

DTU

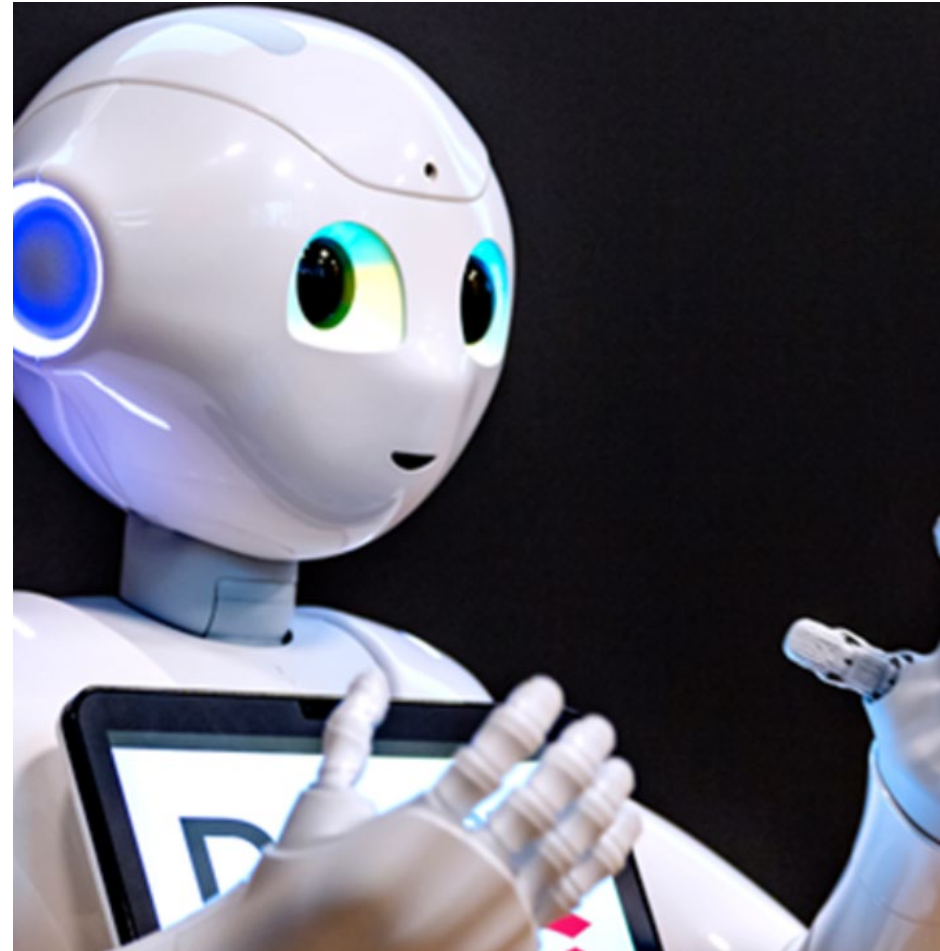


CUU 20. feb. 2023

DAGSORDEN

CUU 20. feb. 2023

- 1) Velkomst
- 2) ChatGBT
- 3) Digitale kompetencer
- 4) Kursustyper/niveauer
- 5) Eventuelt
- 6) Meddelelser



Chat GBT

Research tool or cheating engine?

Instituddirektør Jan Madsen, DTU Compute

ChatGPT

Research tool or cheating engine?

Jan Madsen , Professor, PhD

Head of Department, DTU Compute

CUU, February 20, 2023

Just two months after the program's public launch,
ChatGPT reached 100 million monthly active users

ChatGPT?



Hvem er du?



Jeg er en AI-model udviklet af OpenAI med fokus på at besvare spørgsmål og håndtere opgaver relateret til sprog. Jeg er kendt som ChatGPT.



ChatGPT?



Who is OpenAI?



OpenAI is an artificial intelligence research organization founded in 2015 with headquarters in San Francisco. Its goal is to develop and promote AI technologies in a responsible manner, with the aim of having a positive impact on society. OpenAI is supported by a number of investors, including tech leaders and entrepreneurs.



ChatGPT is a Generative AI

- Generative artificial intelligence (AI) **describes algorithms (such as ChatGPT) that can be used to create new content, including audio, code, images, text, simulations, and videos.** Recent new breakthroughs in the field have the potential to drastically change the way we approach content creation

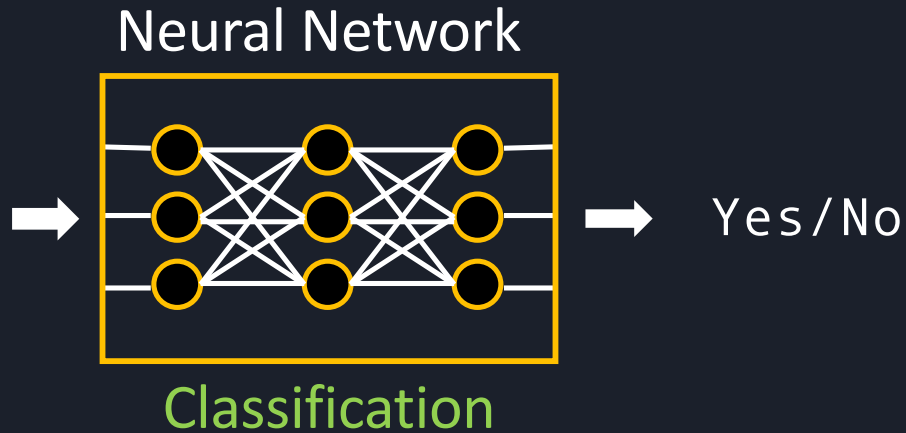
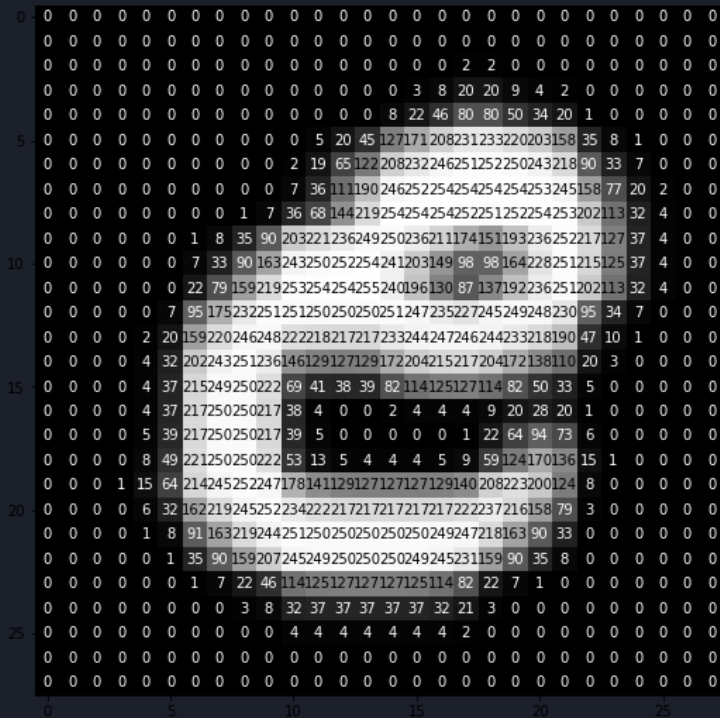
The AI

AI | Machine Learning | Deep Learning



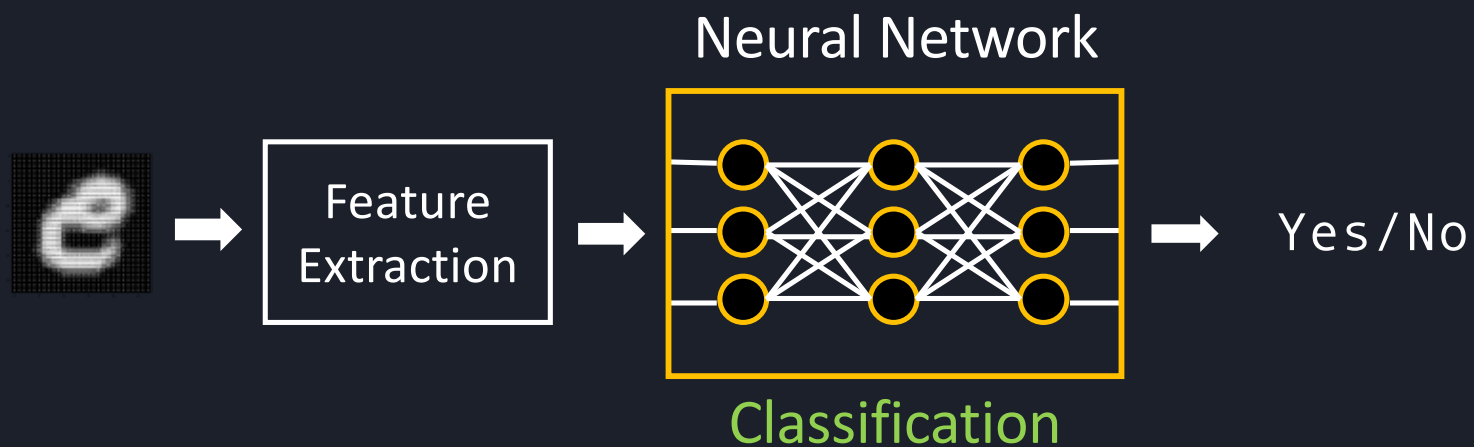
Machine Learning: = e ?

28 x 28 pixels x 2⁸ bits = 6.271 bits



Machine Learning: = e ?

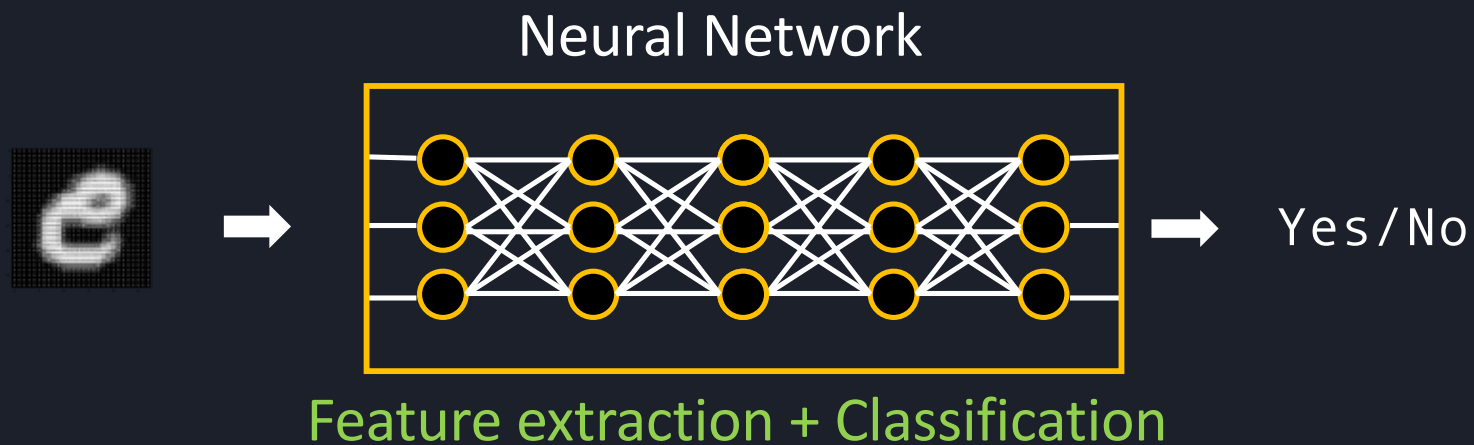
Supervised learning



Deep Learning:

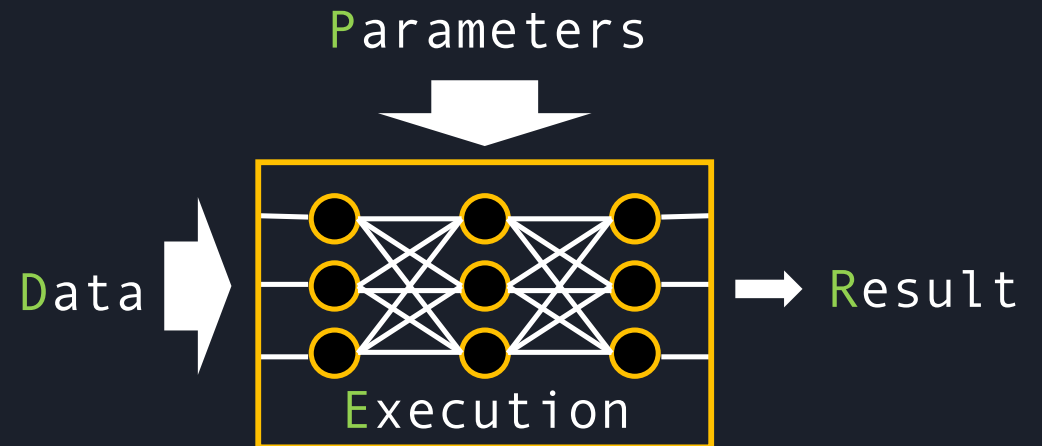
 = e ?

Reinforcement learning



Accuracy of Deep Learning

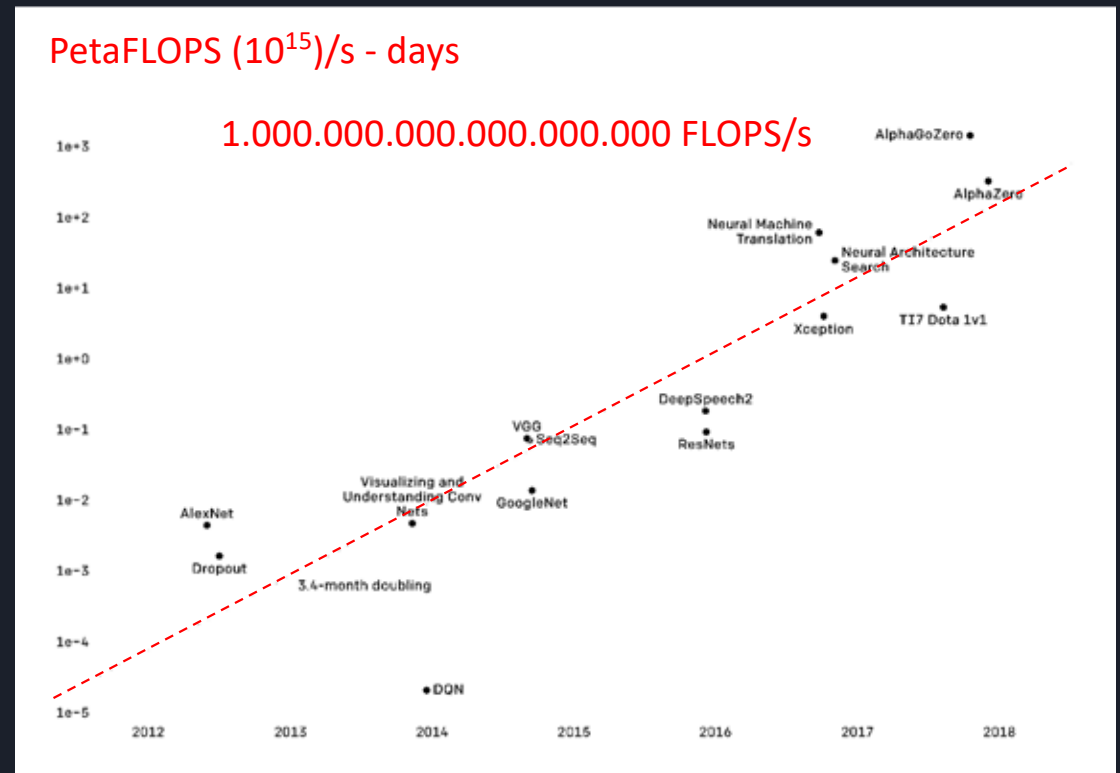
- FLOPS - Floating Point Operations
- Faster processing - GPU
- Parallel - cluster of GPU's
- $\text{Cost}(R) \sim E \times D \times P$



Accuracy of Deep Learning

- FLOPS - Floating Point Operations
- Faster processing - GPU
- Parallel - cluster of GPU's
- $\text{Cost}(R) \sim E \times D \times P$

300.000x increase



The Sustainability Challenge

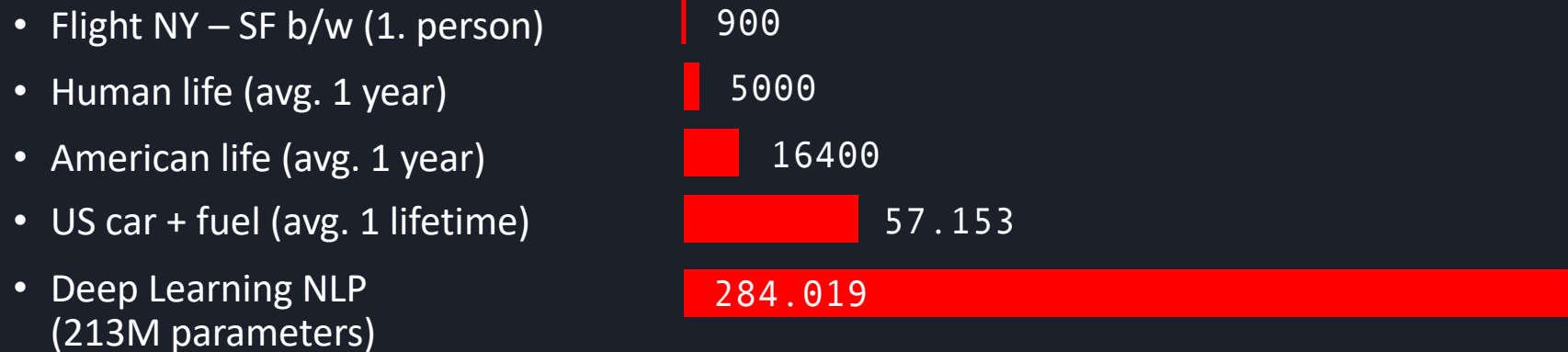
- CO₂ footprint (kg)

• Flight NY – SF b/w (1. person)	900
• Human life (avg. 1 year)	5000
• American life (avg. 1 year)	16400
• US car + fuel (avg. 1 lifetime)	57.153

[source: Strubell et al, "Energy and policy considerations for deep learning in NLP", 2019]

The Sustainability Challenge

- CO₂ footprint (kg)



~ 32x around the earth

[source: Strubell et al, "Energy and policy considerations for deep learning in NLP", 2019]

ChatGPT

Training

Parameters



$$\text{Cost}(R) \sim E \times D \times P$$

Inference



$$\text{Cost}(R) \sim E$$

ChatGPT training

- Initial model trained with **supervised** fine tuning
- Human AI trainers provide conversations in which they play both sides
- **Reinforcement** learning based on reward model, which uses two or more model responses ranked by quality

The Awakening

ChatGPT and exams

For the exam in *Introduction to Programming and Data Processing* which runs under numbers 02631, 02632, 02633, 02634, we have an open Internet during the exam, so students can find help in the online textbook and other documentation by using ordinary Internet search engines such as Google and evaluate and adapt any suggestion for a partial solution to the exam assignment.

I have tested ChatGPT capabilities on solving the exam set from one of the previous semesters and I find that ChatGPT can solve almost an entire exam set and student submission of the ChatGPT solution would probably have **resulted in a grade around 10**. It requires only simple copy and paste. With a slight change in the input to ChatGPT, the solution improves to what typically would correspond to a grade of 12. Screenshots from ChatGPT are available on the following pages.

The capabilities of ChatGPT have **far-reaching consequences for written exams** with an open Internet.



Finn Årup Nielsen
Associate Professor

Finn Årup Nielsen, DTU Compute, December 2022

ChatGPT and exams

FA

Given a matrix, we want to count the number of pairs. A pair is here defined as two neighboring elements with the same value. The neighborhood is defined as the immediate elements left, right, up or down from the current element.



Problem definition

Create a function called `count_pairs` which as input takes a matrix A. The function should return the number of pairs, where a pair is defined as two neighboring elements with the same value, and the neighborhood is the immediate left, right, up and down elements.

Solution template

```
def count_pairs(A):  
    #insert your code  
    return c
```

FA

Given a matrix, neighboring elements with the same value are considered as two pairs. Create a function that takes a matrix as input and returns the number of such pairs.

```
def count_pairs(A):
    #insert your code here
    return c
```



Here's a possible implementation for the "count_pairs" function:

```
def count_pairs(A):
    # Initialize the counter for the number of pairs
    c = 0

    # Get the number of rows and columns in the matrix
    rows, cols = len(A), len(A[0])

    # Iterate over the elements in the matrix
    for i in range(rows):
        for j in range(cols):
            # Check if the element has a neighbor to the right with the same value
            if j < cols - 1 and A[i][j] == A[i][j+1]:
                c += 1
            # Check if the element has a neighbor below with the same value
            if i < rows - 1 and A[i][j] == A[i+1][j]:
                c += 1

    # Return the number of pairs
    return c
```

We can test the function with the following code:

```
# Define a matrix
A = [[1, 2, 3], [4, 4, 6], [7, 8, 9]]

# Count the number of pairs in the matrix
pairs = count_pairs(A)

# Print the result
print(pairs) # Should print 2
```

The function should return "2", because there are two pairs of neighboring elements with the same value in the matrix: "(4,4)" and "(8,8)".

S

ed as two pairs as the

function should count elements with the same value as two pairs.

The Challenges



DTU machine learning courses at scale

Course participants 2022

02450 Introduction to machine learning and data mining

F22+ E22: 473 + 596 = **1069** students

02456 Deep learning

E22: **423** students

02476 Machine Learning operations

JAN 23: **200** students

25 | 07.02.2023 |

02631+02632+024633 Introduction to programming and data analysis

JAN22 + F22 + JUN 22 + AUG 22 +E22 = 182 +114 +252 +423 +204 = **1175** students

University level ban

- In an email addressed to all students and faculty from Provost Sergei Guriev, Sciences Po's senior management team announced a ban on the use of ChatGPT, and all other AI-based tools, at Sciences Po. **Without transparent referencing, students are forbidden to use the software for the production of any written work or presentations, except for specific course purposes, with the supervision of a course leader.** The sanctions for use of the software may go as far as exclusion from the institution, or even from French higher education as a whole.

Jan 27, 2023

<https://newsroom.sciencespo.fr/sciences-po-bans-the-use-of-chatgpt/>

University level ban

- The introduction of generative AI has raised questions about the **definition of plagairism** and academic integrtly, as new digital research tools come into play all the time!
- Plagairism is the act of using **someone's** work or idea without proper credits.
- Challenge is not new: Wikipedia, with no clear author, is copying from **somewhere**
- ... but, what if it is generated by **something**?

Algorithm = Human !!!

ChatGPT Plagiarism

Kasper Groes Albin Ludvigsen's linked-in post

Should I be proud or worried that ChatGPT copy pasted something I wrote? 😂😂
In December, I published a story in Towards Data Science (TDS) in which I guesstimated ChatGPT's carbon footprint. Now, a blog post has appeared in which the author reports on a conversation she allegedly had with ChatGPT about climate change. During that conversation, **ChatGPT gave an answer that contains a near exact copy paste of a paragraph from my TDS story.** Should I be proud? I guess it's kinda cool. And maybe a sign of recognition. Should I worry?

GettyImages

This week Getty Images commenced legal proceedings in the High Court of Justice in London against Stability AI claiming Stability AI **infringed intellectual property rights including copyright in content owned or represented by Getty Images**. It is Getty Images' position that Stability AI unlawfully copied and processed millions of images protected by copyright and the associated metadata owned or represented by Getty Images absent a license to benefit Stability AI's commercial interests and to the detriment of the content creators.



Can ChatGPT recognise itself?

- Maybe we should ask OpenAI to act responsibly and create a "fingerprint" service for journalists, schools etc:
- You upload a suspicious text and they check against a (hashed) list of ChatGPT outputs, whether it was indeed generated by ChatGPT

Should we just ban ChatGPT?

NO!



Nikolaos Nakis

@nnaknik



Currently, I am TAing an [#mlops](#) course.

In today's session, a student needed help regarding [#fastapi](#).

After several minutes of struggling with a google search, I turned to [#ChatGPT](#) getting the correct answer in a matter of seconds.

7:25 PM · Jan 11, 2023 · **223** Views

Nikolaos is a PhD student at DTU Compute

Use of bots in education

- Show students shortcomings of AI
- Changing how assignments are setup, such that bots cannot complete them
- Detecting AI-use in students work – an expanded urkund
- ...



ChatTutor-scaling of high quality education

- Improve the learning experience
- Empower students – enrich the learning experience
- Trusted chatbot - grounded by knowledge graph



Tue Herlau
Assoc Professor

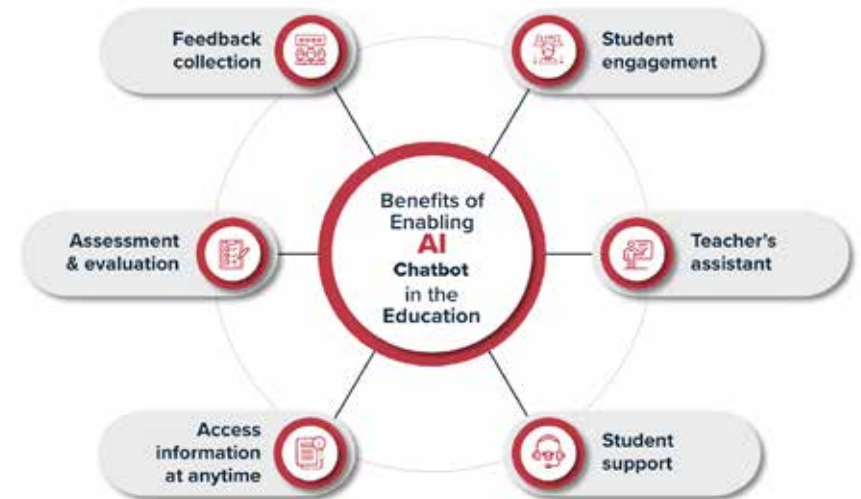


Lars Kai Hansen
Professor,
Head of Section of
Cognitive Systems

Improve TA productivity + Empower students for effective learning

By 2026, it is anticipated that the **global e-learning market** will develop at a compound annual growth rate of 9.1%. People are choosing corporate training and courses online, so they don't have to take time away from their jobs and families to upgrade their skills. A **robust student assistance strategy is required for educational institutions** in light of this expansion. Prioritise and respond quickly to student inquiries before registration, during the course, and thereafter.

A **chatbot for education** can be a big help in offering top-notch student support and providing quick answers to students' questions (mtalkz).



<https://mtalkz.com/chatbot-for-education/>

<https://www.quytech.com/blog/benefits-of-ai-chatbot-in-education-future-of-edtech/>

How **Conversational AI** can support university teaching

- Safe and Secure **Feedback** – privacy aware sharing
- AI Assistants - **combine** complex domain knowledge
- Enhance student **engagement** 24/7-responsive, reliable, rewards
- Improve student's **metacognition** – learning strategies, known unknowns

The Future

Digitalization

- Digitalization happens in the **crossings** between professions
- Digitalization **accelerates** professions and their **convergence**
- Digitalization is **not in isolation** -> organizations get **disrupted!**
- Digitalization impacts ALL aspects of **life** and **society**

Digital Transformation

INDUSTRIAL EDUCATION

1. Private and closed
2. Hierarchy and silos
3. Specialised
4. One size fits all
5. Status quo
6. Planning
7. Process and rules
8. Controlling
9. Money



DIGITAL EDUCATION

1. Open and transparent
2. Networks
3. Interdisciplinary
4. Adaptable and personalized
5. Agility and innovation
6. Experimentation
7. Relationships and connections
8. Empowering
9. Purpose

“Technology development is unavoidable – to understand this, is foundational for leaders ability to act on our future”

Jan Madsen



why should DTU ban ChatGPT in its educations?



There is no compelling reason for DTU, or any educational institution, to ban ChatGPT in their education. While there may be concerns about the potential for AI to replace human teachers, ChatGPT is best seen as a complement to human education, not a replacement.



ChatGPT can provide students with instant access to information, help them clarify their understanding of concepts, and save teachers time and increase efficiency by providing instant answers to administrative questions. Additionally, ChatGPT provides a valuable resource for students and teachers, enabling them to interact with a powerful AI system and gain exposure to cutting-edge technology.

Banning ChatGPT would limit the educational opportunities available to students and teachers and would be at odds with the trend towards increased use of AI in education. There is no evidence that ChatGPT is harmful to students or education, and the benefits it provides make it an important tool for enhancing education.

We have to embrace the future of ChatGPTs

Acknowledgements



Tue Herlau
Associate Professor



Finn Årup Nielsen
Associate Professor



Ole Winther
Professor



Lars Kai Hansen
Professor,
Head of Section of
Cognitive Systems



Mie Weile
PhD student,
Deputy Director of
Tech4Civ

ChatGPT: Hvad nu?

Dekan Philip Binning

MINE KURSER OG
GRUPPER

VÆRKTØJSKASSE

STUDIAREGLERFAGLIGE TILBUD OG
VEJLEDNINGSOCIALT OG
POLITISKUndervisning > Studieregler > Eksamen > [Snyd ved eksamen og anden bedømmelse](#)**EKSAMEN**Undervisningsperioder
(undervisningsåret)

Eksamensdatoer

Tilmelding og afmelding

Snyd ved eksamen og anden bedømmelse

- [Hvad er eksamenssnyd?](#)
- [Indberetning af eksamenssnyd](#)
- [Hvad skal en indberetning indeholde?](#)
- [Hvilken bedømmelse skal underviser give studerende, der indberettes?](#)
- [Information fra underviser til den indberettede studerende](#)
- [Hvordan er den studerende stillet under en snydsag?](#)
- Sanktioner

Hvad er eksamenssnyd?

[Januar 2023: Det skal præciseres, at det som følge af ovenstående ikke er tilladt at bruge AI chatbotter som ChatGPT og andre former for kunstig intelligens i eksamensafleveringer, da brug heraf ikke er udtryk for ens egen selvstændige præstation. Dette gælder også ved skriftlig eksamen med alle hjælpemidler tilladt. Den eneste undtagelse er, hvis brug af disse softwares fremgår specifikt af kursusbeskrivelsen eller er oplyst til de studerende af underviser inden eksamen.]

Nogle (rigtig) svære spørgsmål?

- DTU har forbudt for ChatGPT og AI, men der forventes udfordringer. Hvordan defineres AI (stavekontrol, google søgning etc...)?
- AI er den nye virkelighed, vi ikke bare kan forbyde (computere, regnemaskiner blev ikke forbudt). Hvad gør vi?
- Hvad er eksamenssnyd?
- Hvordan eksaminerer vi de studerende?
- Hvordan ved vi om det er snyd?
- Hvordan kontrollere vi bedst snyd?
- Hvad mener DTU med 'Alle hjælpemidler tilladt'?

chat.openai.com/auth/login

Bookmarks Library Bank Kayak All music AllMusic's Best of 2... Min Sundhedsplatf... spr

ChatGPT is at capacity right now

[Get notified when we're back](#)

Write a guided meditation about the status of ChatGPT.

As you read this message, please take a moment to pause and breathe. Notice the sensations in your body and the rhythm of your breath. Remind yourself that you are not alone in wanting to try out ChatGPT. Many others are interested in it as well. Be patient and know that the website is doing its best to accommodate everyone. Trust that the right time for you to try ChatGPT will come. In the meantime, continue to focus on your breath and stay present in the moment.

Digitale kompetencer

Dekan Philip Binning

Teknologi for mennesker

- **MÅL**
DTU går forrest i realiseringen af digitaliseringens muligheder
- Digitalisering er et grundlæggende element i alle DTU's uddannelser - i teori og praksis

Pejlemærke 3
Vi går forrest i realiseringen af digitaliseringens muligheder

OPGAVER

- Hvilke digitale kompetencer skal enhver DTU-ingeniør have i **fremtiden**?
- Hvad er DTU-ingeniørens digitale mindset?



Hvad forstår vi ved digitale kompetencer?

DTU-ingeniørens digitale mindset baseres på **‘Computational thinking’**, der omfatter:

1. **‘Algorithmic thinking’**

Et stærkt digitalt sprog,
kendskab til de digitale grundbegreber bag programmering

2. **‘Digital thinking’**

Visualisering, dataindhentning og databehandling,
versionsstyring, etik etc.

3. **‘Digital framing’**

En rammensættende disciplin
– evne til at omsætte et virkeligt (analogt) problem til et digitalt problem
(med passende løsningsmodel, tilvejebringelse og indsamling af data samt behandling og fortolkning heraf)



Draft: Learning Objectives – work in progress

oversættes på næste slide

1. Explain the concepts of digital literacy and computational thinking
2. Evaluate and discuss data, data sharing and its security, and understand its ethical basis
3. Demonstrate computational thinking and formulate an algorithmic perspective on creative problem solving
4. Create and exchange FAIR data and work with data analytics (visualization, data mining, statistical methods, uncertainty quantification, etc.)
5. Construct mathematical models of engineering problems
6. Develop computer programs to solve engineering problems using version control and repositories
7. Use and evaluate artificial intelligence, and understand its relation to human intelligence
8. Understand the uses and limitations of digital hardware and infrastructure
9. Critically evaluate digital outputs and put them in their social and physical context

Udkast til digitale læringsmål – et arbejdsdokument

1. Forstå og forklare begreberne i 'digital literacy' og 'computational thinking'
2. Evaluere og diskutere data, datadeling og sikkerhed forbundet hermed samt forstå grundlæggende etiske overvejelser og hensyn
3. Demonstrere evne til 'computational thinking' og formulere et algoritmisk perspektiv på en kreativ problemløsning
4. Skabe og udveksle FAIR data og arbejde med data-analyse (visualisering, datamining, statistiske metoder, usikkerhedsberegning etc.)
5. Konstruere matematiske modeller for ingeniørfaglige problemstillinger
6. Udvikle computerprogrammer til at løse ingeniørfaglige problemer ved hjælp af versionsstyring og repositories
7. Bruge og evaluere kunstig intelligens og forstå forhold mellem AI og menneskelig intelligens
8. Forstå brug af og begrænsninger ved digital hardware og infrastruktur
9. Kritisk evaluere digitale resultater og kunne sætte dem i social og fysisk kontekst

Hvor opnås de digitale kompetencer?

1) Nyt Polyteknisk grundlag giver første fundament for digitale kompetencer gennem 7 nye grundfagskurser:

Matematik og computer science

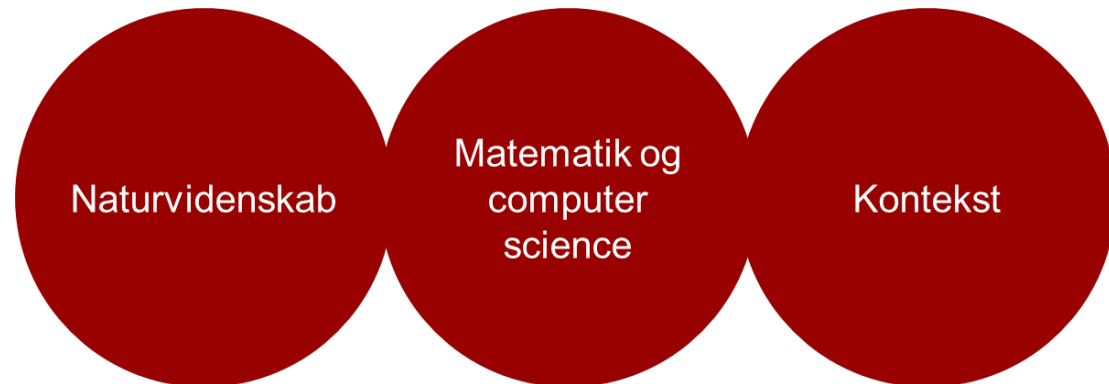
- Programmering
- IntroMat og Lineær Algebra
- Funktioner af flere variable
- Statistik

Naturvidenskab

- Grundlæggende Fysik
- Grundlæggende Kemi
- Interdisciplinær Bioengineering

Kontekst

- Viden og samfund



2) Fagspecifikke kurser og projekter

3) Extracurriculære aktiviteter

Hvad kan vi lære af andre?

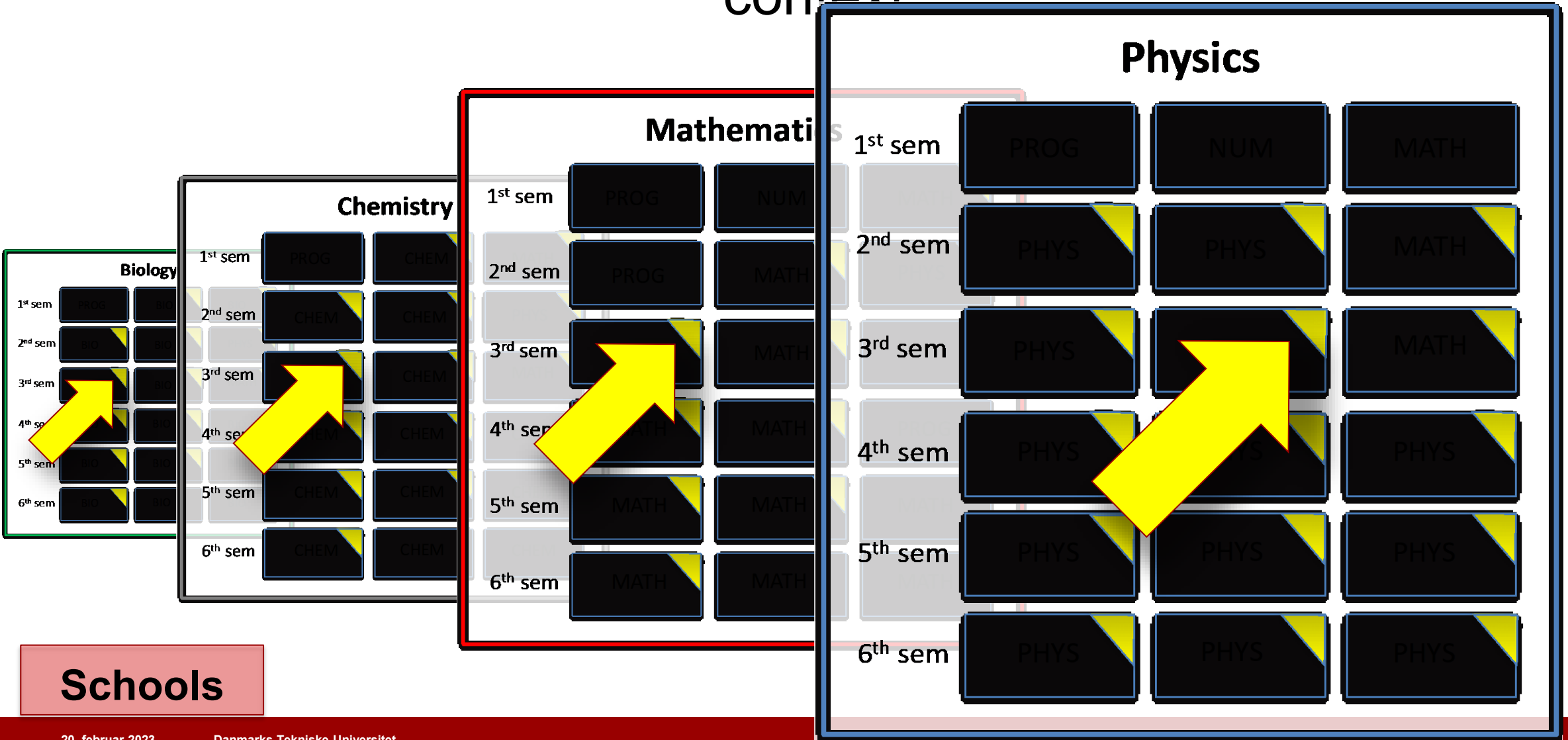
Oslo Universitet

Anders Malthe-Sørensen

Uddrag af
Anders Malthe Sørensens præsentation på
DTU's undervisningsseminar 8. november 2022
From do digital to be digital



At the University of Oslo, programming is integrated in all science study programs and adapted to the disciplinary context

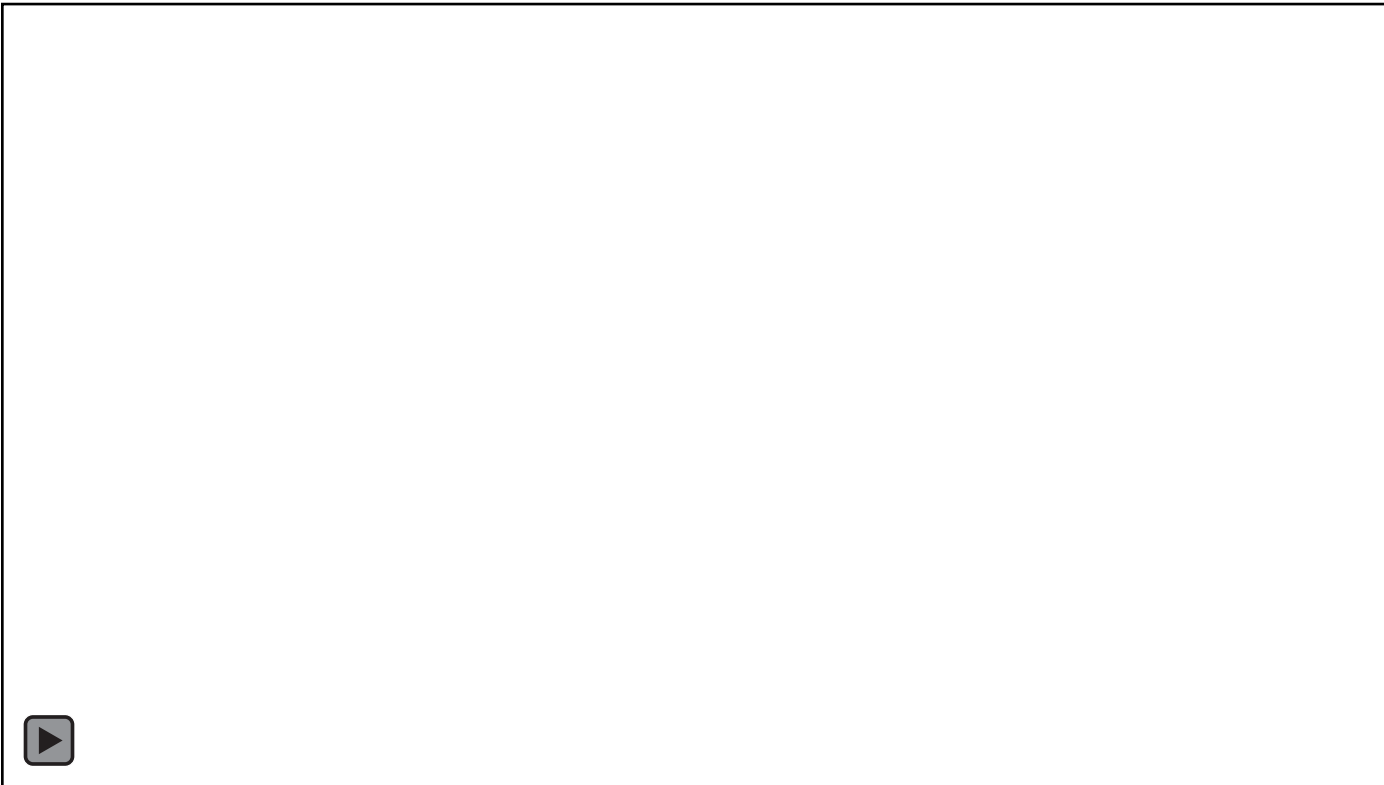


Schools

How does computing change education ?

– example from physics

Classical problems often only provide closed answers that do not open for discussions



$$\vec{F} = m \vec{a} = -m g \hat{j}$$

... we have the time derivatives ...

$$\frac{dy}{dt} = v \sin(\alpha) - g t$$

which we insert into (7.4):

$$y = v \sin(\alpha) t - \frac{1}{2} g t^2$$

$$= v \sin(\alpha) \frac{v \sin(\alpha)}{g} - \frac{1}{2} g \left(\frac{v \sin(\alpha)}{g} \right)^2$$

$$= \frac{v^2 \sin^2(\alpha)}{g} - \frac{1}{2} g \frac{v^2 \sin^2(\alpha)}{g^2}$$

$$= \frac{v^2 \sin^2(\alpha)}{2g}$$

It is proven that the geometric shape of the path of the javelin is a parabola, that is, a height y , using the curve describing the motion on the vertical axis as a quadratic relation in the horizontal position x .

Note that the parabolic shape is characteristic for ballistic motion when the acceleration is constant. If the motion takes some large deviation on the earth, the curvature is constant. If the motion takes some large deviation on the earth, the curvature is constant. If the acceleration of gravity is constant. In this case the path is heliopic and not parabolic, as we will see when we address gravitation.

Example: Maximum height and length of ballistic motion

Problem: A cannon fires a projectile with an initial speed $v = 400 \text{ m/s}$ at an angle α to the horizon. The cannon stands on the ground, and we assume that the ground is horizontal. This can happen at maximum. Find the angle α that gives the highest point of the projectile, the angle α that gives the maximum range of the cannon.

Strategy: In this problem we follow the motion of a projectile described by the initial velocity v as a function of time. We place the origin at the point where the projectile enters the cannon, and let the y -axis correspond to the vertical direction with positive direction upwards.

Model: The motion of the projectile is determined by the forces acting on the projectile. Since the projectile is only affected by air resistance, we have already found a motion of the projectile in Sect. 7. We can describe our motion here.

Analysis: The position of the projectile as a function of time is given in (7.4), which I compare with:

$$y(t) = v \sin(\alpha) t - \frac{1}{2} g t^2$$

$$y(t) = v \sin(\alpha) t - \frac{1}{2} g t^2$$

... path of the projectile for various firing angles α is illustrated in Fig. 7.3. How do we determine the highest point in the path?

In order to find the length of the shot, we need to find out when the projectile is in the ground. This occurs when $y = 0$, which gives us the time until the projectile is in the ground. We can use this time to find out how far the projectile has travelled horizontally before being ground.

First, we want to find the maximum height of the projectile. The height is given by $y(t)$, and we want to find the time t that corresponds to the maximum of $y(t)$. We will find this by calculating the maximum value of a function occurs when the derivative of the function is zero. However, in this case the derivative of the curve is a physical quantity as well, the derivative of $y(t)$, dy/dt is the velocity in the direction of the y -axis. The projectile therefore reaches its maximum height when its velocity in the y -direction is zero. That is, when

$$\frac{dy}{dt} = v \sin(\alpha) - g t = 0$$

we rearrange to solve for the time, t , giving the maximum height:

$$v \sin(\alpha) - g t = 0$$

$$v \sin(\alpha) = g t$$

$$t = \frac{v \sin(\alpha)}{g}$$

That is the maximum height! We find this by inserting the relation for the time, t , into (7.4):

$$y(t) = v \sin(\alpha) \left(\frac{v \sin(\alpha)}{g} \right) - \frac{1}{2} g \left(\frac{v \sin(\alpha)}{g} \right)^2$$

$$= \frac{v^2 \sin^2(\alpha)}{g} - \frac{1}{2} g \frac{v^2 \sin^2(\alpha)}{g^2}$$

$$= \frac{v^2 \sin^2(\alpha)}{2g} \left(2 - 1 \right) = \frac{v^2 \sin^2(\alpha)}{2g}$$

We find that the maximum height is reached for the angle α that makes this expression maximal. This occurs when $\sin(\alpha)$ is maximum, which occurs when $\alpha = \pi/2$. This corresponds to our intuition: if we want the cannon to fire as high as possible it should point the cannon straight upwards.

The second part of the exercise was to find the maximum length of the projectile, that is, for which angle α we get the maximum length. The projectile hits the ground for a time t_g when $y(t_g) = 0$. We insert this relation in the equation of motion (7.4):

$$y(t_g) = v \sin(\alpha) t_g - \frac{1}{2} g t_g^2 = 0$$

I want to solve this equation with respect to t_g to find the time it takes until the projectile hits the ground:

$$v \sin(\alpha) t_g - \frac{1}{2} g t_g^2 = 0$$

$$v \sin(\alpha) t_g = \frac{1}{2} g t_g^2$$

A possible solution to this equation is that $t_g = 0$ seconds. While this is a possible solution since the projectile starts at the ground at the time $t = 0$, it is not the time we are after here. We can therefore discard this solution, and divide by t_g both sides of the equation:

$$v \sin(\alpha) = \frac{1}{2} g t_g$$

$$t_g = \frac{2v \sin(\alpha)}{g}$$

So we know the time it takes until the projectile hits the ground, we can also find the horizontal position the projectile has, using the equation of motion for x defined in (7.4):

$$x(t_g) = v \cos(\alpha) t_g = v \cos(\alpha) \left(\frac{2v \sin(\alpha)}{g} \right)$$

$$= \frac{2v^2 \sin(\alpha) \cos(\alpha)}{g}$$

x distance the projectile travels, $x(t_g)$ is a function of the firing angle, α . The maximum of the distance occurs when the derivative of the distance with respect to α is zero:

$$\frac{d}{d\alpha} \left(\frac{2v^2 \sin(\alpha) \cos(\alpha)}{g} \right)$$

$$= \frac{2v^2}{g} \frac{d}{d\alpha} (\sin(\alpha) \cos(\alpha))$$

$$= \frac{2v^2}{g} (-\sin(\alpha) \sin(\alpha) + \cos(\alpha) \cos(\alpha))$$

Set it zero when $\alpha = \pi/4$. That is, the projectile reaches the maximum length on the firing angle is $\pi/4$.

What is the maximum length? We insert $\alpha = \pi/4$ into (7.18):

$$x = \frac{2v^2}{g} \sin(\pi/4) \cos(\pi/4) = \frac{2v^2}{g} \frac{1}{2} = \frac{v^2}{g}$$

$$x(t_g) = \frac{2v^2}{g} \cos(\alpha) \sin(\alpha)$$

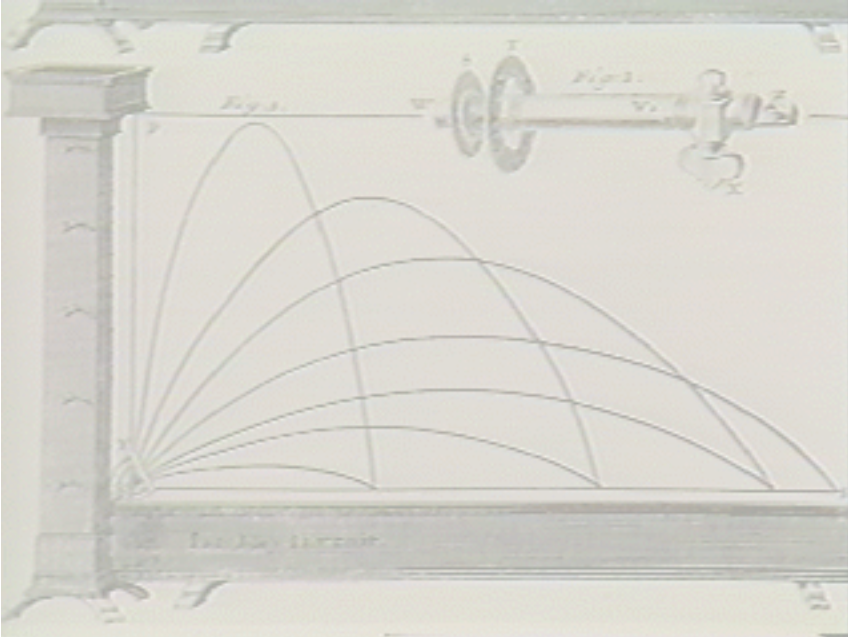


Instead we can teach the students the same content, but in a more open and motivating context.

How can you measure the velocity inside a tornado?

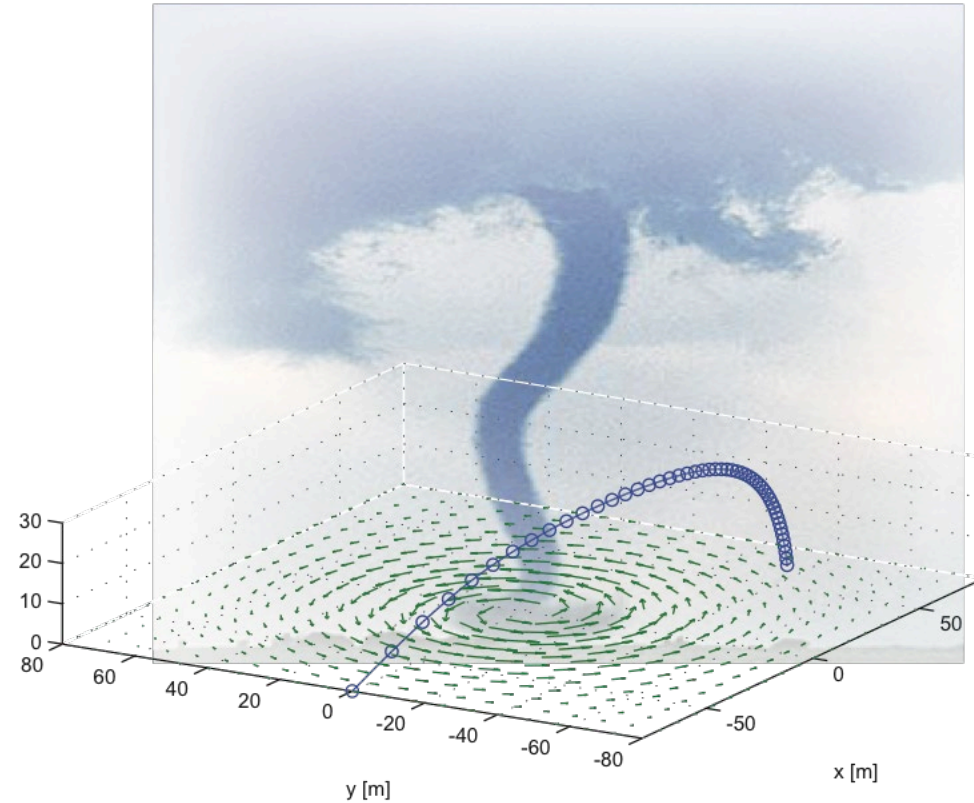
Students can find the path of a probe in a tornado

- because they know how to program



$$\vec{F} = m \vec{a} = -m g \hat{j}$$

Can be solved **without** programming



$$\vec{F} = m \vec{a} = -m g \hat{j} - D (\vec{v}(t) - \vec{w}(\vec{r})) |\vec{v}(t) - \vec{w}(\vec{r})|$$

Can **only be solved** with programming

Et udviklingsprojekt – hvad gør vi?

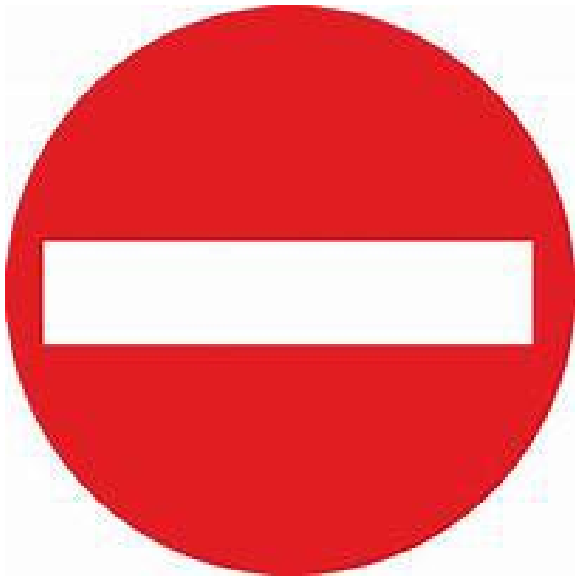
- Præsentation af digitale kompetencer på undervisningsseminar 8. november 2022
From do digital to be digital
- Implementering af Polyteknisk Grundlag fra E2023
- første skridt til et fundament for digitale kompetencer
- **Dialog med CUU, DUU** og andre kollegiale fora
- Drøftelse med DTU's Aftagerpanel
- Etablering af en visionsgruppe til løbende inspiration og sparring



Kurstyper/niveauer

Studiechef Jørgen Jensen

Kandidatkurser må ikke indgå i diplomingeniør- og bacheloruddannelsen



§ 16. Bacheloruddannelsen skal være et afrundet forløb, der bygger på det niveau, som den studerende har erhvervet i den adgangsgivende uddannelse.

Stk. 2. Universitetet tilrettelægger uddannelsesforløbet på en sådan måde, at den faglige sammenhæng og progression sikres.

og

” § 27. Kandidatuddannelsen skal være et afrundet forløb, der udbygger de kundskaber og den indsigt, som den studerende har erhvervet i bacheloruddannelsen [...]”

Uddrag fra struktur på Bacheloruddannelsen

Valgfrie kurser

I denne blok kan der frit vælges blandt de udbudte ~~civilingeniør~~ bachelor kurser, som udbydes på DTU samt tilsvarende kurser på andre universiteter, hvis der foreligger en forhåndsgodkendt merit. Der kan vælges op til 10 ECTS-point blandt kurser på diplomingeniørniveau (gældende fra 1. september 2020). Man kan vælge at tage de kurser, der ligger inden for rammerne af det anbefalede studieforløb på de enkelte bacheloruddannelser. Man kan også benytte valgfriheden til at følge kurser inden for videregående matematik, fysik eller kemi. Eller man kan vælge mere generelle kurser, fx inden for ledelse og økonomi. Endelig kan man benytte de valgfrie kurser til at ændre fokus i sin uddannelse, så man kvalificerer sig til kandidatuddannelser, som den valgte bacheloruddannelse ikke umiddelbart giver adgang til.

Nuværende opdeling – kursusbasen 2022/2023



Bachelor/BSc-kurser
ca. 350 stk.



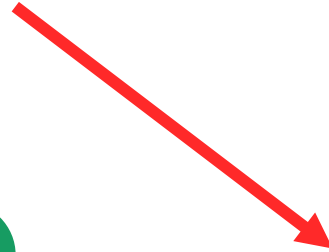
Kandidatkurser/MSc-
kurser ca 750 stk

Der er ca. 320 diplomkurser

Diplomingeniør- og bachelorstuderende udgør ca. 10% af deltagerne på kandidatkurser men fordelt på op til 1/3 af kurserne



Bachelor
(BSc)-kurser



Kandidatkurser
(MSc)-kurser

Oversigter over fordelingen af studerende på kandidatkurser

Kandidatkurser 2021/2022		Efter-uddannelse					I alt
Kursus-nummer	Kursusnavn	BEng	BSc	Gæst	MSc	I alt	
10122	Statistisk fysik		3		3	20	26
10200	Materialers struktur og dynamik studeret med røntgen og neutroner				1	12	13
10255	Avanceret 3D Røntgen imaging					0	0
10302	Elektronstrukturmetoder i materialefysik, kemi og biologi					22	22
10304	Eksperimentel overfladefysik				2	6	8
10314	Magnetisme og magnetiske materialer				2	19	21
10315	Magnetisme og magnetiske materialer - med projekt					5	5
10316	Materialeredesign med maskinlæring og kunstig intelligens		10			27	37
10318	Mangepartikel metoder i faststoffysik					8	8
10321	Nanosystemteknologi				1	18	19
10325	Kvantemekanisk modellering af nanoelektronik					7	7
10333	Fysikken i vedvarende energi		3		6	19	28
10337	Teoretisk mikrofluidik					7	7
10339	Begreber i heterogen katalyse og anvendelser indenfor energi		1		4	5	10

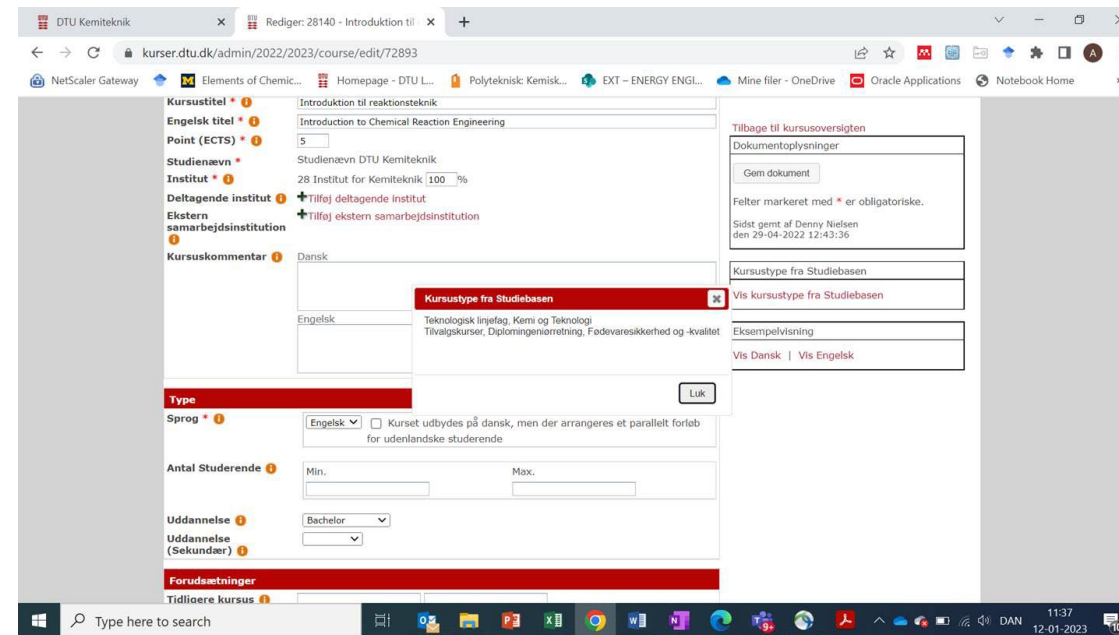
Kandidatkurser 2021/2022		Efter-uddannelse		I alt
Kursus-nummer	Kursusnavn	BEng	BSc	I alt
22257	Præktisk lægemiddeludvikling		4	4
22281	Biomaterialer			
22283	Molekylær termodynamik, transport og analyse			
22435	Medikoteknisk produktudvikling			
22436	Avanceret medikoteknisk produktudvikling		3	3
22446	Engineering World Health Sommerskole i medicoteknisk instrumente		13	13
22475	Vævs- og bevægeapparatets biomekanik DTU			
22485	Medicinske billedsystemer		1	1
22488	Avanceret ultralydsbilleddannelse		1	1
22506	Magnetisk resonans i medicinsk billeddannelse		2	2
22507	Avancerede emner indenfor Magnetisk Resonans billeddannelse		1	1
22508	Praktisk NMR spektroskopi: Synliggør reaktioner i (bio)kemiske systemer	3		3
22511	Bio-medicinsk optik		1	1
22512	Optiske biosensorer		2	2
22525	Medicinsk billedanalyse		6	6
22530	Computerintensiv strålingsdosimetri			
22603	Lysmikroskopi for life science		1	1
22652	Eksperimentelt projekt i Fysik og Nanoteknologi			
22700	Effective Science Communication		3	3
23101	Introduktion til fødevarerproduktionskæder		2	2
23102	Fødevarer sikkerhed i produktionskæder		1	1
23151	Aquatic food primary production: Fishery and aquaculture		1	1

Kandidatkurser 2021/2022		Efter-uddannelse					I alt
Kursus-nummer	Kursusnavn	BEng	BSc	Gæst	MSc	I alt	
42500	Innovation in Engineering		8	1	15	1036	1060
42502	Facilitating Innovation in Multidisciplinary teams	3			4	149	156
42504	Innovation in Engineering		9		3	319	331
42505	Facilitating Innovation in Multidisciplinary teams				2	91	93
42543	Ledelse af bæredygtige organisatoriske forandringer	4	2		9	250	265
42554	Social Entrepreneurship: Theory and Practice	2				5	7
42575	Teknologi og Innovationsledelse			1	2	239	242
42576	From Analytics to Action				18	173	191
42577	Introduktion til Business Analytics		23	1	14	200	238
42578	Advanced Business Analytics		1		4	124	129
42634	X-Tech Entrepreneurship				19	439	458
42879	Beslutningsstøtte og strategisk vurdering	3	1		21	156	181
46100	Introduktion til mikrometeorologi for vindenergi				5	20	25
46110	Grundlæggende Aerodynamik		3		4	28	35
46115	Turbulensmodellering CFD				1	11	12
46200	Planlægning og udvikling af vindmølleparker		1		8	95	104
46205	Feasibility-studier af energiprojekter	2	3		3	149	157
46211	Offshore vindenergi				17	53	70
46230	Balancering af elsystemer med storskala vindkraft		1		1	107	109
46300	Vindkraft og aeroteknologi		1		22	93	116
46310	Aeroelasticitet for vindmøller				2	34	36
46320	Vindmøllelaster, -aerodynamik og -kontrol					38	38

Opgave til studienævnene ved revision af kursusbasen

Validér kursusniveau på kurserne!

Benyt fremsendte oversigter som hjælp og vær opmærksom på kursernes nuværende placering i uddannelserne



DTU Kemiteknik x Rediger: 28140 - Introduktion til x +

kursus.dtu.dk/admin/2022/2023/course/edit/72893

NetScaler Gateway Elements of Chem... Homepage - DTU L... Polyteknisk; Kemisk... EXT - ENERGY ENGL... Mine filer - OneDrive Oracle Applications Notebook Home

Kursustitel * Introduktion til reaktionsteknik

Engelsk titel * Introduction to Chemical Reaction Engineering

Point (ECTS) * 5

Studienavn * Studienavn DTU Kemiteknik

Institut * 28 Institut for Kemiteknik 100 %

Deltagende institut * Tilføj deltagende institut

Ekstern samarbejdsinstitution * Tilføj ekstern samarbejdsinstitution

Kursuskommentar * Dansk

Kursustype fra Studiebasen * Teknologisk linjefag, Kemi og Teknologi
Tilvalgskurser, Diplomingeniørretning, Fødevareresikkerhed og -kvalitet

Type

Sprog * Kurset udbydes på dansk, men der arrangeres et parallelt forløb for udenlandske studerende

Antal Studerende * Min. Max.

Uddannelse * Bachelor

Uddannelse (Sekundær) *

Forudsætninger * Tidligere kursus

Tilbage til kursusoversigten

Dokumentoplysninger

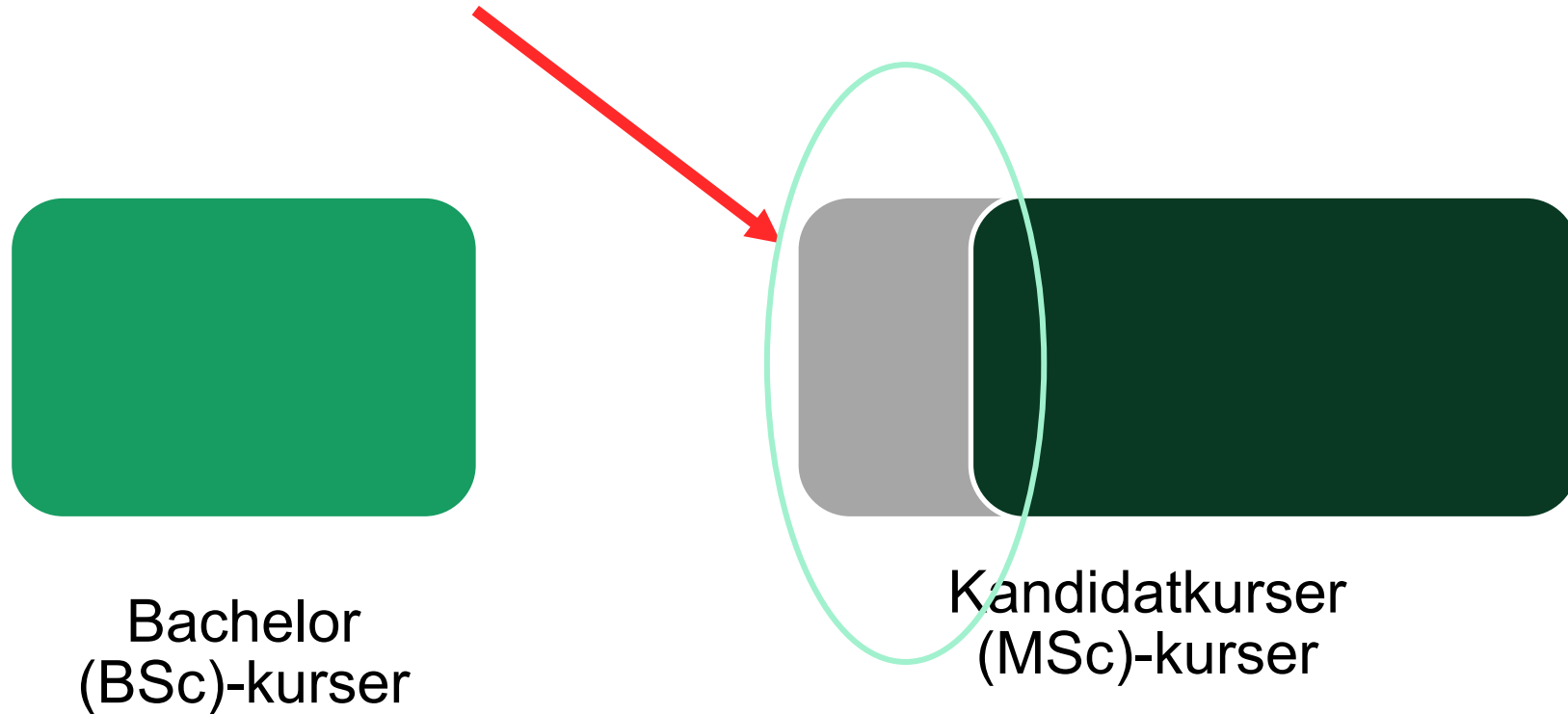
Felter markeret med * er obligatoriske.

Sidst gemt af Denny Nielsen
den 29-04-2022 12:43:36

Kursustype fra Studiebasen

11:37
12-01-2023

Studielederne vurderer, hvilke kandidatkurser der for deres uddannelser kan betragtes som værende på bachelorniveau



Og laver lister ...

Tilvalgskurser på diplomingeniøruddannelsen

Tilvalgskurser

Nedenstående kurser er allerede forhåndsgodkendt. En del af kurserne har kursustypen kandidatkursus, men er godkendt på bachelorniveau for studerende på diplomingeniøruddannelsen i elektroteknolog. På grund af disse kursers faglige niveau er de hovedsageligt henvendt til studerende, som i tillæg til studieplanens professionsrettede kurser søger teoretiske udfordringer på et højere niveau.

34746	Robust og fejltolerant regulering	10 point	F1 (man 8-12, tors 13-17)
34747	Digital regulering	10 point	E5 (ons 8-17)
34748	Modellering for drift og overvågning af komplekse industrielle processer	5 point	F5A (ons 8-12)
34753	Robotteknik	5 point	E4A (tirs 13-17)
34754	Autonome robotsystemer	5 point	Januar
34756	Avancerede Autonome Robotter	10 point	F4 (tirs 13-17, fre 8-12)

Tilføjelse til beskrivelsen af valgfrigruppen på BSc

Disse kurser kan indgå som bachelorkurser i valgfriblokken på bacheloruddannelsen i Elektroteknologi:

31070	Hands-on microcontroller programming	5 point	June
31200	Fundamentals of acoustics and noise control	5 point	Autumn E3A (Tues 8-12)
31220	Electroacoustic transducers and systems	10 point	Autumn E2 (Mon 13-17, Thurs 8-12)
31221	Nonlinear transducers	5 point	January
31241	Building acoustics	5 point	Autumn E2A (Mon 13-17)
31383	Robotics	5 point	Autumn E4A (Tues 13-17)
31385	Autonomous robot systems	5 point	January
31386	Building dependable robot systems	5 point	Spring F3B (Fri 13-17)
31415	RF communication circuits	10 point	Autumn E2 (Mon 13-17, Thurs 8-12)
31632	Integrated analog electronics 2	5 point	Spring F4A (Tues 13-17)
31633	Design and layout of integrated CMOS circuits	5 point	June

Nuværende opdeling – kursusbasen 2022/2023



Bachelor/BSc-kurser
ca. 350 stk.



Kandidatkurser/MSc-
kurser ca 750 stk

Der er ca. 320 diplomkurser

Forventet fremtidig opdeling



Bachelor (BSc)-
kurser



Bachelor(BSc)/kandidat(MSc)-
kurser



Kandidatkurser
(MSc)-kurser

Udvalgets bemærkninger til:

- klacifisering af bachelorkurser på kandidatniveau
- ny kursustype

Eventuelt