** | Ch 4 v6 – Ether Channel HSRP  
Ch 4 v5 – Wireless LANs  
Ch 5 - Dynamic Routing | **Sep 8**  
- Lab Session 3.2 Configuring PVST  
- Lab Session 4 Link Aggregation | **Sep 8**  
- Lab Session 3.1 Examining a Redundant Design |
| **4** | **Week of Sep 15** | Ch 8 – Single-Area OSPF  
Ch 9 – Multiarea OSPF  
Ch 10 - OSPF Turing and Troubleshooting | **Sep 15**  
- Lab Session 5 OSPF Single Area  
- Lab Session 6 OSPF Multi Area | **Sep 15**  
- Lab Session 3.2 Configuring PVST  
- Lab Session 4 Link Aggregation |

*Sep 8 between 10 am -11pm:*  
- Quiz 1 – Chapter 2

*Sep 15 between 10 am -11pm:*  
- Quiz 2 – Chapter 4
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Released on</th>
<th>Due</th>
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<tbody>
<tr>
<td>5</td>
<td>Sep 22</td>
<td>Ch 6 – EIGRP</td>
<td><strong>Sep 22</strong></td>
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<td>Ch 7 – EIGRP Tuning and Troubleshooting</td>
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<td><strong>Lab Session 7 EIGRP</strong></td>
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<td><strong>Lab Session 8 EIGRP Advanced</strong></td>
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<td>6</td>
<td>Sep 29</td>
<td>Ch 9 – IOS Images and Licensing</td>
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<td><strong>Skills Exam 1 on Oct 1, 2019 from 11:15 AM – 1:10 PM in KJH 259</strong></td>
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<td>7</td>
<td>Oct 6</td>
<td>Take home NetAcad Online Exam 1 on Oct 6 from 5-11pm</td>
<td><strong>Oct 6</strong></td>
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<td><strong>Lab Session 9 Propagating a Default Route in EIGRP for IPv4 and IPv6</strong></td>
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<td>8</td>
<td>Oct 13</td>
<td>Take-home Midterm Exam on Oct 13 from 5-7pm (on Blackboard using Respondus LockDown Browser/Monitor)</td>
<td><strong>Oct 13</strong></td>
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<td><strong>Lab Session 9</strong></td>
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<td>9</td>
<td>Oct 20</td>
<td>Ch 7 – Network Evolution</td>
<td><strong>Oct 20</strong></td>
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<td>Ch 1 – WAN Concepts</td>
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<td>Ch 2 – Point to Point Connections</td>
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<td>Ch 4 v5 – Frame Relay</td>
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<td>10</td>
<td>Oct 27</td>
<td>Ch 4 ACL</td>
<td><strong>Oct 27</strong></td>
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<td>Ch 5 v5 – Network Address Translation (NAT/PAT)</td>
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<td><strong>Lab Session 12 Network Address Translation</strong></td>
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<td><strong>Lab Session 10 Frame Relay</strong></td>
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<td><strong>Lab Session 11</strong></td>
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| Week of Nov 3 | Ch 3 - Branch connections | **Released on: Nov 3**  
- Lab Session 13  
  Site-to-Site connectivity  
**Due: Nov 3**  
- Lab Session 12 Network Address Translation  
**Nov 3 between 10 am -11pm:**  
  Quiz 4 - Chapter 4 |
| 11 | | |
| Week of Nov 10 | Ch 5 - Network Security and Monitoring | **Released on: Nov 10**  
- Lab Session 14 Monitoring  
**Due: Nov 10**  
- Lab Session 13  
  Site-to-Site connectivity  
**Nov 10 between 10 am -11pm:**  
  Quiz 5 - Chapter 7 |
| 12 | | |
| Week of Nov 17 | Ch 6 - Quality of Service  
Ch 8 – Troubleshooting the Network | **Due: Nov 17**  
- Lab Session 14  
  Monitoring  
**Nov 17 between 10 am -11pm:**  
  Quiz 6 - Chapter 5  
**Released on: Nov 17**  
- Lab Session 15 Troubleshooting |
| 13 | | |
| Week of Nov 24 | **Thanksgiving Break**  
*No class* | **Due on: Nov 24**  
- Lab Session 15 Troubleshooting  
**Nov 24 between 10 am -11pm:**  
  Quiz 7 - Chapter 8 |
The reading assignment shown for each lecture is to be completed **prior to** that lecture.

*This schedule is subject to revision before and throughout the course.*

**Registered students should see** the [Blackboard Learning System](https://registrar.gmu.edu/calendars/fall-2019/) **for the latest class schedule.**

### Important Dates

| Last day to add classes: | Refer to the link below |
| Final drop deadline with 67% tuition penalty: | Refer to the link below |
| Last day of classes: | Refer to the link below |

[https://registrar.gmu.edu/calendars/fall-2019/](https://registrar.gmu.edu/calendars/fall-2019/)

### Religious Holidays

A list of religious holidays is available on the [University Life Calendar page](https://registrar.gmu.edu/calendars/fall-2019/). Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor **at least 1-week in advance** of the conflict date in order to make alternative arrangements.
Attendance Policy

Departmental policy requires students to take exams at the scheduled time and place, unless there are truly compelling circumstances supported by appropriate documentation. Except in such circumstances, failure to attend a scheduled exam will result in a score of zero (0) for that exam, in accordance with Mason policy on final exams. Students should not make travel plans or other discretionary arrangements that conflict with scheduled classes and/or exams. If the University is closed due to weather or other unforeseen conditions, final exams may be rescheduled – students are strongly advised not to make plans that would prevent them from attending exams that may be rescheduled during the entire exam period.

Communications

Registered students will be given access to a section of the Blackboard Learning System for this course. Blackboard will be used as the primary mechanism to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams.

Communication with the Instructor on issues relating to the individual student should be conducted using GMU email, via telephone, or in person - not in the public forums on Blackboard. GMU email is the preferred method – for urgent messages, you should also attempt to contact the Instructor via telephone. Federal privacy law and GMU policy require that any communication with a student related in any way to a student's status be conducted using secure GMU systems – if you use email to communicate with the Instructor you MUST send messages from your GMU email account.

Lecture slides are complements to the lecture process, not substitutes for it - access to lecture slides will be provided in Blackboard.

All course materials (lecture slides, assignment specifications, etc.) are published on Blackboard. This allows users of most computing platforms to view and print these files. Microsoft® Word (or a compatible word processing application) is required for preparing assignments – it is available on computers in the Mason open labs.

Privacy

Instructors respect and protect the privacy of information related to individual students. Issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Assessable work other than final exams will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor or via another secure method). Under no circumstances will a student's graded work be returned to another student.

Faculty and staff will take care to protect the privacy of each student's scores and grades.

Disability Accommodations

The Office of Disability Services (ODS) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.
Accommodations for disabled students must be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

**Honor Code**

All members of the Mason community are expected to uphold the principles of scholarly ethics. Similarly, graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to IT graduates are available via the following links:

**ACM Code of Ethics and Professional Conduct**

**IEEE Code of Ethics**

On admission to Mason, students agree to comply with the requirements of the [GMU Honor System and Code](#). The Honor Code will be strictly enforced in this course. Honor Code cases are heard by a panel consisting of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is plagiarism and will not be tolerated. The Instructor reserves the right to use manual and/or automated means (including such services as Turnitin.com) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

For this course, the following requirements are specified:

All assessable work is to be prepared by the individual student, unless the Instructor explicitly directs otherwise.

All work must be newly created by the individual student for this course for this semester.

Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the instructor.

Students may seek assistance with assigned work (and are encouraged to do so if they feel the need), provided:

- The directions for the assigned work do not prohibit such assistance.
- Such assistance is acknowledged in the submitted work, clearly identifying the person(s) giving assistance and the nature of the assistance given.
- Any work to be submitted is prepared entirely and exclusively by the student submitting it. Students are expressly prohibited from sharing any assessable work for this course in any manner with other students (except students assigned as Teaching Assistants to this course and the student's section), unless all students involved have had their work graded and returned by the Instructor, or the Instructor has explicitly approved such sharing.