ELEC-C7420 Basic Principles in Networking

Welcome!

Aalto University
School of Electrical
Engineering

Yu Xiao

11.01.2022

Agenda

- 12.15- 13.10 Course arrangement
- 13.15- 14.00 What is a network?

Responsible teachers:

- Yu Xiao yu.xiao@aalto.fi
- Stephan Sigg stephan.sigg@aalto.fi

Course assistants (taking care of exercise sessions and assignment evaluation):

- Leo Lazar leo.lazar@aalto.fi
- Esa Vikberg esa.vikberg@aalto.fi

- **Sign up for courses and exams on SISU. Also remember to login to MyCourses and go to our course page, so your name will be included in the participant list on MyCourses as well.**

- **Microsoft Teams for online lectures, exercise sessions and communications with course assistants. Note that Zoom will be used for lectures in the 2nd half of the course.**

- **MyCourses for assignment submission and material sharing**

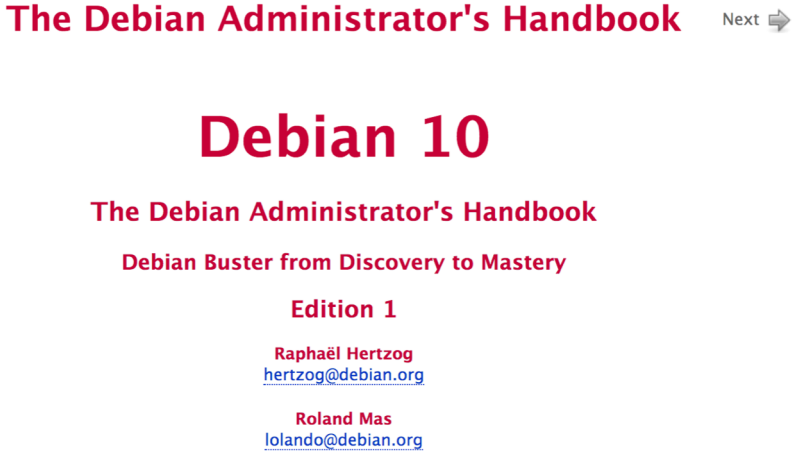
Pre-Course Survey

https://link.webropolsurveys.com/S/9243AB9782AF5B11

Prerequisites

- **Basic Programming Skills, e.g. Python**
- **Linux Basics**

Recommended to take ELEC-A7310 Linux Basics beforehand, or to read materials provided by that course. For example, https://debian-handbook.info/browse/stable/


The Debian Administrator's Handbook Next

Debian 10

The Debian Administrator's Handbook

Debian Buster from Discovery to Mastery

Edition 1

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Learning Outcomes

At the end of this course, you will be able to

- Describe the basic principles of TCP/IP model and the representative protocols at each layer
- Use network diagnostic tools to analyze the working mechanisms and performance of networking services
- Implement basic communications services using socket programming
- Understand basic principles of network security: public/private key encryption, signatures, hashing, Message authentication, Email Security (PGP), securing of TCP (SSL), IPSec and VPN.

Teaching/Learning Methods

- Interactive lectures and tutorials
- Reading tasks
- Group discussion
- Lab work (e.g. network measurement, socket programming, Arduino programming)

Schedule

Time	Lecture
12.15-14.00, Jan 17 (Mon)	TCP/IP network model, Ethernet and MAC address
12.15-14.00, Jan 18 (Tue)	Basics of wireless communications, Wi-Fi
12.15-14.00, Jan 24 (Mon)	Tutorial on wireless measurement
12.15-14.00, Jan 25 (Tue)	Network layer, IP address and routing
12.15-14.00, Jan 31 (Mon)	Exercise session, Q&A for assignment 1
12.15-14.00, Feb 1 (Tue)	Transport layer
23.59 Feb 4 (Fri)	Deadline of Assignment 1
12.15-14.00, Feb 7 (Mon)	Tutorial on socket programming
12.15-14.00, Feb 8 (Tue)	HTTP and DNS
12.15-14.00, Feb 14 (Mon)	Exercise session
12.15-14.00, Feb 15 (Tue)	Mid-term feedback
12.15-14.00, Feb 18 (Fri)	Deadline of Assignment 2
Aalto University School of Electrical Engineering	No lecture during the exam week (Feb 21 – 25) **Mid-term Exam (12-14 Feb 21, TU2)**

Schedule (Cont.)

Time	Lecture
12.15-14.00, Feb 28 (Mon)	Principles of cryptography
12.15-14.00, Mar 1(Tue)	Dijkstra, AS routing and message integrity
12.15-14.00 Mar 7 (Mon)	Exercise session
12.15-14.00, Mar 8 (Tue)	Exercise session
12.15-14.00, Mar 14 (Mon)	Message integrity, digital signatures and end-point authentication
12.15-14.00, Mar 15 (Tue)	Securing email and TCP connections
12.15-14.00 Mar 21 (Mon)	Exercise session
12.15-14.00, Mar 22 (Tue)	Exercise session
12.15-14.00, Mar 28 (Mon)	Exercise session
12.15-14.00, Mar 29 (Tue)	Ipsec and VPNs
12.15-14.00, Apr 5 (Tue)	Summary and feedback

Assignments and Exam

1) Wi-Fi measurement (1-2 students per group)	14 points + 2 bonus points
2) Socket programming (individual assignment)	20 points + 2 bonus points
3) mid-term exam	16 points
4) Cryptography (2 students per group)	10 points
5) Routing and integrity (2 students per group)	10 points
6) Digital signatures (2 students per group)	10 points
7) Secure email and TPC (2 students per group)	10 points
8) IP Sec and VPNs (2 students per group)	10 points

(Security-related assignment descriptions announced 1 week ahead the deadline)

Evaluation criteria can be found from MyCourses

Assessment

Course grading (scale : 1-5) is based on the results of assignments and mid-term exam.

Grade 1: 61-68

Grade 2: 69-76

Grade 3: 77-84

Grade 4: 85-92

Grade 5: 93-100

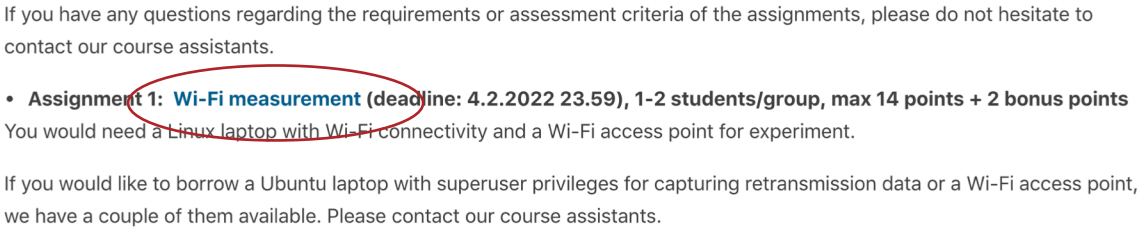
Late submission policy: 1 point will be deducted per day.

Assignment 1: Wi-Fi measurement

Devices:

- Several Linux laptops and wireless APs can be borrowed from course assistants from Jan 20. Please contact our assistants beforehand.

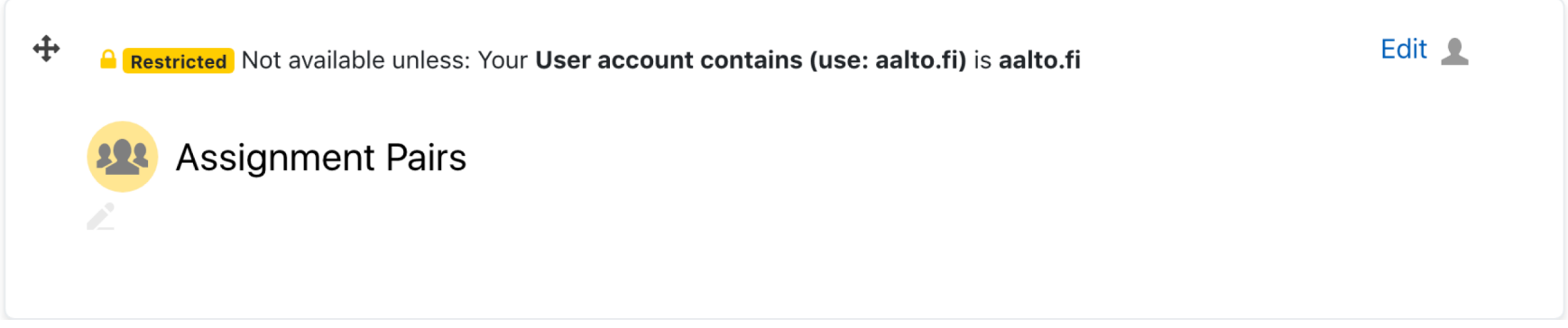
You can download the detailed description from MyCourses.



Group registration

Go to the Assignments page on MyCourses, you will find a link for group registration. The link will be open from Jan 11, 14.00 until Feb 4.

If you want to change the partner during the 2nd half of the course, please contact our course assistants.



Assignment 2: Socket programming

You must demo your work to our course assistants and then submit your source code via MyCourses by Feb 18. You are not allowed to copy code from Internet or other students.

Please reserve beforehand a slot to demo your work between Feb 14 and Feb 18, 2022. You will find a link for making reservations on MyCourses later.

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Study Materials

- Peter L Dordal. An Introduction to Computer Networks. https://intronetworks.cs.luc.edu/current/html/
- Kurose, Ross. Computer Networking, a top-down approach.
- Other materials are listed on MyCourses->Materials

Q&A