



Welcome to

## 0. Introduction

# Communication and Network Security 2019

Henrik Lund Kramshøj [hk@zencurity.com](mailto:hk@zencurity.com)

Slides are available as PDF, [kramse@Github](https://github.com/kramse)  
0-Introduction.tex in the repo [security-courses](https://github.com/kramse/security-courses)

## Contact information



- Henrik Lund Kramshøj, internet samurai mostly networks and infosec
- Independent security consultant
- Master from the Computer Science Department at the University of Copenhagen, DIKU
- Email: [h1k@zencurity.dk](mailto:h1k@zencurity.dk)      Mobile: +45 2026 6000

You are welcome to drop me an email



# Course: Communication and Network Security

## Ob 1 Netværks- og kommunikationssikkerhed (10 ECTS)

15 days of teaching

Exam: Date April 9. 2019

Teaching dates: 05/02 2019, 07/02 2019, 12/02 2019, 14/02 2019, 19/02 2019, 21/02 2019, 26/02 2019, 28/02 2019, 05/03 2019, 07/03 2019, 12/03 2019, 14/03 2019, 19/03 2019, 21/03 2019, 26/03 2019

**Changes: the dates 19/3 and 21/3 will be moved!**

**And since we are here, lets try to agree on best dates**

# Kursusmateriale



Dette materiale består af flere dele:

- Kursusmaterialet - præsentationen til undervisning - dette sæt
- Øvelseshæfte med øvelser

Hertil kommer diverse ressourcer fra internet, specielt RFC-dokumenter

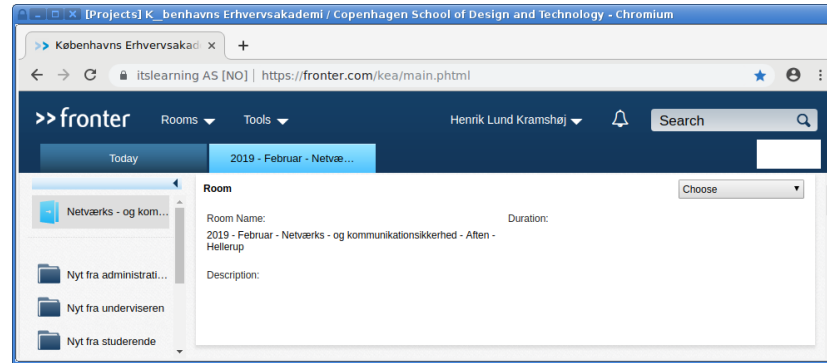
Bemærk: kursusmaterialet er ikke en substitut for andet materiale, der er udeladt mange detaljer som forklares undervejs, eller kan slås op op internet

# Deliverables and Exam



- Exam
- Individual: Oral based on curriculum
- Graded (7 scale)
- Draw a question with no preparation. Question covers a topic
- Try to discuss the topic, and use practical examples
- Exam is 30 minutes in total, including pulling the question and grading
- Count on being able to present talk for about 10 minutes
- Prepare material (keywords, examples, exercises, wireshark captures) for different topics so that you can use it to help you at the exam
- Deliverables:
- 2 Mandatory assignments
- Both mandatory assignments are required in order to be entitled to the exam.

# Frontier Platform



We will use frontier a lot, both for sharing educational materials and news during the course.

You will also be asked to turn in deliverables through frontier

<https://fronter.com/kea/main.phtml>

If you haven't received login yet, let us know

# Course Description



From: STUDIEORDNING Diplomuddannelse i it-sikkerhed August 2018

Indhold:

Modulet går ud på at forstå og håndtere netværkssikkerhedstrusler samt implementere og konfigurere udstyr til samme.

Modulet omhandler forskellig sikkerhedsudstyr (IDS) til monitorering. Derudover vurdering af sikkerheden i et netværk, udarbejdelse af plan til at lukke eventuelle sårbarheder i netværket samt gennemgang af forskellige VPN teknologier.

My translation:

The module is centered around network threats and implementing and configuring equipment in this area.

Module includes different security equipment like IDS for monitoring. The evaluation of security in a network, developing plans for closing security vulnerabilities in the network and a review of various VPN technologies.

Final word is the Studieordning which can be downloaded from

<https://kompetence.kea.dk/uddannelser/it-digitalt/diplom-i-it-sikkerhed>

Studieordning\_for\_Diplomuddannelsen\_i\_IT-sikkerhed\_Aug\_2018.pdf

# Expectations alignment



In groups of 2 students, brainstorm for 5 minutes on what topics you would like to have in this course

Use 5 minutes more on Agreeing on 5 topics and prioritize these 5 topics



# Goals



Introduce networking and related security issues

# Forudsætninger



Dette er en workshop og fuldt udbytte kræver at deltagerne udfører praktiske øvelser

Kurset anvender Kali Linux til øvelser, men UNIX kendskab er ikke nødvendigt

Øvelserne foregår via virtuel maskine

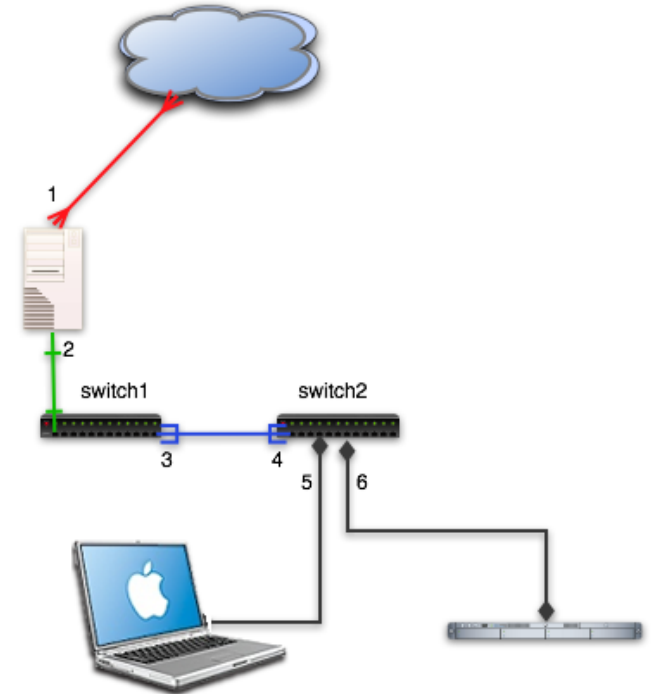
- Til penetrationstest og det meste Internet-sikkerhedsarbejde er der følgende forudsætninger
- Netværkserfaring
- TCP/IP principper - ofte i detaljer
- Programmeringserfaring er en fordel
- UNIX kendskab er ofte en **nødvendighed**
  - fordi de nyeste værktøjer er skrevet til UNIX i form af Linux og BSD

# Kursusfaciliteter



Der er opbygget et kursusnetværk med følgende systemer:

- OpenBSD router
- Switche Juniper EX2200-C og mindre TP-Link
- UniFi AP wireless access-point



# Primary literature

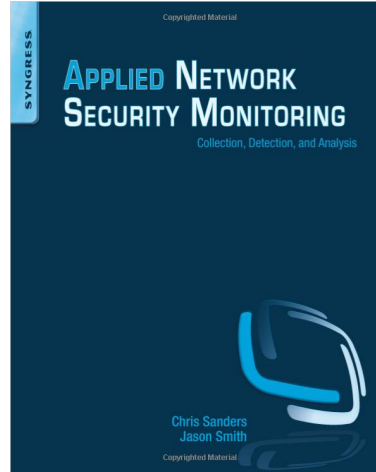


Primary literature are these three books:

- *Applied Network Security Monitoring Collection, Detection, and Analysis*, 2014 Chris Sanders  
ISBN: 9780124172081 - shortened ANSM
- *Practical Packet Analysis - Using Wireshark to Solve Real-World Network Problems*, 3rd edition 2017,  
Chris Sanders ISBN: 9781593278021 - shortened PPA
- *Linux Basics for Hackers Getting Started with Networking, Scripting, and Security in Kali*. OccupyTheWeb, December 2018, 248 pp. ISBN-13: 978-1-59327-855-7 - shortened LBfH

Price check around January 2019 - all three can be bought in hardcopy for 1.000-1.100DKK

# Book: Applied Network Security Monitoring (ANSM)

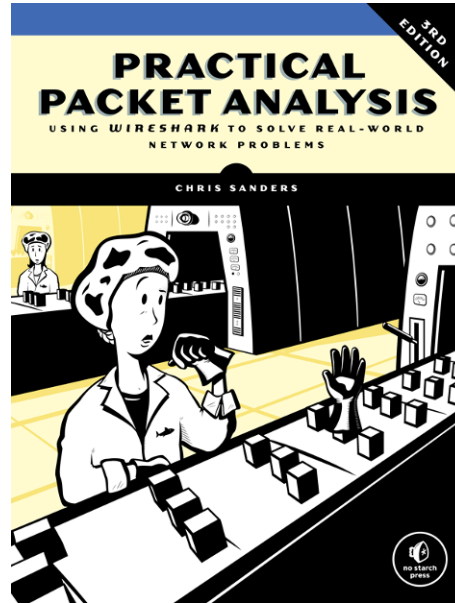


*Applied Network Security Monitoring: Collection, Detection, and Analysis* 1st Edition

Chris Sanders, Jason Smith eBook ISBN: 9780124172166 Paperback ISBN: 9780124172081 496 pp. Imprint: Syngress, December 2013

<https://www.elsevier.com/books/applied-network-security-monitoring/unknown/978-0-12-417208-1>

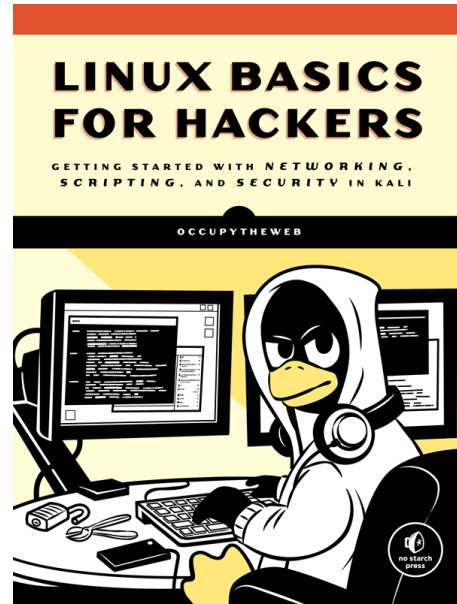
# Book: Practical Packet Analysis (PPA)



*Practical Packet Analysis, Using Wireshark to Solve Real-World Network Problems* by Chris Sanders, 3rd Edition April 2017, 368 pp. ISBN-13: 978-1-59327-802-1

<https://nostarch.com/packetanalysis3>

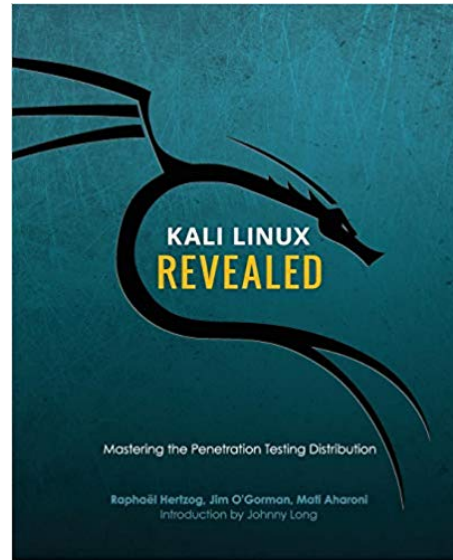
# Book: Linux Basics for Hackers (LBhf)



*Linux Basics for Hackers Getting Started with Networking, Scripting, and Security in Kali* by OccupyTheWeb December 2018, 248 pp. ISBN-13: 9781593278557

<https://nostarch.com/linuxbasicsforhackers>

## Book: Kali Linux Revealed (KLR)



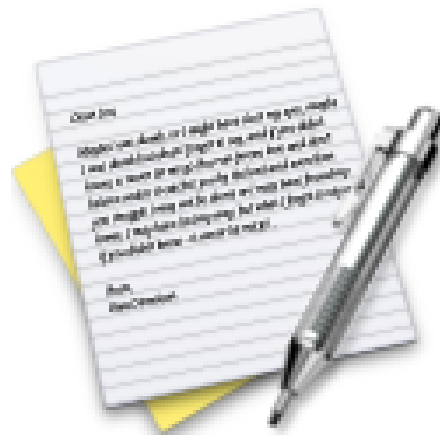
*Kali Linux Revealed Mastering the Penetration Testing Distribution*

<https://www.kali.org/download-kali-linux-revealed-book/>

Not curriculum but explains how to install Kali Linux



# Exercise

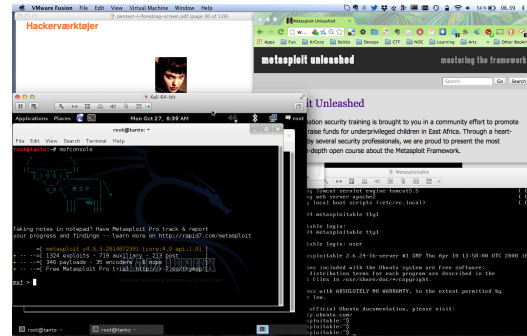


Now lets do the exercise

## Download Kali Linux Revealed (KLR) Book 10 min

which is number **1** in the exercise PDF.

# Hackerlab Setup



- Hardware: modern laptop CPU with virtualisation  
Dont forget to enable hardware virtualisation in the BIOS
- Software Host OS: Windows, Mac, Linux
- Virtualisation software: VMware, Virtual box, HyperV pick your poison
- Hackersoftware: Kali Virtual Machine <https://www.kali.org/>
- Soft targets: Metasploitable, Windows 2000, Windows XP, ...

Having a Debian 9 Stretch will also be recommended, one pr team

# Wifi Hardware



Since we are going to be doing exercises, sniffing data it will be an advantage to have a wireless USB network card.

- The following are two recommended models:
- TP-link TL-WN722N hardware version 2.0 cheap but only support 2.4GHz
- Alfa AWUS036ACH 2.4GHz + 5GHz Dual-Band and high performing
- Both work great in Kali Linux for our purposes.

I have some available for teams if you dont buy them.

# Aftale om test af netværk

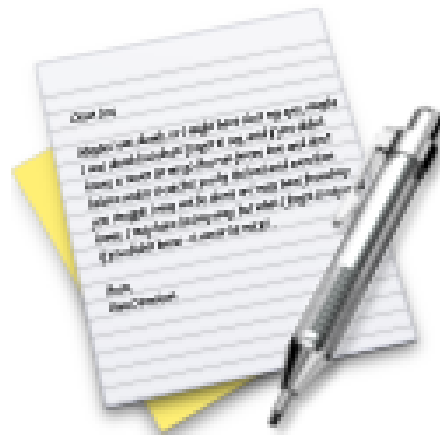


**Straffelovens paragraf 263 Stk. 2. Med bøde eller fængsel indtil 6 måneder straffes den, som uberettiget skaffer sig adgang til en andens oplysninger eller programmer, der er bestemt til at bruges i et anlæg til elektronisk databehandling.**

Hacking kan betyde:

- At man skal betale erstatning til personer eller virksomheder
- At man får konfiskeret sit udstyr af politiet
- At man, hvis man er over 15 år og bliver dømt for hacking, kan få en bøde - eller fængselsstraf i alvorlige tilfælde
- At man, hvis man er over 15 år og bliver dømt for hacking, får en plettet straffeattest. Det kan give problemer, hvis man skal finde et job eller hvis man skal rejse til visse lande, fx USA og Australien
- Frit efter: <http://www.stophacking.dk> lavet af Det Kriminalpræventive Råd
- Frygten for terror har forstærket ovenstående - så lad være!

# Exercise

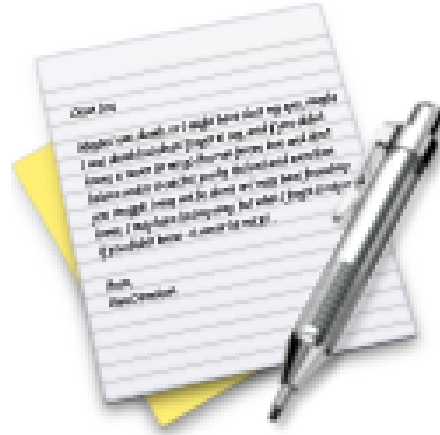


Now lets do the exercise

## Check your Kali VM, run Kali Linux 30 min

which is number **2** in the exercise PDF.

# Exercise



Now lets do the exercise

**Bonus: Check your Debian VM 10 min**

which is number **3** in the exercise PDF.

# Manualsystemet



kommando [options] [argumenter]

\$ cal -j 2005

It is a book about a Spanish guy called Manual. You should read it. – Dilbert

Manualsystemet i UNIX er utroligt stærkt!

Det SKAL altid installeres sammen med værktøjerne!

Det er næsten identisk på diverse UNIX varianter!

man -k søger efter keyword, se også apropos

Prøv man crontab og man 5 crontab

# En manualside



## NAME

`cal` - displays a calendar

## SYNOPSIS

`cal [-jy] [[month] year]`

## DESCRIPTION

`cal` displays a simple calendar. If arguments are not specified, the current month is displayed. The options are as follows:

- `-j` Display julian dates (days one-based, numbered from January 1).
- `-y` Display a calendar for the current year.

The Gregorian Reformation is assumed to have occurred in 1752 on the 3rd of September. By this time, most countries had recognized the reformation (although a few did not recognize it until the early 1900's.) Ten days following that date were eliminated by the reformation, so the calendar for that month is a bit unusual.



# Kommandolinien på UNIX



## Shells kommandofortolkere:

- sh - Bourne Shell
- bash - Bourne Again Shell, ofte default på Linux
- ksh - Korn shell, lavet af David Korn
- csh - C shell, syntaks der minder om C sproget
- flere andre, zsh, tcsh

Svarer til command.com og cmd.exe på Windows

Kan bruges som komplette programmeringssprog

# Kommandoprompten



```
[hlk@fischer hlk]$ id
uid=6000(hlk) gid=20(staff) groups=20(staff),
0(wheel), 80(admin), 160(cvs)
[hlk@fischer hlk]$
```

```
[root@fischer hlk]# id
uid=0(root) gid=0(wheel) groups=0(wheel), 1(daemon),
2(kmem), 3(sys), 4(tty), 5(operator), 20(staff),
31(guest), 80(admin)
[root@fischer hlk]#
```

typisk viser et dollartegn at man er logget ind som almindelig bruger  
mens en havelåge at man er root - superbruger

# Kommandoliniens opbygning



```
echo [-n] [string ...]
```

Kommandoerne der skrives på kommandolinien skrives sådan:

- Starter altid med kommandoen, man kan ikke skrive `henrik echo`
- Options skrives typisk med bindestreg foran, eksempelvis `-n`
- Flere options kan sættes sammen, `tar -cvf` eller `tar cvf`
- I manualsystemet kan man se valgfrie options i firkantede klammer `[]`
- Argumenterne til kommandoen skrives typisk til sidst (eller der bruges redirection)

# Adgang til UNIX

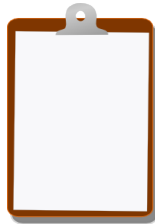


Adgang til UNIX kan ske via grafiske brugergrænseflader, eksempelvis

- KDE <http://www.kde.org>
- GNOME <http://www.gnome.org>
- Xfce <https://xfce.org/>

eller kommandolinien

## For Next Time



Think about the subjects from this time, write down questions

Check the plan for chapters to read in the books

Most days have about 100 pages or less, but one day has 4 chapters to read!

Visit web sites and download papers if needed

Retry the exercises to get more confident using the tools

Buy the books!