Teaching staff meeting
Physics and Astronomy BSc JD

Chase Broedersz

Agenda

- Program updates (Chase Broedersz)
- Finances (Sape Kinderman, director of education College of Sciences)
- Evaluations (Ben Freivogel, Chair program committee)
- Visible Learning Trajectories (Chase Broedersz)
- Active and engaging learning practices (Nathalie Degenaar and Sander Mann)

Graduation and influx

Diploma’s

’25 record number: **100**

’26 ? , but 118 BSc projects registered

Influx

	’25/‘26	’26/‘27
P&A	130	-15% (prognosis)
P&M	26	

Dropout rates (within 1 year)

27% (5 year average)

National Student Survey

New assessment

Evaluations and

mechanisms (Be

Learning traje

(Chase)

Active Lear

(Nathalie and Sander)

Ranglijst Natuur- en sterrenkunde

	Feiten				Prestatie		Oordelen						
	Voertaal	Opleidingsvorm(en)	Numerus fixus?	Instroom	Doorstroom naar jaar 2	Diploma na 4 jaar	Inhoud	Docenten	Toetsing	Voorbereiding loopbaan	Sfeer	TOTAALSCORE	OORDEEL
Natuur- en sterrenkunde													
Amsterdam UvA	nl	vt	nee	147	•	•	+	+	+	+	+	72	★★★★☆
Amsterdam VU	nl	vt	nee	147	•	•	+	+	+	+	+	72	★★★★☆
Leiden UL - natuurkunde	nl	vt/dt	nee	84	-	-	+	+	+	+	+	67	★★★★☆
Utrecht UU	nl	vt	nee	169	•	•	+	•	+	•	•	67	★★★★☆
Nijmegen RU	nl	vt	nee	134	-	-	+	•	+	•	+	66	★★★★☆
Groningen RUG - natuurkunde	en	vt	nee	156	+	-	•	+	•	•	+	65	★★★★☆
Leiden UL - sterrenkunde	nl	vt	nee	129	-	-	•	•	+	-	•	57	★★★☆☆
Groningen RUG - sterrenkunde	en	vt	nee	96	•	-	-	•	-	•	•	52	★★☆☆☆
Technische natuurkunde													
Enschede UT	nl	vt	nee	44	-	•	++	++	+	+	++	79	★★★★½
Eindhoven TU/e	en	vt	nee	199	-	•	+	•	+	•	+	66	★★★★☆
Delft TUD	nl	vt	nee	217	-	-	•	•	+	•	•	61	★★★☆☆
Groningen RUG	en	vt	nee	53	•	--	•	•	•	•	+	61	★★★☆☆

Voor toelichting en bronnen zie de icoontjes bovenaan deze tabel, de leeswijzer, de verantwoording, of de methodiek.

- = ondergemiddeld, • = gemiddeld, + = bovengemiddeld

Programme

B Natuur- en Sterrenkunde			Natuurkunde (Ba)		Sterrenkunde (Ba)	
UvA/VU	UU	RUN	UL	RUG	UL	RUG
Study guidance	89.4	63.9	82.7	79.3	79.2	81.7	72.6
Availability of guidance	91.8	75.0	85.7	80.0	82.1	80.3	78.4
Quality of guidance	86.6	50.7	78.9	78.4	75.7	83.3	65.8

AI workshop (April 30 2026)

Defence

- Two-lane approach
- Mitigating offload risks

Offence

- Learning activities
- Operational and theoretical GenAI LTOs

Points of attention for the program in ’26/‘27

- AI in education
- Student recruitment
- Practicum
- Honors program

- PhD TA coordination
- Active learning and student presence
- Launching and implementation

Visible Learning Trajectories

Antonija Oklopčić
Honors coordinator

Overview finances CoS and P&S

Sape Kinderman

Director of Education CoS

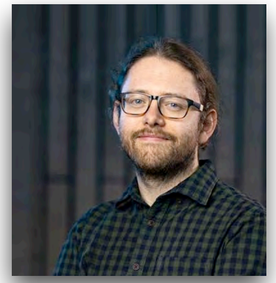
Feedback Mechanicsms

Ben Freivogel

Chair OCNS

Visible Learning Trajectories N&S BSc
Launch date: September 2026

Classical Particles & Fields



John Sheil (VU/ARCNL)

Quantum Physics

Auke Pieter Colijn (UvA/IHEF)

Many Body Physics

Charusheela Ramanan (VU/LaserLab)

Research Skills & Academic attitude

Professional Skills & Attitudes

Joshua Dijksmam (UvA/WZI)

Astronomy

Nathalie Degenaar (UvA/API)

Mathematical & Computational Skills

Philippe Corboz (UvA/ITFA)

Classical Particles & Fields

Quantum Physics

Many Body Physics

Astronomy

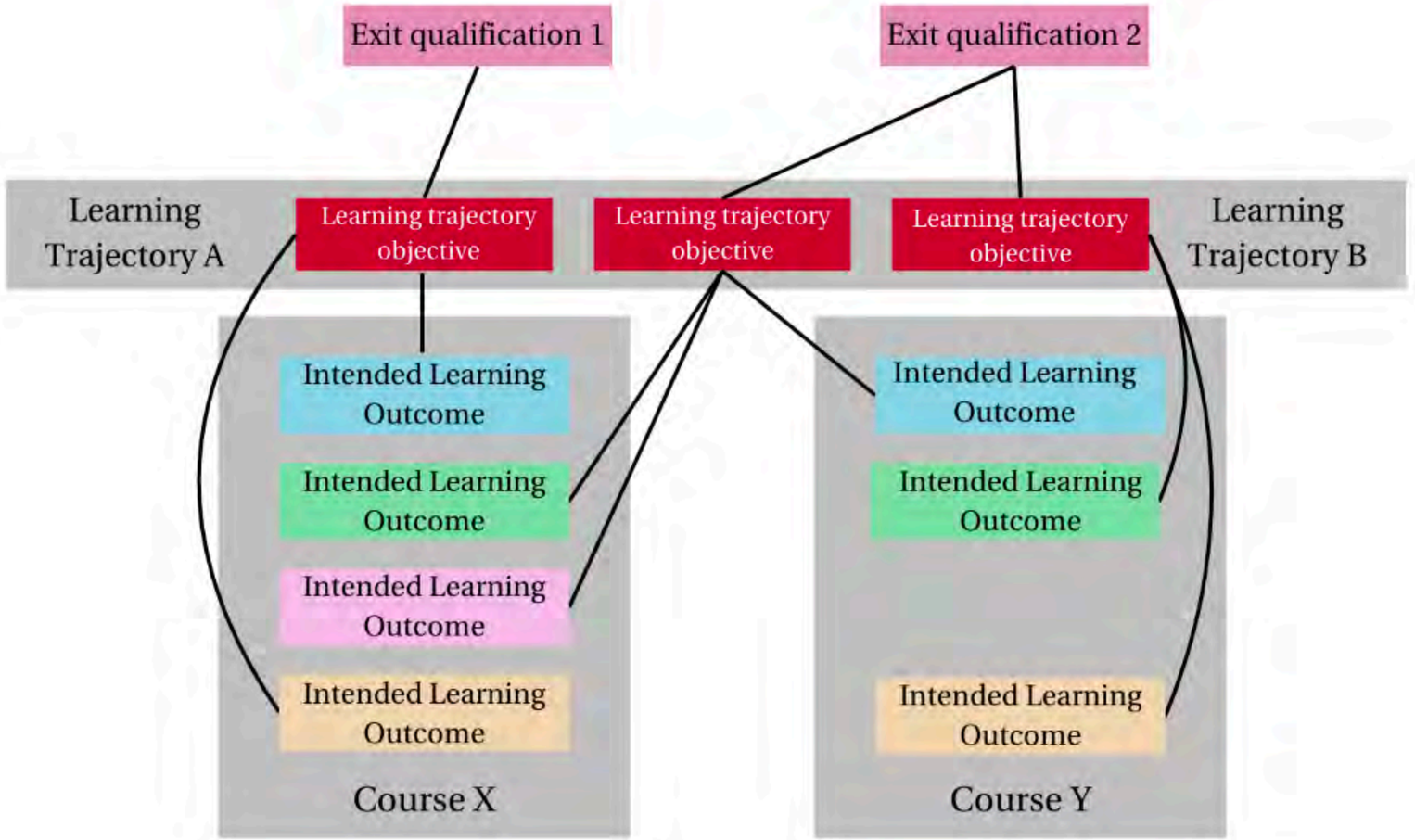
Mathematical & Computational Skills

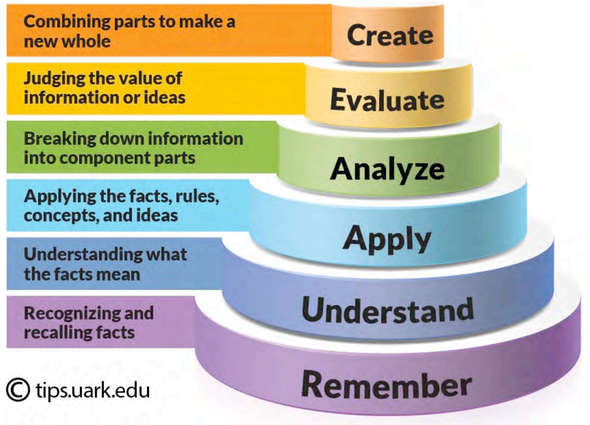
Professional Skills & Attitudes

Research Skills & Academic attitude

Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
Calculus 1 (3)	Lineare algebra (6)	Trilligen en golven (3)	Calculus 2 (6)	Quantumfysica 1 (6)	Project N&S 1 (4)
Klass. Mech. 1/Spec. Rel. T (6)	Sterrenkunde 1 (6)	Data analyse en statistiek (3)	N&S Practium 1 (3)	Elektriciteit en magnetisme (6)	
Inleiding programmeren (3)			Thermische fysica (3)		
Academische vaardigheden en tutoraat (2)					
Wiskunde N2 (6)	N&S Practicum 2 (6)	Quantum concepten (3)	Quantumfysica 2 (6)	Statistical Physics (6)	Numerical statistical physics (3)
Astrophysics (6)	Electrodynamica (6)	Research practicum (3)	Optica (3)	Physics of Sustainable Energy	Reflectie op natuurkunde (3)
Condensed Matter (6)			Klass. Mech. 2 (3)	Planetary systems (6)	
				Elementary (astro)particle Physics (6)	
Professional skills and career planning (3)					
Advanced quantum physics (6)	Atomic physics (6)	Workshop Physics & Astronomy (6)	Advanced Electrodynamics and Special Relativity (6)	Bachelor Project (15)	
Introduction to cosmology (6)	Many-body Physics (6)	*Orientation on education (6)*	Light-Matter Interactions (6)		
Fluids and soft matter	Physics of Life (6)		Mathematical Methods 3 (6)		
History and Philosophy of Science (6)	Standard model of elementary particles (6)		Cosmology and Black Holes (6)		
Astronomical observation lab					

Visible Learning Trajectories N&S BSc





Visible Learning Trajectories tool

Students and teachers gain insights such as:

- What do you learn in this course and at what level?
- How does this course connect to what you learned before?
- How does a subsequent course build upon this?

Recommendations

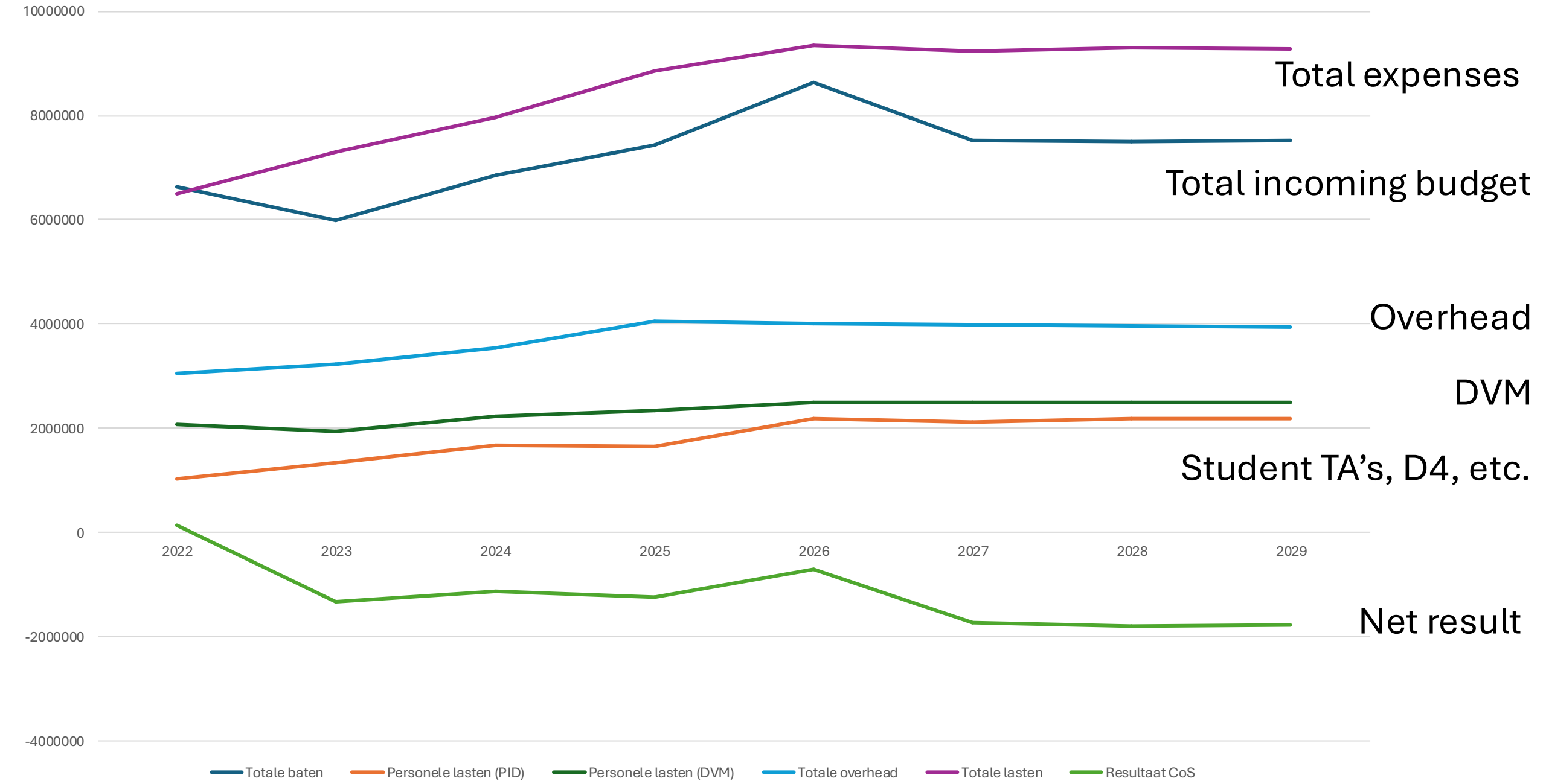
- Maintain a permanent Learning Trajectory (LT) coordination team with sufficient time and resources.
- Hold an annual curriculum review meeting (before the Study Guide revision cycle).
- Align teaching and assessment with revised Intended Learning Outcomes (ILOs) and Bloom’s taxonomy.
- Improve alignment between related courses and strengthen coherence across learning trajectories.
- Review course sequencing to ensure logical progression of knowledge and skills.
- Strengthen research and professional skills throughout the curriculum.
- Reassess the Quantum curriculum, including opportunities to streamline elective offerings.
- Expand computational physics education, including consideration of a dedicated elective.
- Better integrate astronomy across the programme and strengthen links with core physics, data science, and HPC.
- Enhance statistics and programming education to meet the demands of modern astronomy.

Active learning

Nathalie Degenaar

Sander Mann

Budget Overview College of Sciences 2022 – 2029



Total expenses

Total incoming budget

Overhead

DVM

Student TA's, D4, etc.

Net result

Bachelor Physics and Astronomy

Overview teaching personnel

Student TA's, D4/D3

DVM: Staff and PhD

External

Measure 1: Lower student TA's, increase DVM

Note: # Student TA's already lowered by ~ 5 fte through current measures!

Bachelor Physics and Astronomy

Income and expenses / EC

DVM in hours / EC

Measure 2: Reorganize or discontinue courses with < 25 students.

Reshape the curriculum if necessary.

First year students

students finishing year 1

students graduating within 3 years

students graduating within 4 years

Measure 3: Work on:

- ***Study success in year 1***
- ***Study progress overall***

Course Evaluation Issues

Program Committee (OC) : 5 Students, 5 Staff.

Tasks:

- Advise program director, communicate with faculty and students
- Approve/comment on regulations (OER), …
- Major task: discuss courses, read course evaluations, give feedback.

New course evaluation system starting ~ 1 year ago: disaster
Response rates often < 10%
Faculty-wide problem

Solutions

For now: rely on SRS system

- First year: students `required' to attend, works well*
- Higher years: years of failed attempts to get students to attend voluntarily.
- Past year: OC students helped collect feedback during exercise sessions. Works well but time intensive -> only a few key courses evaluated.

Better solution: shorter, easier evaluation form. Hopefully coming soon from UvA central.

Request to Teachers

Please get students to fill out evaluation forms.

Suggestion: in last lecture, allot 15 minutes for this.

If you collect feedback in another way, please share it with us. (Email me or Secretaris-OCNS-FNWI@uva.nl)

More generally: Our job to connect education to faculty.

Staff members: Iddo Heller, Sander Mann, Rasjied Sloot, Jory Sonneveld, Ben Freivogel

Retaining our students

Activating learning in the BSc Physics & Astronomy

Nathalie Degenaar, API | Part of SKO project

In close collaboration with:

Julia de Graaf & Bel Wood (students BSc program committee - OC)

Nina Scheres & Emma Wiersma (FNWI Teaching & Learning Centre - TLC)

The problem: Dropout rates

Our yearly intake:

>150 highly motivated students

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After three years:

25–40% have dropped out

Dropout concentrated in year 1

The problem: Dropout rates

Our yearly intake:

>150 highly motivated students

How do we keep the initial curiosity alive?

After three years:

25–40% have dropped out

Dropout concentrated in year 1

What do teachers experience?

Who recognizes the following?

Students forgot prior knowledge (from school, a previous course)

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Who recognizes the following?

Students forgot prior knowledge (from school, a previous course)

Students only care about what they'll get at the exam

Attendance of the TA classes (werkcolleges) is very poor

What our students tell us

Lowest scores in course evaluations:

Receiving sufficient feedback on learning

Stimulated to actively participate

+ No strong incentive to participate in the TA classes

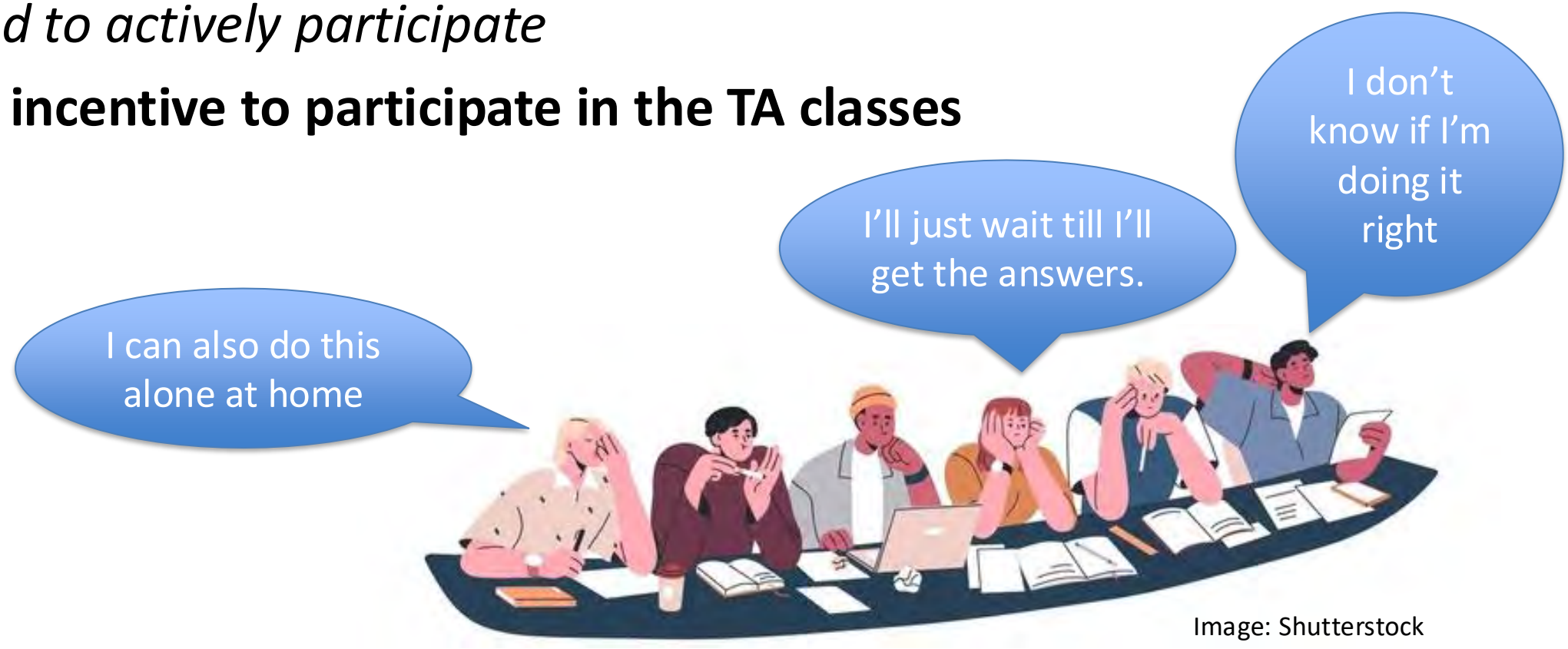

Image: Shutterstock

Impact and what we can do

Research shows student success and retention is strongly impacted by:

Active learning along a course*

Cohort feeling/formation

==> TA classes are great for this!

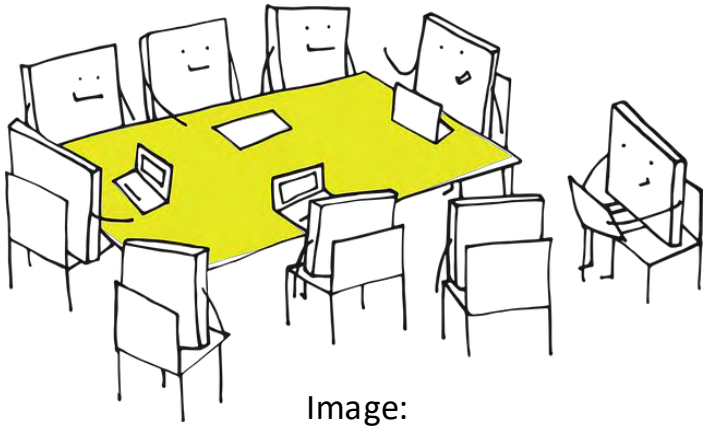

Image:
Manfredsteger via Pixabay

** Active learning = students think actively about, discuss, apply or explain material during class rather than just listening*

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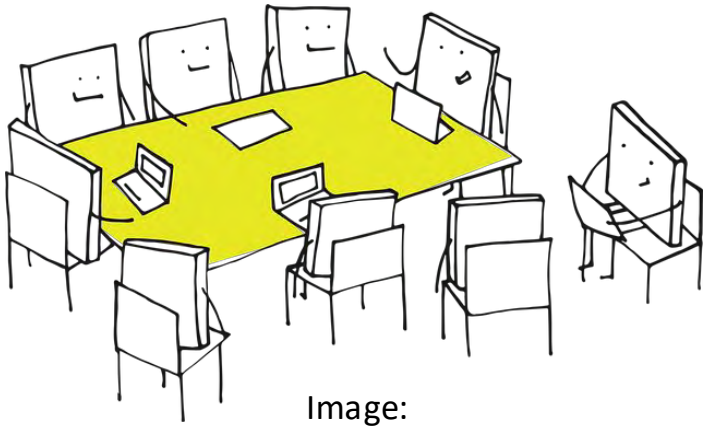


Image:
Manfredsteger via Pixabay

Key challenges:

How can we design our teaching so that students start learning early?

How can we get students to attend the TA classes?

Active learning: What do you think?

What comes to your mind when talking about active learning?

Who consistently implements this in their courses?

What are reasons not to think about / implement active learning?

Difficult to know what to do or where to start?

Sounds like a significant time investment?

How much time would it take?

Active learning: What if...

...investing 0.5-1 hr per week during your course
can already have a huge impact.

Would this be reasonable? Who would be up for this?

Student story and their proposed idea

From discussions with students about active learning:

TAs make all the difference in a TA class!

- If TAs are active, students are too
- If TAs connect to students, they feel connected

Students propose:

Simply a structured TA class!

- fixed features (start, end, break)
- active learning elements

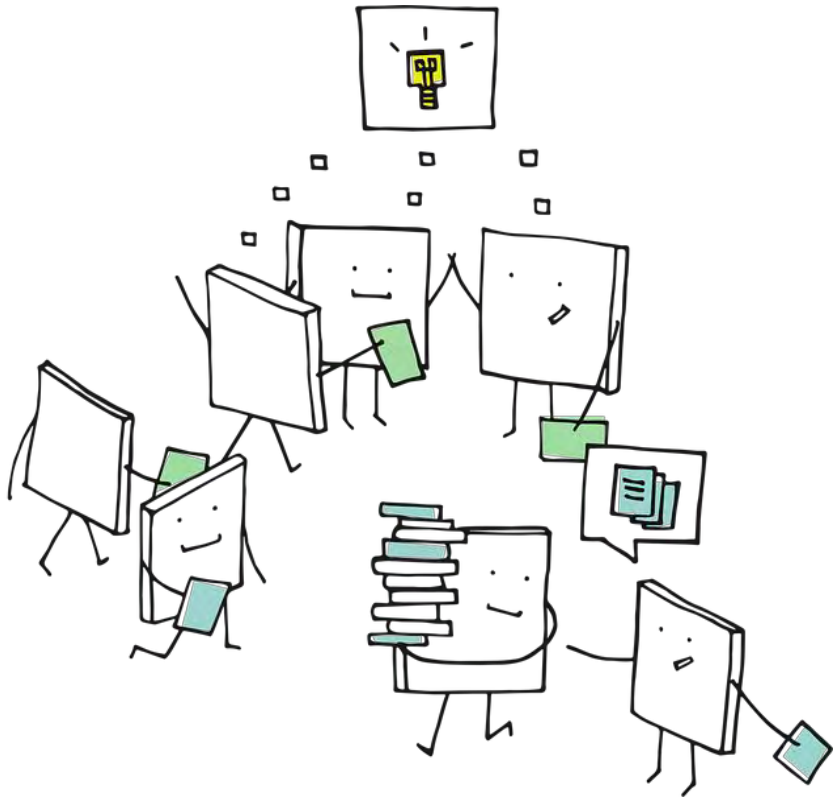


Image: Manfredsteger via Pixabay

A plug-and-play tutorial template

Students developed a very simple concept of a fixed basic structure for TA classes:

1. Joint start (~5-10 min):

Welcome = personal attention

Recap lecture = activate prior knowledge

2. Action:

Kick off jointly by discussing an example exercise / strategy

Working on exercises, moments of prompting / checking in / activities, time guidance

3. Joint end (~5-10 min):

Brief recap TA class, exit ticket

Simple activities: It does not have to be hard

Examples for starting

- Ask students to recap
- Quiz questions on lecture

Core activities

List of ideas by OC students

New TLC website coming!

Examples for closing

What was hardest or is still unclear? → Input next lecture

Werkcollege: *vak* WC *nr.*	**Docent: *Naam***	
Doel van het werkcollege:	lesdoelen	
Onderdeel	**Tijdsduur**	**Activiteit**
1. Klassikale introductie / activatie	# min	**Vast onderdeel**: Recap van hoorcollege
2a. Kerndeel 1	# min	**Klassikale start kerndelen**
Pauze	# min	
2b. Kerndeel 2	# min	**Klassikale wrap-up kerndelen**
3. Klassikale afronding	# min	**Vast onderdeel:** Recap van het werkcollege

Requirement for success: Role of coordinator

The template is just a scaffolding for TAs. As a coordinator:

- *You* set the direction and define the structure
- *You* choose the template the TAs work with
- *You* provide clear instruction, motivation and support of your TA team

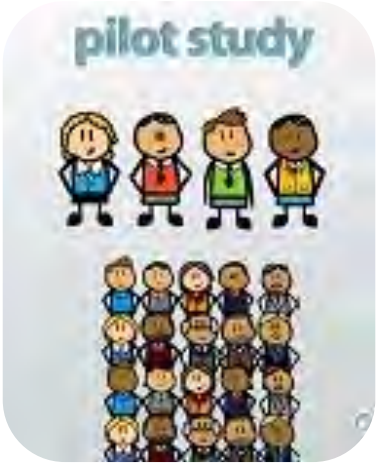
Coordinators have full leadership and ownership

Success relies on teacher ownership

Running a pilot

Pilot for Sterrenkunde 1 running next academic year (block 2).

Looking for 1–2 course coordinators to join the 2026/27 pilot.

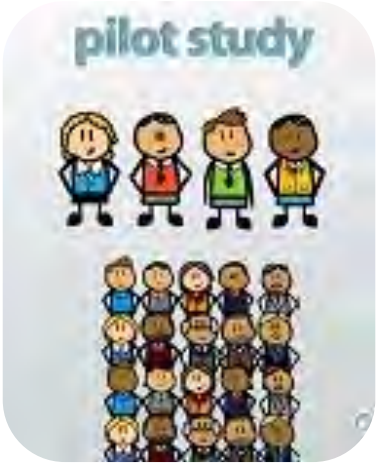


Pilot: What would be expected of you?

- **Setting the template:** you drive this small adaption in your course
  Investment: 0.5 hr creating template per TA class

- **Briefing TAs for each class:** explain how to use the template each time
  Investment: 0.5 hr meeting with TAs per class

- **Learn and evaluate:** monitor and adjust with the pilot group/TLC
  Investment: 3 x 1 hour meeting with project team



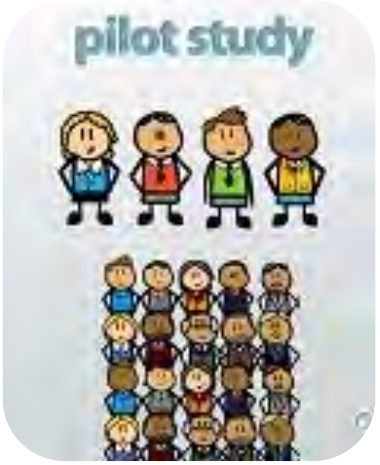
Total expected time investment: 10 hours *in total* (spread over ~ 10 weeks!)

Pilot: What would be offered to you?

- **Kick-off and mid-term session with TLC + OC students**
  Help designing your TA templates (~1 hour each)

- **TLC implements template in TA trainings**

- **Evaluation session with TLC + OC students**
  How did it go? What did (not) work? (~1 hour)



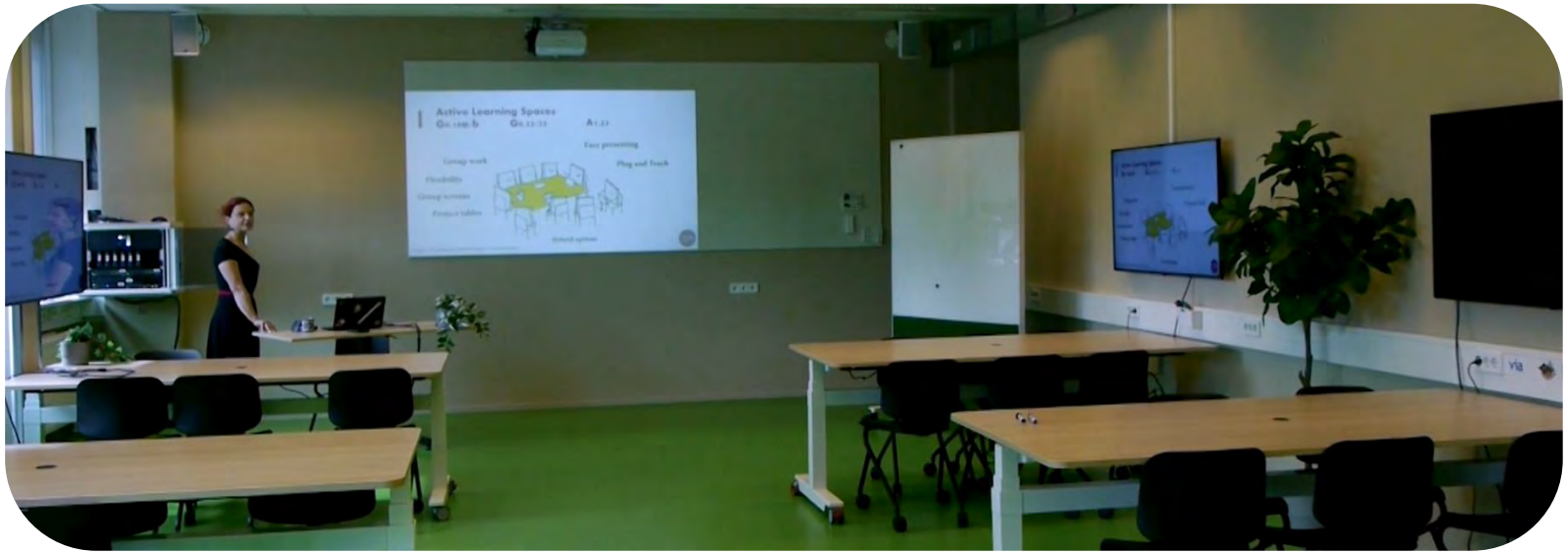
Part of a bigger faculty effort

- **Active learning spaces @ FNWI**

- **TLC STEM active learning guide** to be launched soon

  Big and small ideas, completely tailored to your situation

  (class size, class type, your teaching style)



Running the pilot

Pilot for Sterrenkunde 1 running next academic year (block 2)

Looking for 1–2 coordinators to join with their courses*

Who joins me?

Total expected time investment: 10 hours *in total* (spread over ~ 10 weeks!)

Take aways

1. Active learning and cohort feeling: promote student success & retention

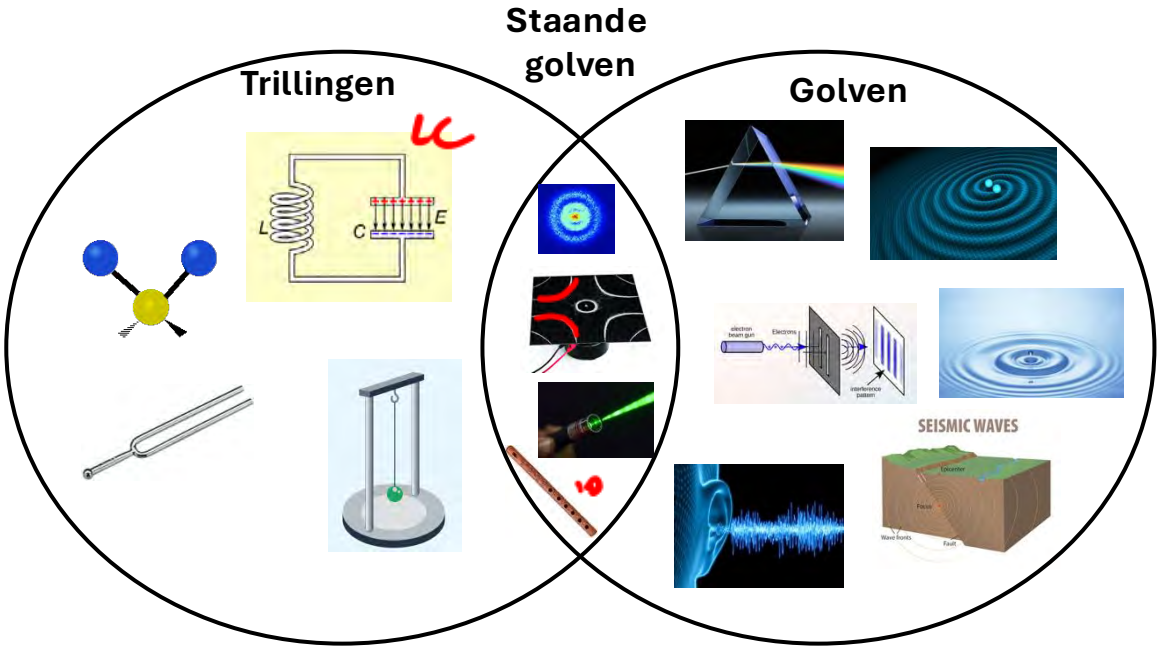
2. TA classes make all the difference, we can gain a lot!

3. Implementing active learning in TA classes does not have to be hard

Concept template and list of learning ideas available; please pass by

Questions or feedback welcome, please come to talk or degenaar@uva.nl

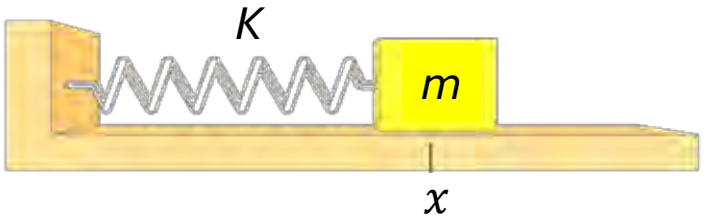
UNIVERSITY OF AMSTERDAM
Institute of Physics



Active learning in Trillingen & Golven

Sander Mann
s.mann@uva.nl

About trillingen & golven (waves & vibrations)



Objectives:

- to solve harmonic oscillators (free, damped, and coupled);
- to derive and use the wave equation and describe phenomena like beating and reflection;
- to apply Fourier theory and use complex solutions.

General info:

- 185 students signed up, about 135 made the exam.
- Year 1, period 3 (4 weeks);
- 2 lectures and 2 tutorials per week;
- 1 final exam.

Changes in 2025 towards active learning

Before 2025, structure was “traditional”: 2 lectures + 2 homework classes. Tutorial attendance was low.

In 2025, with the help of Nina Scheres (TLC), Marcel and I implemented changes to tutorial sessions to activate:

- Tutorials remain homework classes;
- Each TA opens their tutorial sessions with a recap/Wooclap quiz;
- Students work in groups to make one assignment on a large sheet, followed by whole-class discussion.

Evaluation:

1. Wooclap recap was evaluated very positively;
2. Large-sheet assignment was not (little added value);
3. Complaints that there was not enough time left to make homework with both exercises;
4. Crucially: students did not really grasp material. An exam question slightly different from what they had seen before (for example, u and p instead of x and v) led to deluge of complaints.

Implemented changes in 2026

(Interrelated) goals for 2026:

1. Tutorial attendance goes up;
2. Students can track their progress;
3. The passing percentage on exam of similar difficulty goes up;
4. Students understand that harmonic oscillators can be found almost everywhere (which is why it is a prominent course), and know how to set up the equation of motion in different contexts.

Implemented changes:

- Homework largely becomes *home*work;
- There is a weekly Canvas quiz (for bonus points) to track progress in understanding;
- One of the tutorial sessions per week is an active group exercise that targets 4.
- I state explicitly in the first lecture that the tutorial sessions cover exam material not repeated elsewhere.

New tutorial structure

Tutorials every week:

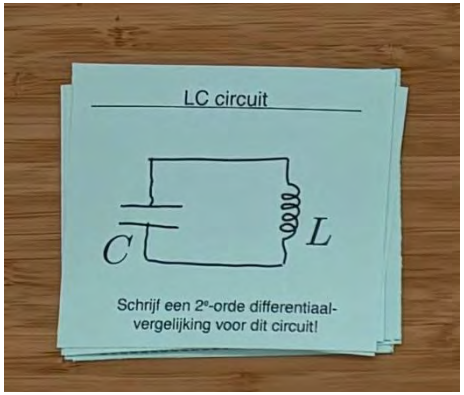
Tutorial 1

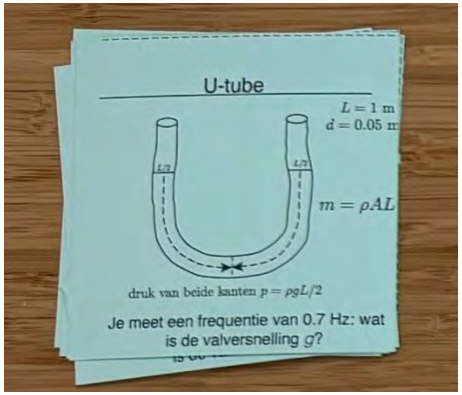
- Canvas quiz (15 min)
- Whole-class discussion of quiz
- Questions about last week's homework, or working on this week's homework.
- Whole-class discussion of a problem.

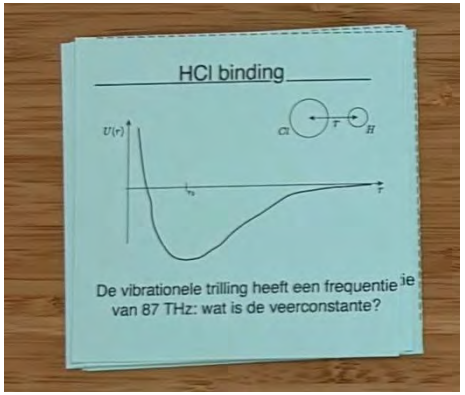
Tutorial 2

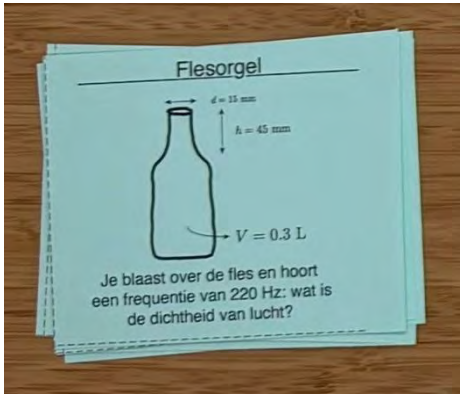
- Active learning group challenge that targets "harmonic oscillators in the wild", and simulates setting up and solving differential equations.

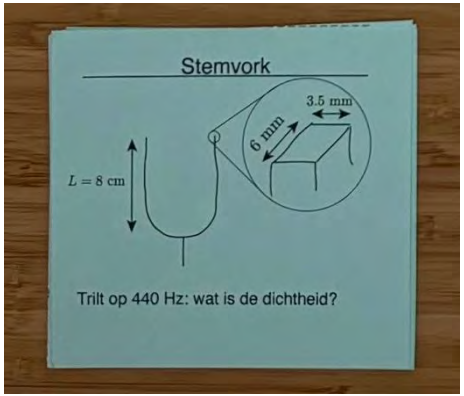
Group challenges: find the answer!





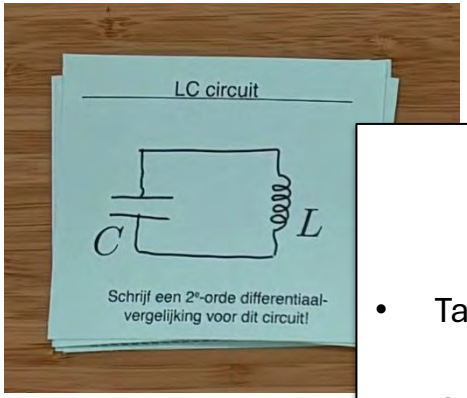




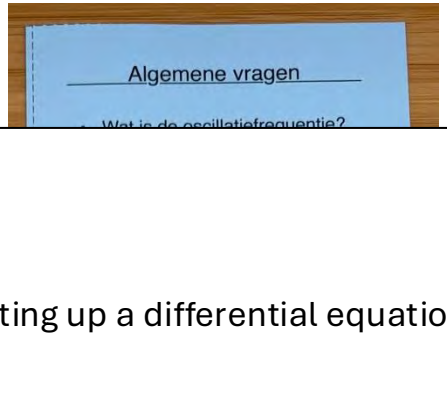


LC circuits

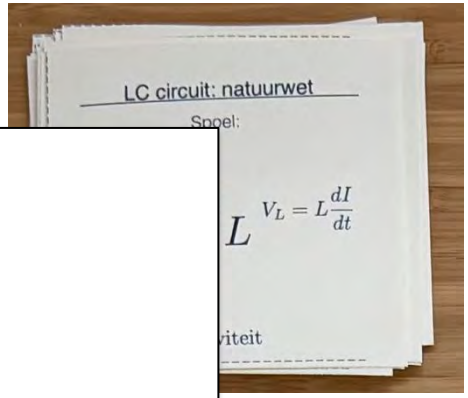
System + specific question



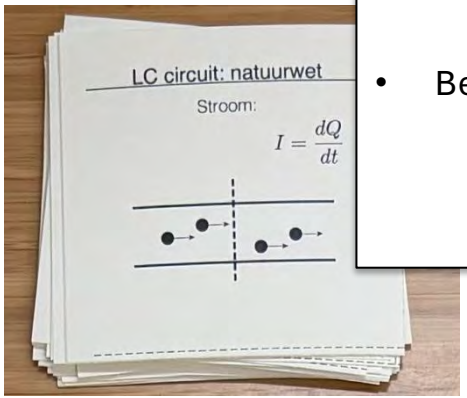
General question card

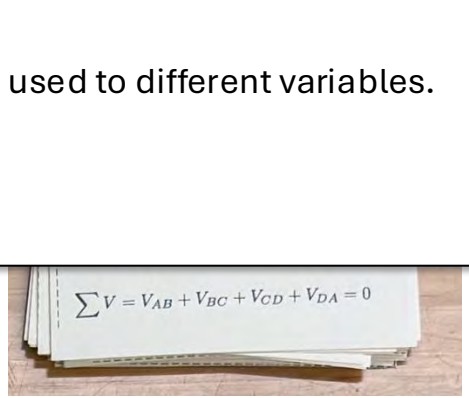


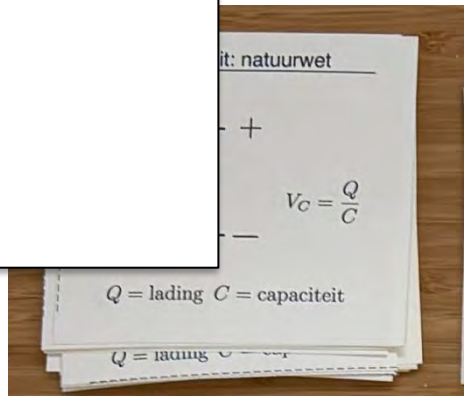
"Law" card



- Targets setting up a differential equation;
- Getting a feeling for what these equations mean;
- Becoming used to different variables.

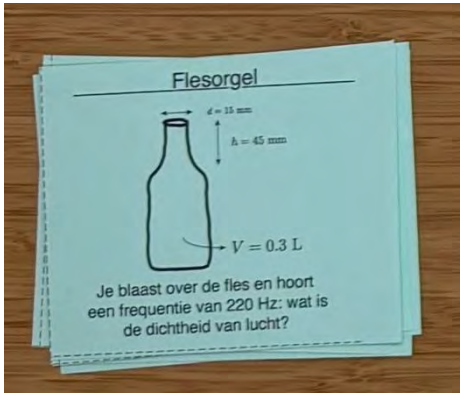




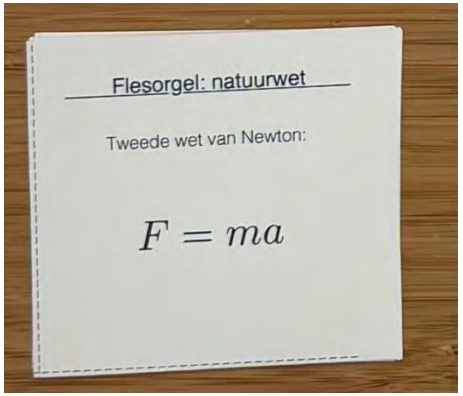


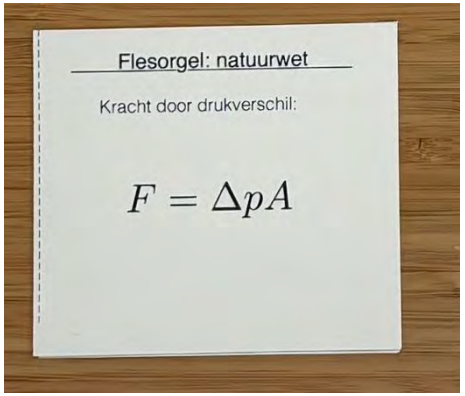
Flesorgel (bottle organ)

Question card

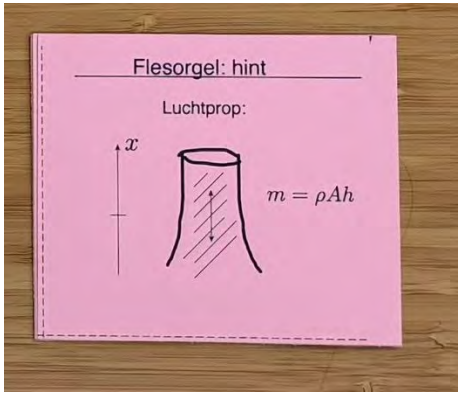


"Law card"





Hint



Sometimes we give a pink "hint" card only after a while: hard to solve without (but not impossible), encourages teamwork/discussion.

Evaluation and outlook

(Interrelated) goals for 2026:

1. Tutorial attendance goes up;
2. Students can track their progress;
3. The passing percentage on exam of similar difficulty goes up;
4. Students understand that harmonic oscillators can be found almost everywhere (which is why it is a prominent course), and know how to set up the equation of motion in different contexts.

Implemented changes:

1. Tutorial attendance was extremely high (estimated over 90%), could be due to multiple factors (the exam threat, generally a good/anomalous cohort, the quiz, the active learning exercise…)
2. The bonus quizzes seemed to work: not passing one was a wake up call.
3. TBD (but passing percentage was high!)
4. We received no complaints this year quizzing students on a system they had not seen before (but again, multiple variables), and the questions were not made poorly.

For next year:

1. Sharpen active learning exercices;
2. Increase difficulty of course.