

# PAPER OUTLINE

## 158.235 Networks, Security and Privacy (15 credits)

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### Objective

The course aims to provide a study of the basic principles of digital communications, Internet technologies, communications software, local area network design, client-server system design, middleware and available wide-area network services from the viewpoint of a software engineer/designer developing networked information systems.

### Prescription

A study of the basic principles of digital communications, Internet technologies, communications software, local area network design, client-server system design, middleware and available wide-area network services from the viewpoint of a software engineer/designer developing networked information systems.

### Pre/co requisites

**Prerequisite(s):** 1581xx or 1591xx or 157.150 or 157.151 or 115.107 At least 45 credits from 100 level

### Paper Offering Details

<b>Year</b>	2019
<b>Mode</b>	Albany Internal
<b>Semester</b>	Two
<b>Coordinator</b>	Julian Jang-Jaccard (Room 3.23, Mathematics Building, Gate 1) Ext:49026
<b>Contributing Staff</b>	<i>Lecturer:</i> Julian Jang-Jaccard <i>Tutor:</i> Hooman Alavizadeh
<b>Online Component</b>	Partially Taught Online - As <i>part</i> of the paper is taught online, Broadband access is required. In addition to accessing the Paper Guide, students will be required to access core and supplementary digital study resources, contribute to discussion fora and complete online activities and assessment tasks. Core study resources that can be published in print will be supplied to the students who request them.
<b>Start Date</b>	Monday 15 July, 2019
<b>End Date</b>	Friday 15 November, 2019

## Learning outcomes

*Students who successfully complete this paper should be able to:*

1. Explain basic principles of data communications.
2. Discuss the differences between common network architectures.
3. Describe client/server system architectures and design requirements.
4. Explain common network security and privacy mechanisms.
5. Perform basic networking and server management tasks.

## Topics

1. Introduction to data communication
2. Application layer
3. Network layer
4. Transport layer
5. Data link layer
6. Physical layer
7. Introduction to security
8. Cryptography, message integrity, and authentication
9. Network security and privacy
10. Backbone and Wide Area Networks

## Assessments

During this course, the following assessments will contribute to your final mark. Learning outcomes assessed are indicated (where applicable) in brackets.

Assessment	Description	Weighting
Computer Work	Covers all topics	40%
	Lab Reports (10%) : Covers topics for weeks 1 – 12	
	Assignment 1 (15%) : Covers topics for weeks 1 – 6	
	Assignment 2 (15%): Covers topics for weeks 7-11	
Final Exam	Covers all topics	60%

Please note: *Assessment weightings are subject to change until the beginning of the semester in which the paper is delivered.*



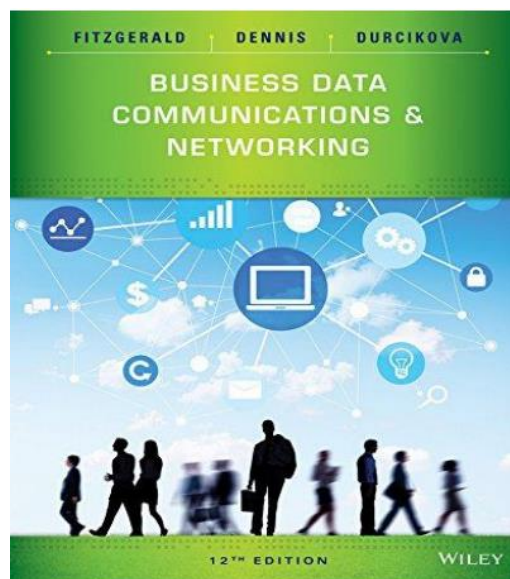
## Textbooks

Compulsory textbook:

J. FitzGerald, A. Dennis and A. Durcikova, "**Business Data Communications & Networking**", 12th edition. Wiley, 2015.

Availability:

- ☐ Bennetts Bookshop stocks textbooks and legislation.
- ☐ Current second-hand textbooks are also bought and sold.
- ☐ For more information visit [Bennett's Online Books](#)



## Stream: Your online learning environment

Accessing Stream helps you do well in the course in three ways:

- 1. Lecturer-to-Student Communication:* We will post any important notices, instructions and additional readings that arise on Stream. By checking Stream often you will always know 'what's going on'.
- 2. Student-to-Lecturer Communication:* We encourage you to communicate with us via Stream if you have any questions. Often these questions alert us to potential areas of confusion that the whole class can benefit from. We aim to respond to your inquiries in a timely manner.
- 3. Student-to-Student Communication:* Stream allows you to communicate with other students via a forum. This is great way to seek clarification and learn from your peers. However please refrain from discussing assignment specific details which may give away the solution.

## Network Etiquette

Please be polite when using the forums. Often things that could be spoken (especially when said with a smile), can when written be misconstrued or take on a tone you didn't intend. Others may struggle with concepts you find obvious – we all have a differing strengths, weaknesses and backgrounds, so if someone asks for help, please be gentle.

## How to approach your study

Follow the lectures, and straight away clarify any doubts you may have. Regular readings (online resources, textbook) and forum discussion is highly encouraged. Regularly attempting tutorial and lab exercise will help you stay on track, and the feedback received will be helpful for doing your assignments.

## Suggested study schedule

This is a 15-credit course, and therefore we would expect a commitment of 10 hours per week from you. The schedule below, which follows the internal timetable is only a suggested one. You may prefer to work out your own schedule, one that suits your personal requirements. The main point is to work to some schedule so that you don't fall behind.

Reading, study (including lecture material): 6 hours

Practical work : 4 hours

## Teaching Schedule

The following teaching schedule may be subject to change.

Wk	Topic Synopsis	Activity and Assessments
1	<b>Introduction to Data Communications:</b> In first week, we will cover the history and basic concepts of data communications, including the OSI and TCP/IP network models, and the importance of network standards.	<b>Choose:</b> lab practical tutorial timeslot and group (if required). <b>Read:</b> Chapters 1
2	<b>Application Layer:</b> Study of data networking protocols by looking at the Application layer. The application layer, as the name implies, is firmly tied to data networking for business applications.	Read: Chapter 2 Do: Lab Practical 1
3	<b>Transport Layers:</b> splitting messages into packets for transmission, and re-assembling them at the destination.	Read: Chapter 5 Do: Lab Practical 2
4	<b>Network Layers:</b> delivering messages from source to destination, across a wide-area network, and includes services such as assigning unique addresses which can be routed worldwide.	Read: Chapter 5 Do: Lab Practical 3 Available: <b>Assignment 1</b>
5	<b>Data Link Layer:</b> Passing data between adjacent devices (or devices physically very close to one another) on a network. It includes services such as sharing network access and error control.	Read: Chapter 4 Do: Lab Practical 4
6	<b>The Physical Layer:</b> Many of the protocols and techniques associated with the physical layer come from general telecommunications technologies, some of which preceded networked computers by many decades. These include	Read: Chapter 3 Do: Lab Practical 5

	concepts such as simplex and duplex working, modulation, multiplexing etc	
	<b>MID-SEMESTER BREAK</b>	<b>Assignment 1 Due</b>
7	<b>Introduction to Security:</b> Types of attacks, aspects of information security (confidentiality, integrity, availability)	Read: Chapters 11 (and Online materials) Do: Lab Practical 6
8	<b>Principles of cryptography, message integrity and authentication:</b> We will explore how to secure exchange of messages over communication networks using cryptographic techniques	Read: Chapters 11 (and Online materials) Do: Lab Practical 7 Available: <b>Assignment 2</b>
9	<b>Network Security 1:</b> Application layer security (securing email), Transport layer security (TLS)	Read: Materials on Stream Do: Lab Practical 8
10	<b>Network Security 2:</b> Network Layer security (IPSec, Firewalls and IDS)	Read: Materials on Stream Do: Lab Practical 9
11	<b>Backbone and Wide Area Networks:</b> Backbone networks - connecting multiple physically (within a few kilometers) or logically segmented LANs to each other and in most cases also to the Internet. We will discuss VLAN, and Virtual Private Networks (VPN).	Read: Chapter 8 and 9 Do: Lab Practical 10 <b>Assignment 2 Due</b>
12	<b>Paper Review:</b> review key topics in the paper, and undertake a practice exam. There is no tutorial this week.	Read: Materials on Stream
	<b>Final Examination:</b> Covering all topics	