**CIS457 Data Communications - Fall 2018**

## Instructor Information

**Instructor:**  Dr. Mostafa El-Said
**Office:** D-2-226 MAK
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**OFFICE HOURS:**  Thru 11:00AM-12:00PM, and Fri 10:00AM-11:00AM

## Course Information

**Lecture**
        **Time:**   M W F 9:00 AM - 9:50 AM
        **Location**: MAK B2-235
**Lab**
**Section 01 (101):**
        **Time:**   T 8:00AM-9:50AM
        **Location**: MAK A1167
**Section 02 (102):**
        **Time:**   T 10:00AM-11:50AM
        **Location**: MAK A1167
**Drop Deadline - grade "W"**
**October 26, 2018 at 5:00PM**

## Catalog Description

**CIS457 Data Communications**
An introduction to data communications techniques, particularly as applied to computer networks. Physical media and devices, data link and network protocols, and other data communications topics will be studied. Prerequisite: CIS 241 and (CIS major, CIS minor, or EGR major). Four credits

## Texts

The course materials are going to be lectured from the following textbook:
**Required:**
- *Computer Networking*: A Top-Down Approach Featuring the Internet, 7th edition, by Kurose & Ross, Addison Wesley, 2008, ISBN-10: 0133594149 ISBN-13: 9780133594140

## Course Objectives

At the end of the course, a successful student will be able to:

1. Explain layered communication protocol architecture
2. Develop distributed network application using the Sockets interface
3. Compare reliable and an unreliable data transfer protocols
4. Describe the operation of various routing protocols
5. Apply various security measures in networks

The following is the general sequencing and pace of lectures. Selected topics will be added depending on time.

| Sequence # | Topics | Chapter # |
|---|---|---|
| **Module 1: Intro: Computer Networks and the Internet** | | |
| 1 | • What is the Internet? <br> • The Network Edge, the Network Core, ISPs and Internet Backbones. <br> • Delay and Loss in Packet-Switched Networks. <br> • Protocol Layers and Their Service Models. | 1 |
| **Module 2: Application Layer** | | |
| 2 | • Principles of Application Layer Protocols. <br> • Socket Programming with TCP. <br> • Socket Programming with UDP. <br> • The Web and HTTP Protocol. <br>    o Building a Web Server using TCP Sockets <br> • File Transfer and the FTP Protocol. <br>    o Building FTP Server using TCP Sockets <br> • DNS-The Internet's Directory Service. <br> • Principles of Cryptography, Authentication. | 2 |
| **Module 3: Transport Layer** | | |
| 3 | • Introduction to Transport-Layer Services. <br>    o Connectionless Transport: *UDP*. <br>    o Connection-Oriented Transport: *TCP*. <br>       ▪ Principles of reliable data transfer service. <br>       ▪ Principles of flow control service. <br>       ▪ Principles of Congestion Control. <br>       ▪ TCP Congestion Control. | 3 |
| **Module 4: Networking Layer & Routing** | | |
| 4 | • Introduction and Network Service Model. <br> • Unicast Routing. <br>    o Intra and Inter domain Routing. <br>    o The Internet Protocol (IP). <br>       ▪ IPv4 and IPv6. <br>       ▪ Routing protocols <br> • Multicast Routing. <br>    o IGMP Protocol | 4&5 |
| **Module 5: Link Layer** | | |
| 5 | • Data Link Layer: Introduction and Services. <br> • Error Detection and Correction Techniques. <br> • Multiple Access Protocols. <br> • LAN Addresses and ARP. <br> • Ethernet. <br> • Hubs, Bridges and Switches. <br> • Wireless Links. | 6 |
| **Module 6: Wireless & Mobility (topics will be selected based on the available time)** | | |
| 6 | • Introduction to Wireless and Mobility. <br> • Wi-fi. <br> • Mobility Principles. <br> • Mobile IP | 7 |
| **Module 7: Security (topics will be selected based on the available time)** | | |
| 7 | • What is Network Security? <br> • Access Control: Firewalls. <br> • Attacks and Countermeasures. <br> • Security in Many Layers: Case Studies. | 8 |

Student grade in this course will be calculated based on the weighted sum of all student's work using the following weights:

| | |
|---|---|
| 1.    Lab Assignments (10-11 assignments) | 10% |
| 2.    Projects<br>        • Project 1: C-S (estimated # of hours to be spent 25 -30 hours)<br>        • Project 2: P2P (estimated # of hours to be spent 50++ hours)<br>        • Project 3: Semester Project (selected by student) -(estimated # of hours to be spent 50++ hours)<br>            ○  **N**otes:<br>                ▪  The above time estimate may vary depending on your programming experience<br>                ▪  All projects must be demoed during the lab time to be graded; otherwise no grade will be given. | 10%<br>15%<br>15% |
| 3.    Exam#1: (**Fri 10/12/2018**) in MAK B2235 **To be Confirmed** | 15% |
| 4.    Exam#2: (**Fri 11/16/2018**) in MAK B2235 **To be Confirmed** | 15% |
| 5.    Final Exam: **(Tuesday, December 11, 8:00 am - 9:50 am)** in MAK B2235 **To be Confirmed** | 20% |

Course grade will be given based on the following scale:

| Grad | From | | To | Grad | From | | To |
|---|---|---|---|---|---|---|---|
| **A** | 93% | - | 100% | **C+** | 77% | - | 79% |
| **A-** | 90% | - | 92% | **C** | 73% | - | 76% |
| **B+** | 87% | - | 89% | **C-** | 70% | - | 72% |
| **B** | 83% | - | 86% | **D+** | 67% | - | 69% |
| **B-** | 80% | - | 82% | **D** | 63% | | 66% |
| | | | | **F** | 0% | - | Less than 63% |

**Semester Project Requirements**

You will be working in a group of *3-4 students* on this assignment. The application that you will create is entirely up to you. A list of suggested topics is provided below and remember the choice is yours. The only hard requirement is your application must implement a client server or a P2P Architecture or hybrid. The project details (delivered functions, project scope, ..etc) must be approved by the instructor.

Once you have come up with an idea, write-up a prospectus and send it to me via email for review. In the prospectus, you should describe:
- What is the purpose of the application?
- Why are you creating this application?
- What can the application do?
    - In another way, give a list of features that your application will implement.

**Semester Project Grading**

The semester project will be graded after *your project demo* based on the quality of the overall project and clarity of the presentation as well as the project documentation.
- The project demo includes a10 minutes for the project functions.
- The submitted report should include:
    - Project code (at max 40 pages, single space, and font: Times New Roman with size 12).
    - Screenshots for the major project functions and deliverables.
    - Project documentation is due at the day you make your project demo.
    - Project documentation has to be submitted in a *hard copy format* and in an *electronic format* via e mail at the day you make your presentation.

Suggested topics for the project include, but are not limited to:

* IDS and IPS
* IoT system
* RFID system
* P2P applications and services
* Industrial applications / P2P in use
* Security in P2P systems
* Performance and robustness of P2P systems
* Self-organization in P2P systems
* P2P Information retrieval
* Higher-level query support in P2P systems
* Semantic overlay networks and semantic query routing in P2P systems
* Trust and reputation management in P2P systems
* Overlay architectures and topologies
* P2P overlay interworking with underlying infrastructure
* Overlay monitoring and management
* Social networks
* P2P Systems over MANETs
* Delay Tolerant P2P systems
* P2P economics
* Cooperation in P2P systems
* P2P workload characterization and simulation
* P2P grids
* **NO** Chat Servers applications please!

**Project Prospectus** - **Date Assigned:** Mon Aug 27
**Project Prospectus** - **Due Date:** Fri Sept 28
**Project Demo: Starts on** Tue Dec 4 → Fri Dec 7

## Class Policies

Students are expected to discuss with faculty the expectations regarding course assignments and standards of conduct. Here are some examples and definitions that clarify the standards:

**Policy on Attendance**
**Policy on Late Assignments and Missed Quizzes/Exams**
**Policy on Collaboration**
**Policy on Academic Integrity**
**Policy on General Items**

## Attendance

The lectures and labs introduce the course materials. Some materials are presented in the lectures and others are covered in the labs. Students are responsible for all class materials covered or assigned in the lectures or the labs. While attendance of lectures and labs is not mandatory, students are expected to attend all lecture and lab meetings. The actual learning also takes place outside the classroom.

## Late Submissions, Missed Exams and Grading

Unless prior arrangements have been made with the instructor, ALL class work is due by the date they are due in and at the beginning of our meeting. Work turned in after the due date and time will receive a *3% late submission penalty per day including the weekend and the holidays with a max of 7 days*. After 7 days from the due date, no late work will be accepted for grading. The only exception to this policy is the last project and lab; there is NO late work will be accepted after the due date.

Barring medical emergency, there will be *no make-up* for the exams. As the exam will take place on a pre-determined date, students who have conflicts are required to contact the instructor to make arrangements to take it. Unforeseen medical and life event emergencies (proof required) are the only circumstances under which a make-up exam may take place.

For your homework and lab assignments, you will receive a full credit if you make a reasonable attempt to solve the problems in the correct way. Labs, homework and projects assignments will be graded and handled as follows:

➢ All assignments will be graded and returned after one week of collecting them.
➢ If a graded assignment is returned and a student is absent at that day, student has to come to my office and pick up her/his assignment. I do not carry old assignments with me every meeting.
➢ Homework and lab reports have to be treated as a business document.

## Collaboration

Students are encouraged to share ideas and discuss assignments. However, each student is responsible for submitting his/her own original work. Any evidence of academic dishonesty will be subject to investigation and discipline as stated in the Policy on Academic Integrity.

## Academic Integrity

Academic integrity includes a commitment to not engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another person's work as ones' own, using internet resources without citation, fabricating field data or citations, taking an exam for another student, having another student take an exam for you, stealing examinations, tampering with academic work of another student, facilitating other students' acts of academic dishonesty, etc.

Any violation of academic integrity will be investigated, and where warranted, punitive actions will be taken based on the severity of the offense. This can include, but not limited to, such sanctions as failing the assignment or exam to failing the course. For more information, consult the University Catalog, the Student Code and the CIS statement on Academic Honesty.

## Policy on General Items

### Classroom Protocol

**For *every* class:**
- Avoid arriving to class late and/or leaving class early. If for any reason, you are planning to arrive late or leave early, please let me know ahead of time, may be via email.
- Turn off your cell phone/pager
- Be courteous to your fellow students by *not making distractions (**e.g., talking, texting, ...).***
- Use of laptop/desktop machine is **not allowed** while I am lecturing in the lecture room or in the lab.
  - We have a lot of figures that you have to draw and write your own notes. So, bring your lecture notes with you every lecture/lab meeting
  - I always allow enough time for you to copy these figures. If I did not notice that you are still working on it, please, ask me to **WAIT** for more time.
- Response to your email is expected to be sent within 24-36 hours from receiving your note. Response time may be longer if your email arrived over the weekend or during the break time.
- No feet on desk unless you have a medical problem **(Doctor Notice is required).**
- At any time, if you have a question, please ask!

### Students with Disabilities

Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course, please contact me and a staff member at the Office of Disability Support Resources (DSR) at 616-331-2490.

### In Case of Emergency

- "In Case of Fire: Immediately proceed to the nearest exit during a fire alarm. Do not use elevators."
- "More information is available on the University's Emergency website located at http://www.gvsu.edu/emergency"

### GVSU Course Policies

This course is subject to the GVSU policies listed at http://www.gvsu.edu/coursepolicies/

**Note: The instructor reserves the right to make changes to the syllabus as necessary**