25 Years of Teaching

Gerth Stølting Brodal

Department of Computer Science
Aarhus University

Curriculum Vitæ

1989–1997	PhD Computer Science, Aarhus University
1997–1998	PostDoc at the Max-Planck-Institut for Computer Science, Saarbrücken, Germany
1998–	Research Assistant Professor / Research Associate Professor / Associate Professor (non-tenured / tenured (2004) / MSK), Professor, Aarhus University
2014–2019	Chair of the education committee Department of Computer Science

Teaching CV

Two projectors

Mentimeter

programming project part of grade

study café

online quiz

exam generator

PhD

+ flickr

lifesize

92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20

BSc
- ADS
- IPSA
- CS:persp
- CS:talent
- TA

} 1 week

PhD

Msc
- IO
- AADS
- CG
- AE
- WWW

Outreach
- “Gymnasiepraktik” / IT Camp

TÅGEKAMMERET VKF

?

Weekend course on being a TA

= slides available on course webpage (until then primarily blackboard / whiteboard)

→ course webpages (all still exist on my homepage)

PeerWise

DISCORD

YouTube

OBS Studio

Teaching style

Class room owns you	>	You control the class room	>	Give the freedom back to the class room
Focus on content Pressure to deliver		Relax when entering class		Encourage student - student interaction

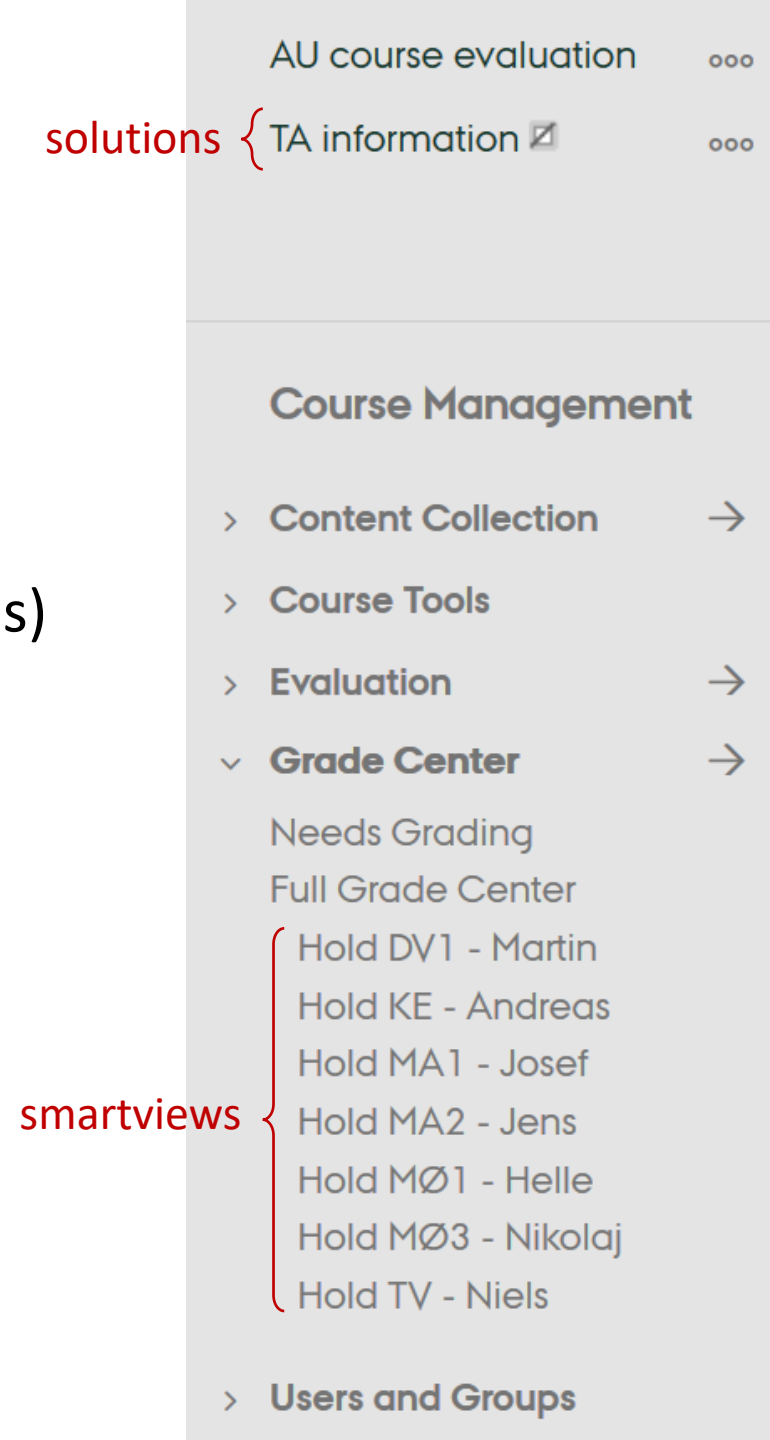
- Accept that you make mistakes
- Try to be informal, relaxed, provoking, interacting (also with +150 students)

No shoes during lectures... [citation from course evaluation: “Shoes are overrated”]

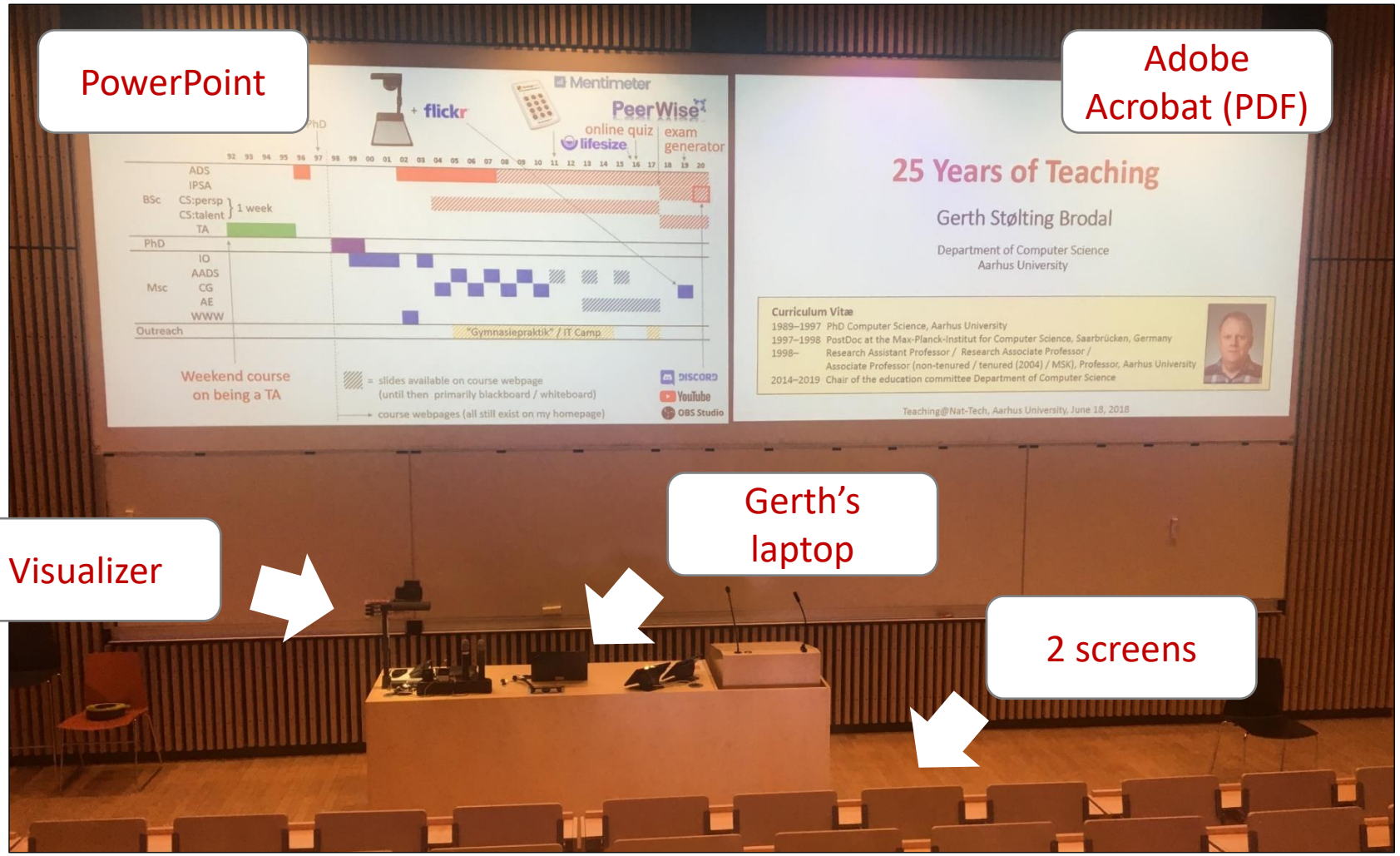
- Try to start where the students are
  – a wrong solution is a good starting point for a discussion
  - Anecdote: +100 students in an auditorium tried to convince me that a (wrong) algorithm worked. I felt under heavy group pressure... After 10 min discussion I disproved the proposed algorithm.
- Students have fun ⇒ You have fun

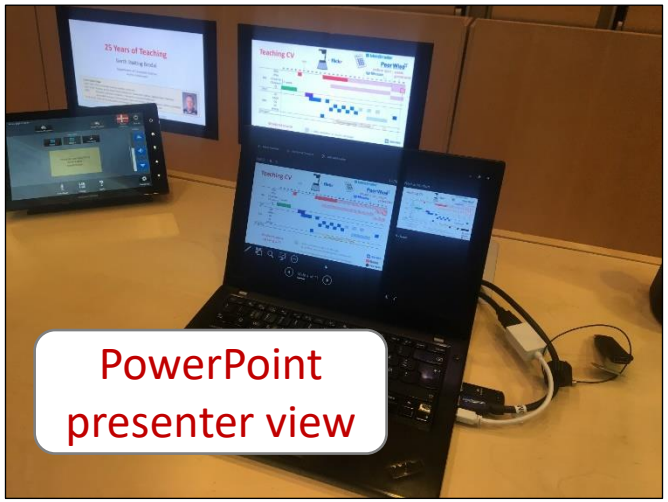
Teaching Assistants

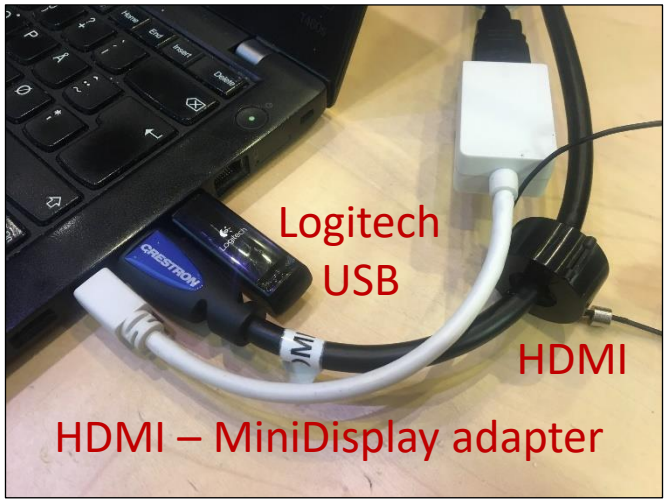
- Should ideally take ownership of course
- TAs are provided with solutions to exercises
  (they are payed for helping students not for solving exercises)
- TA meetings
  - TA-to-TA discussion
  - going over exercises, discussing pitfalls
  - best practice in TA class
  - TAs cover more years (knowledge transfer)
- Several TAs do their own TA evaluation in TA class



Using two projectors







Controlling two projectors with Logitech R700 (when you like to run around in the auditorium)

laser pointer (small red point • , hard to track)

next slide (page down)

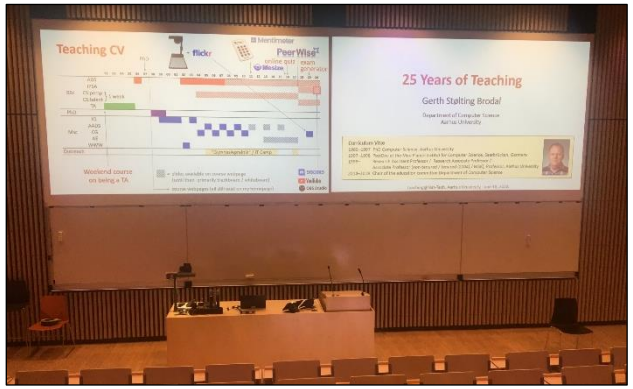
~~black screen~~ (.)

reprogrammed to alternate focus between PowerPoint and Adobe Acrobat

(page up) previous slide

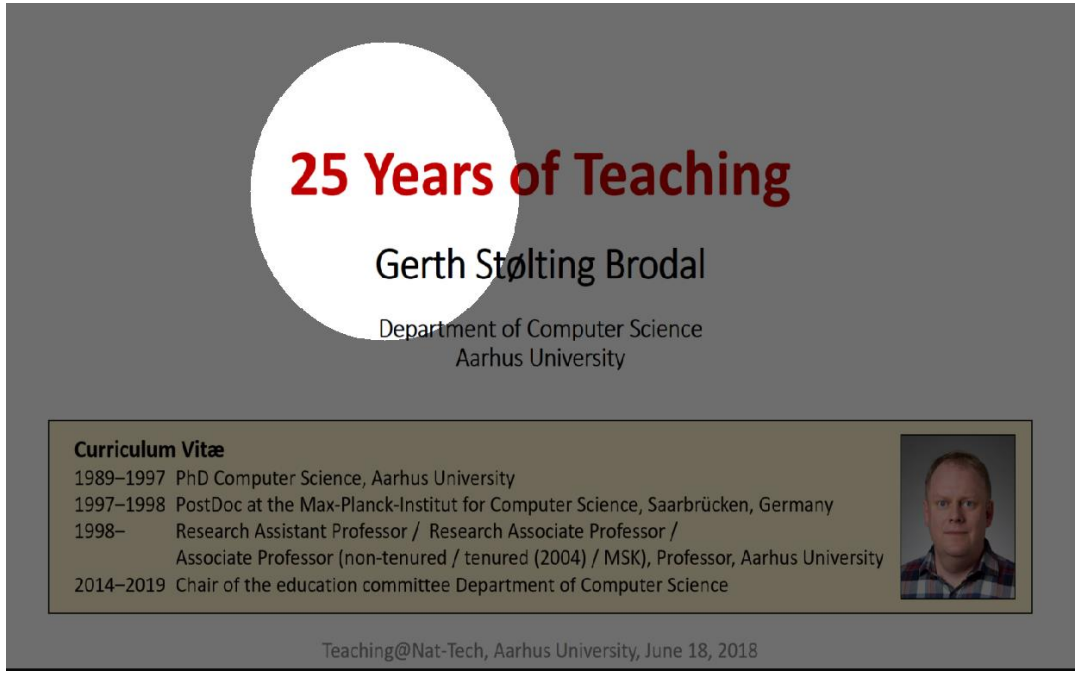
~~(ESC / F5)~~ start presentation

reprogrammed to send Ctrl-L in Adobe Acrobat and ESC / Shift-F5 in PowerPoint



works also with Logitech Spotlight

hold to alternate between
PowerPoint and Adobe Acrobat
(when configured to ".")



...easier to follow and gets recorded on lifesize

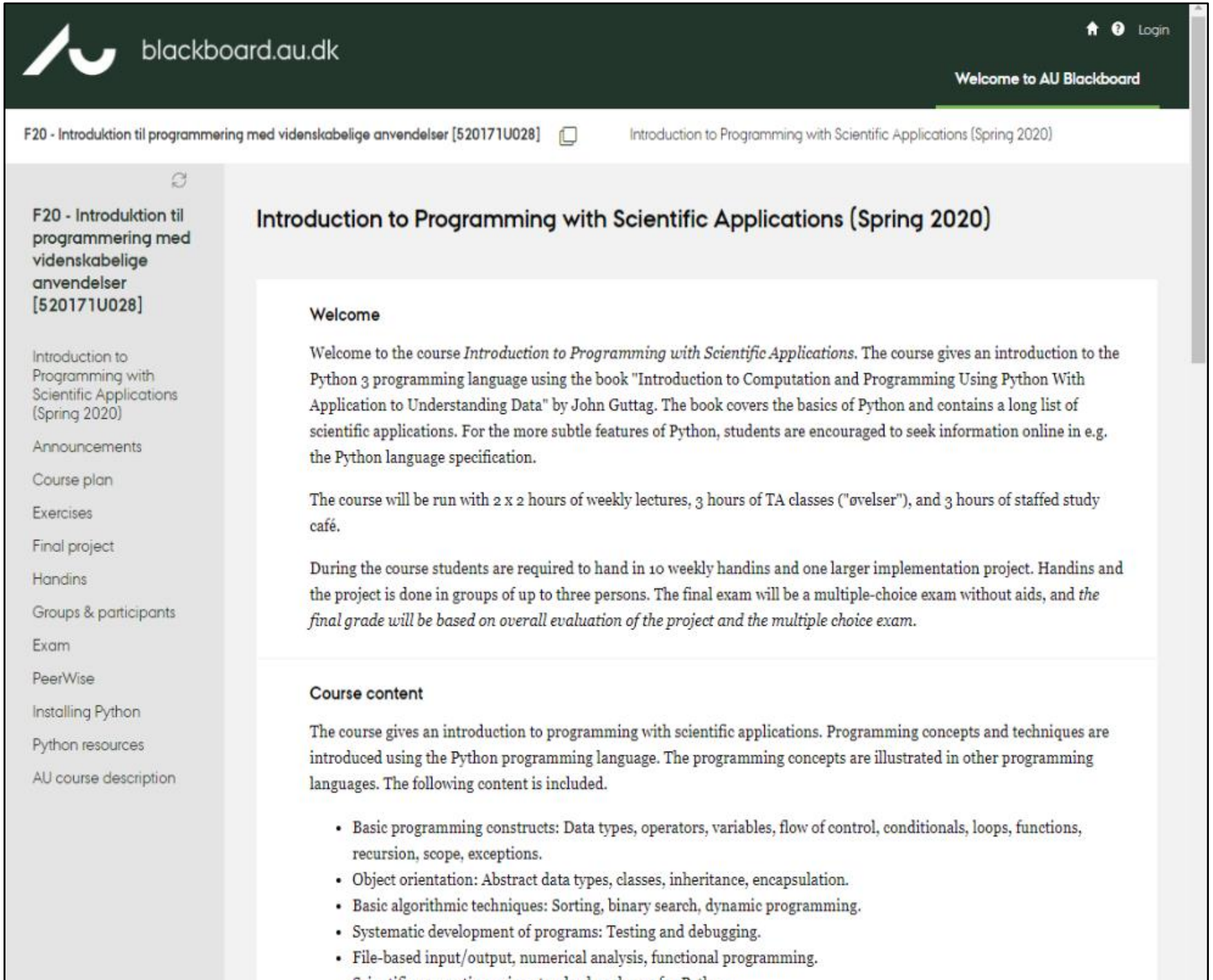
Auto Hot Key script

```
;; Map '.' to switch toggle between AcroRead and PowerPoint presentation

$.::   ; used $ to avoid recursion
if WinActive("ahk_class AcrobatSDIWindow") && WinExist("ahk_class screenClass")
   WinActivate ahk_class screenClass
else
   if WinActive("ahk_class screenClass") && WinExist("ahk_class AcrobatSDIWindow")
      WinActivate ahk_class AcrobatSDIWindow
   else
      Send . ;; Default send '.' if other window not present,
             ;; or other type of window
return

;; In AcroRead allow Logitech presenter to toggle Fullscreen
;; by mapping escape and F5 to Ctrl-L (remote alternates between
;; submitting F5 and escape)

$ESC::
if WinActive("ahk_class AcrobatSDIWindow")
   send ^l
else
   send {ESC}
return

$F5::
if WinActive("ahk_class AcrobatSDIWindow")
   send ^l
else
   if WinActive("ahk_class PPTFrameClass")
      ;; For PowerPoint send Shift-F5 instead of F5
      ;; to continue pressentation at current slide
      ;; (instead of starting from slide 1)
      send +{F5}
   else
      send {F5}
return
```

Keep it simple
– for the students

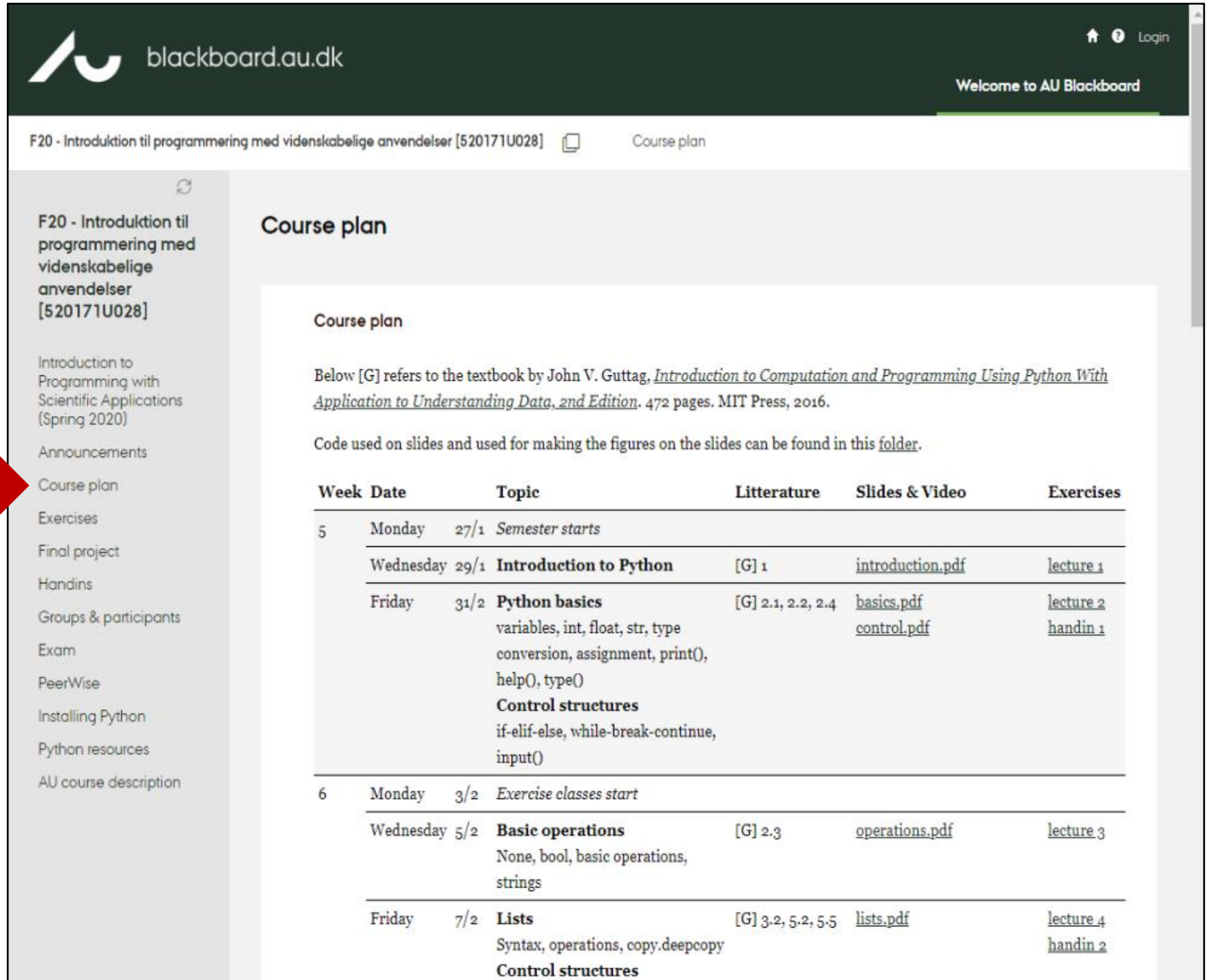
all pages available
at semester start

blackboard.au.dk/webapps/blackboard/execute/courseMain?course_id=_133812_1



course plan
= single page with
all necessary links

- Not mobile friendly
- Supports Ctrl-F
- Avoid fancy Bb features
- Updated as we go



Exam

Previous exams

Below are the exam questions from the exams in the first year introduction to algorithms and data structure courses since 1991. A suffix of "j", "a" or "m" indicates a reexam in January, May or August, respectively. "/s" is the solution to the exams. "/%" is the answer statistics from the exam. Be aware that the curriculum has changed (slightly) over the years.

Algorithms and Data Structures (ADS, Fall 2017-)

20m/s 20/s/% 19m/s 18/s 18m/s 17

Algorithms and Data Structures 1 (dADS1, Spring 2004-2017)

17a/s 17/s 16a/s 16/s 15a/s 15/s 14a/s 14/s 13a/s 13/s 12a/s 12/s 11a/s 11/s 10a/s 10/s 09a/s 09/s 08a/s 08/s 07a/s 07/s 06a/s 06/s 05a/s 05/s 04a/s 04/s

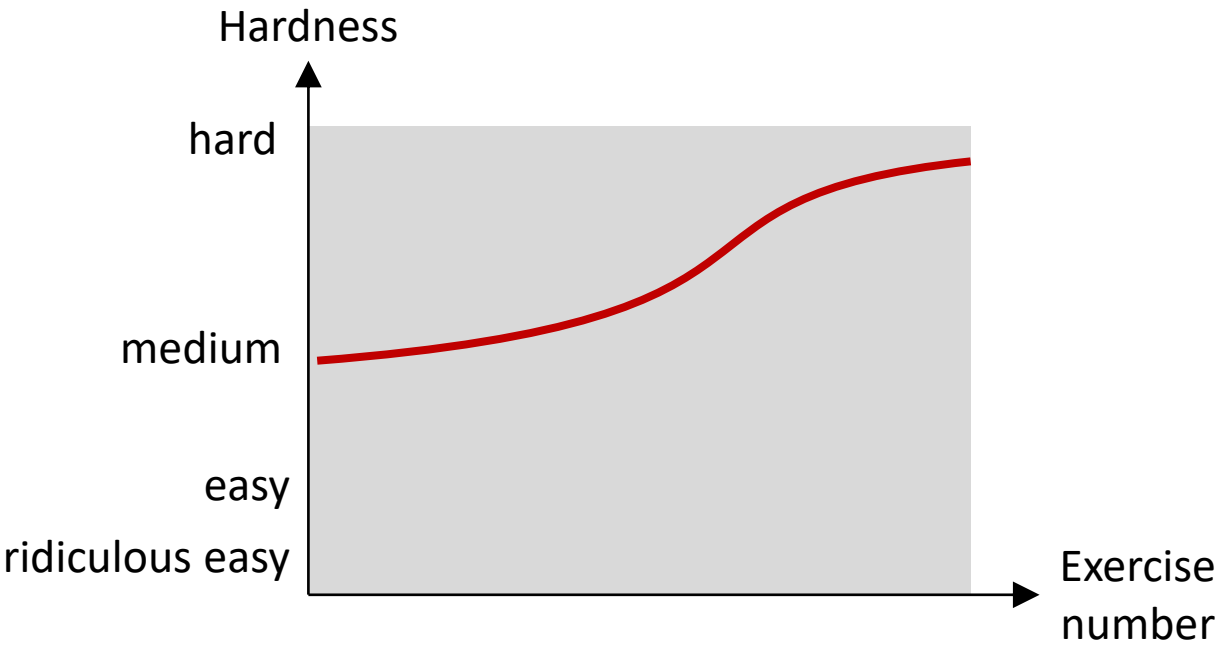
Algorithms and Data Structures 2 (dADS2, Spring 2004-2017)

17a/s 17/s 16a/s 16/s 15a/s 15/s 14a/s 14/s 13a/s 13/s 12a/s 12/s 11a/s 11/s 10a 10/s 09a 09/s 08a/s 08/s 07a 07/s 06a 06/s 05a 05/s 04a 04/s

Algorithms and Data Structures (dADS, Spring -2003)

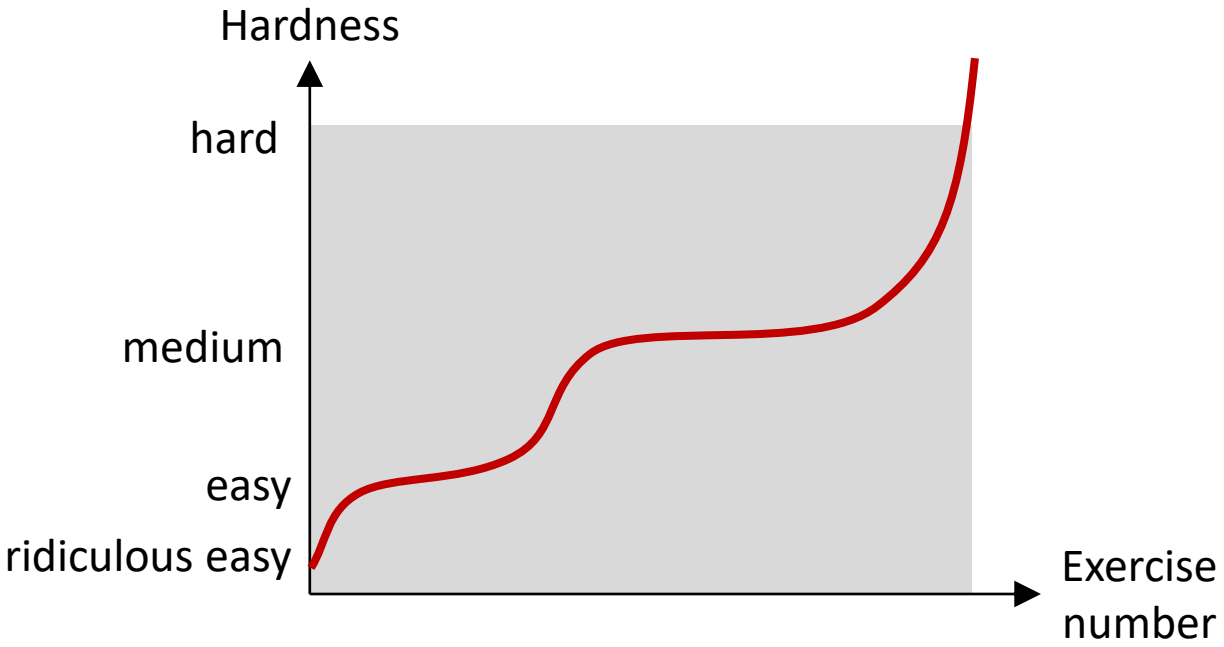
Written Exams

Early years



- Too many challenging exercises
- Hard to differentiate around passing grade

More recently

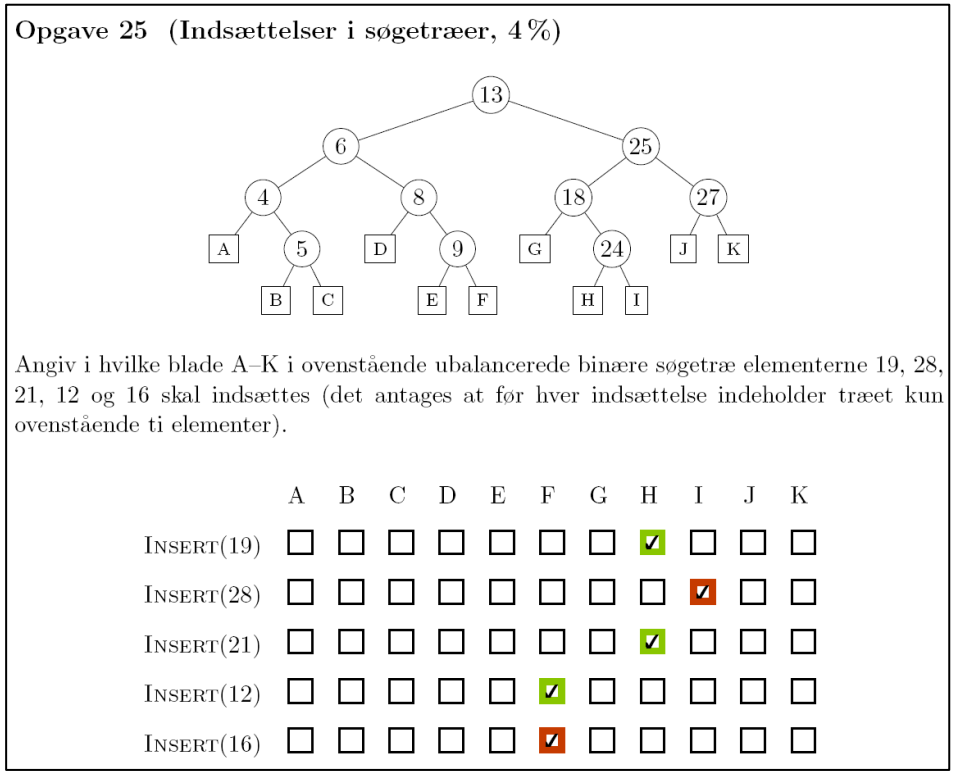


- Sufficiently many easy exercises to get evidence for passing
- Challenge top students

Fall 2019 – Exam generator

- I have used the same (types of) questions for many years
- Made a script to generate a PDF with 126 pages of exam training questions (covering most types of exam questions)
- Students verify answers in Acrobat Reader

Grade	-3	00	02	4	7	10	12
2019	1%	4%	1%	6%	26%	26%	35%
2018	1%	4%	10%	16%	30%	27%	12%
2017	0%	6%	10%	24%	28%	19%	13%



Python → LaTeX + tikz → PDF with embedded JavaScript

https://blackboard.au.dk/webapps/blackboard/content/listContent.jsp?content_id=_2279347_1&course_id=_130942_1

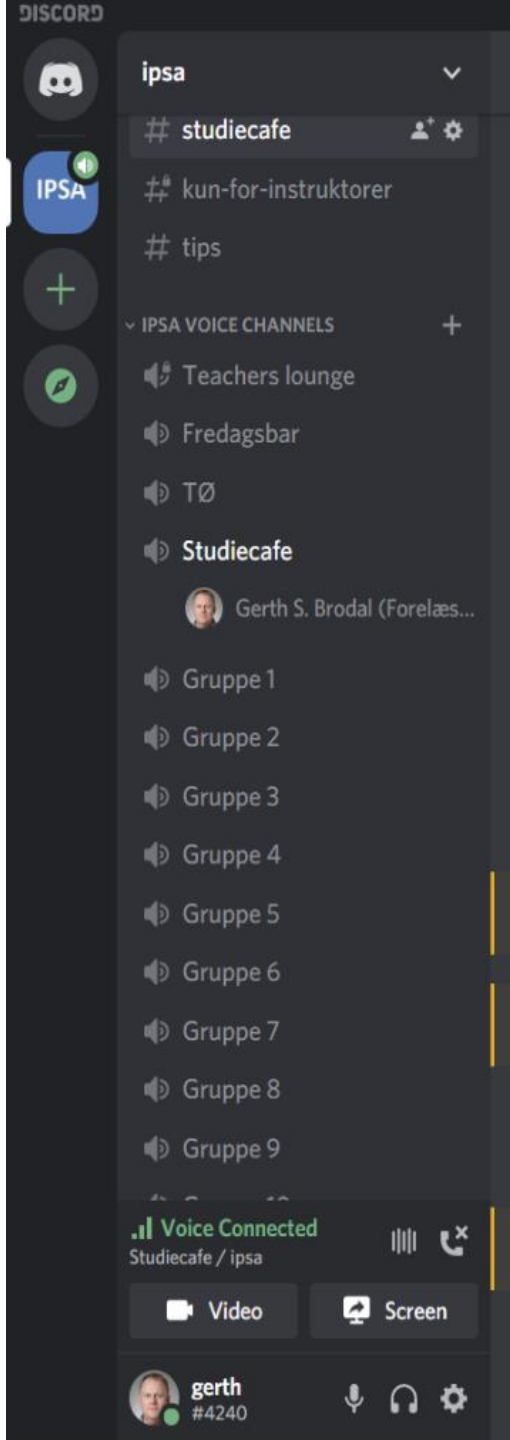
Spring 2020 experience – going online

Introduction to Programming with Scientific Applications

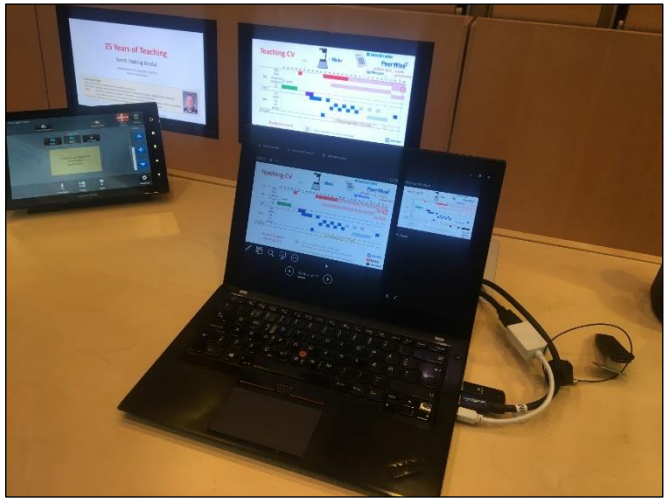
- March 11, 20:00 – Denmark closed down
- March 11, 23:16 – TAs suggest to move to DISCORD
- March 12, 00:31 – Discord server running
- March 12, 9:15 – first TA session on Discord
- March 13, 10:15 – first study café on Discord
- Lectures, asynchronous on YouTube
  (spend lot of time improving slides, technical content)
  (recorded with OBS Studio)

I spend ≈ 4 hours every week in the Discord study café interacting with students, screen sharing a lot of code...

(Bb discussion board completely silent !)



Final remark



- Courses evolve over time

- Attend teaching activities offered...
  - You will likely be confirmed in a lot you already know and do, but
  - you get a change to reflect on your teaching,
  - a single new minor idea can change a lot in your course,
  - a chance to interact and get inspired by colleagues from other fields

Thanks to STLL