

13 January 2022

# Natural sciences and math

Sukhraj Singh (math)  
Johan Lindell (physics)  
Signe Severinsen (biology, PE)  
Tim Ford (biology)  
Hans Bolvinkel (chemistry)



# Mathematics

- Is an obligatory subject in S5, S6 and S7.
- You can choose either advanced math (Danish A-level) or standard math (Danish B-level).
- Standard math is 4 periods (4 x 45 min) per week in S5 and 3 periods/week in S6 and S7.
- Advanced math is 6 p/week in S5 and 5p/week in S6 and S7.

# **Natural sciences in S5**

- Biology
- Physics
- Chemistry

Obligatory in S5 (2p/week), equals Danish C-level.

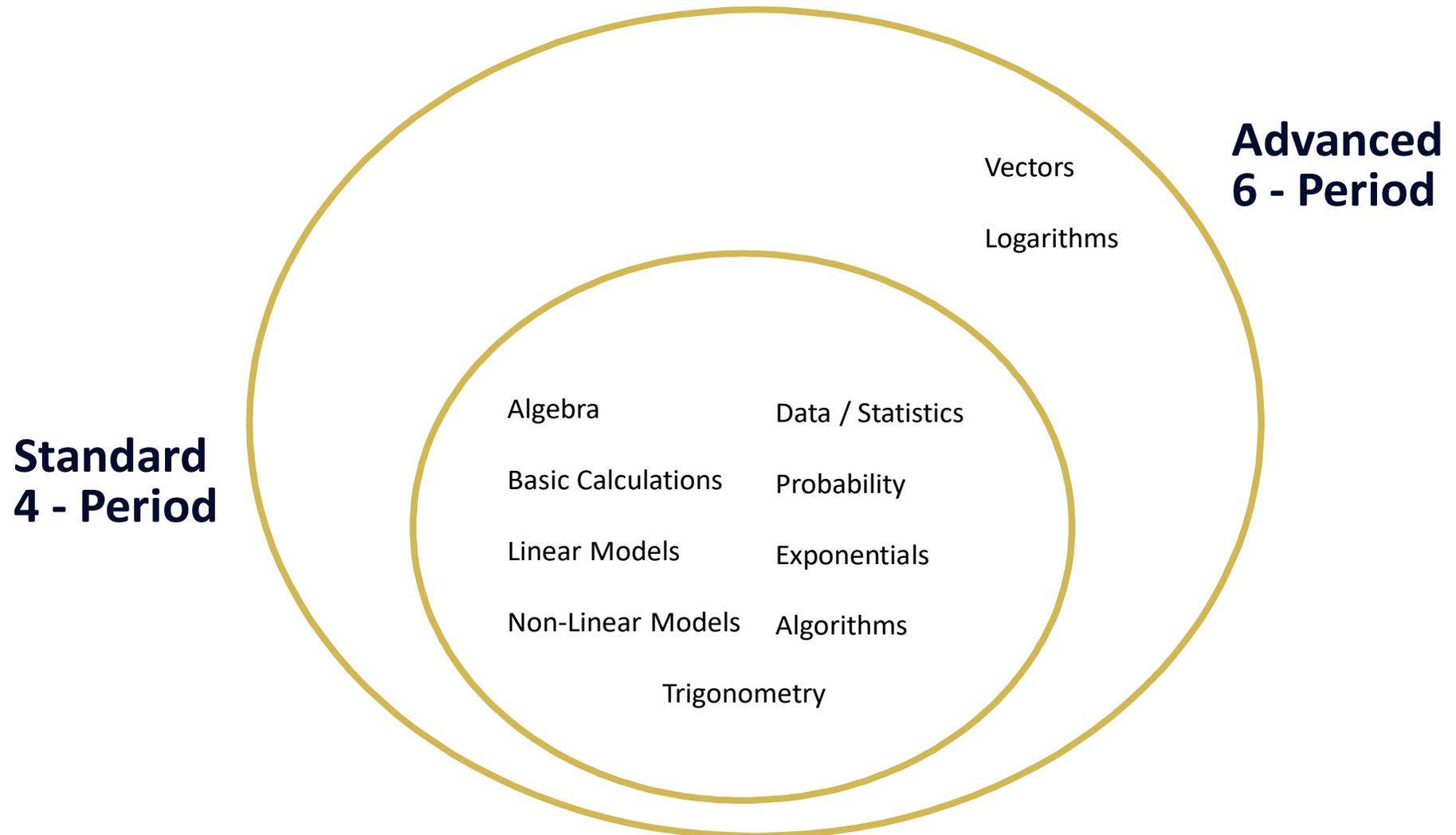
## **Natural sciences in S6 and S7**

- Advanced Physics (4p/week), equals Danish A-level.
- Advanced Biology (4p/week), equals Danish A-level.
- Standard Biology (2p/week), equals Danish B-level.
- Advanced Chemistry (4p/week), equals Danish A-level.

## **Subject choices in S6 and S7**

- You need to follow math as well as **AT LEAST** one of the natural sciences in S6 and S7.
- The minimum amount of periods per week in S6 and S7 is thus 5 (standard biology and standard math).
- Unique to the EB (compared to the STX) is that you can choose **ALL** sciences **AND** math at advanced level. You will then have advanced physics, advanced biology, advanced chemistry and advanced math for a total of 17 periods each week.

# Mathematics (S4 and S5 Curriculum)



# Mathematics (S6 and S7 Curriculum)

## Standard 3 - Period

Periodic Modelling  
Applications  
Null Hypothesis

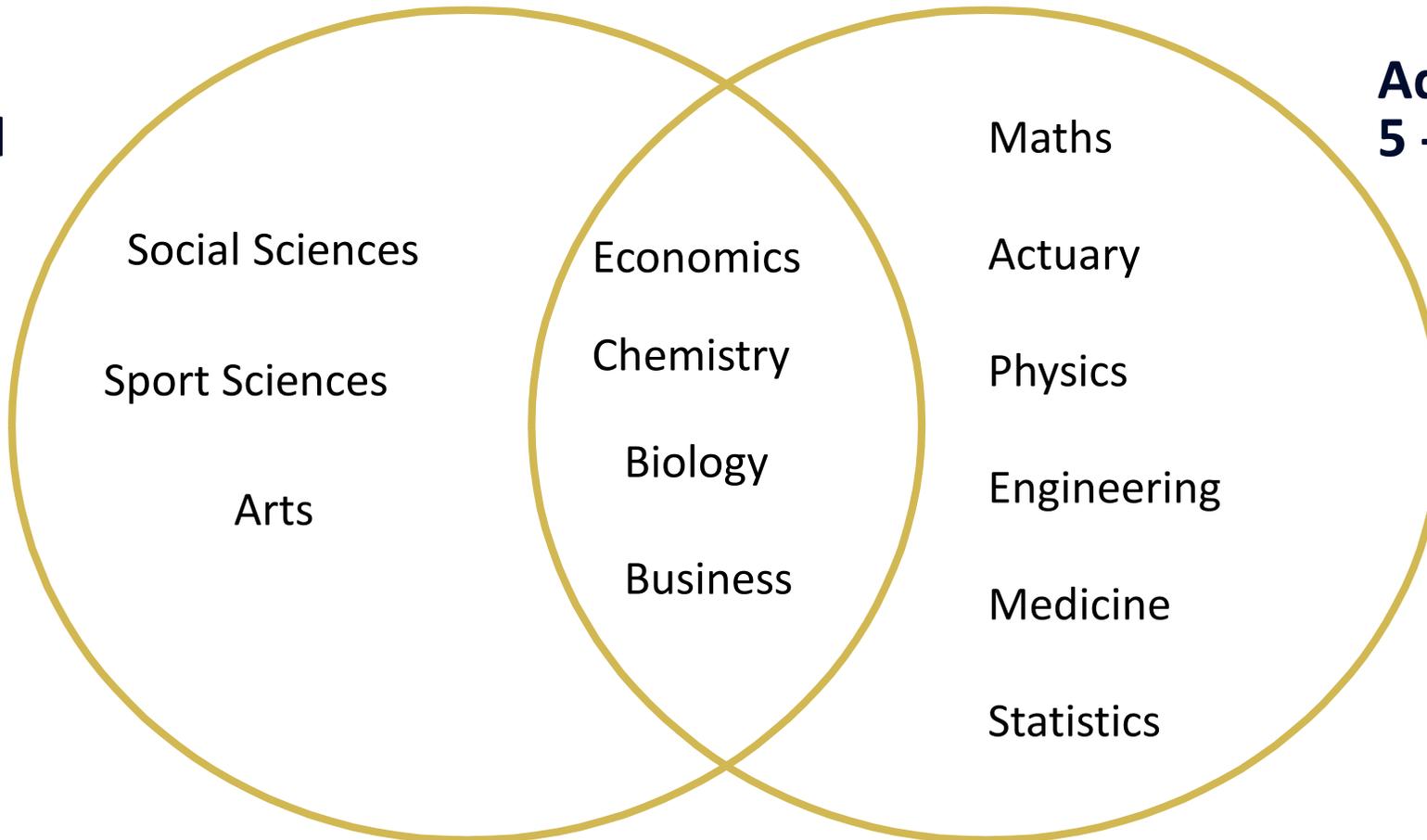
Functions  
Differentiation  
Combinatorics  
Probability  
Exp. + Logs  
Integration  
Statistics

## Advanced 5 - Period

Functions (**adv**)  
Exp. & Logs (**adv**)  
Limits/Differentiation (**adv**)  
Complex Numbers  
Vectors  
Sequences and Series  
Probability (**adv**)  
Integration (**adv**)  
Statistics (**adv**)

# Mathematics (University Courses)

**Standard  
3 - Period**



**Advanced  
5 - Period**

# Physics

**Physics** is the natural science that studies matter, its fundamental constituents, its motion and behavior through space and time, and the related entities of energy and force. Physics is one of the most fundamental scientific disciplines, and its main goal is to understand how the universe behaves.

## How do we work in physics class?

- Theory
- Solving problems
- Practicals
- Connect physics to everyday life
- Use our math-skills to describe what we discover
- Discuss current events like the Nobel-prize, James Web telescope, historical events and persons etc.

## Topics in S5 (2p)

Topic
Electricity / Magnetism
Mechanics
Waves
Matter and Heat
Atomic and Nuclear Physics

## Topics in S6-S7 (adv. physics 4p)

Topic	Subtopic
Fields	Electric Field
	Magnetic Field
	Gravitational Field
Interactions	Uniform Acceleration
	Uniform Circular Motion
Oscillations and Waves	Harmonic Oscillations
	Description of waves, Wave equation
	Doppler Effect
	Behaviour of waves
	Standing waves
Quantum Physics	Electromagnetic waves
	Particle behaviour of waves
	Wave behaviour of particles
	Wave-Particle Duality
	Quantum model of the atom

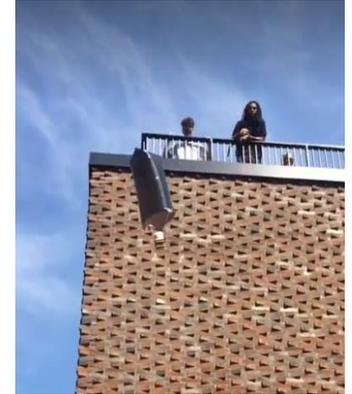
# Physics practicals

**S5 and S6:**  
Investigating  
different  
energy forms -  
amusement  
parks and  
potato guns



**S5 concepts of  
physics:**

Prevent an egg  
from cracking  
when dropping  
it from a height  
of 10m.



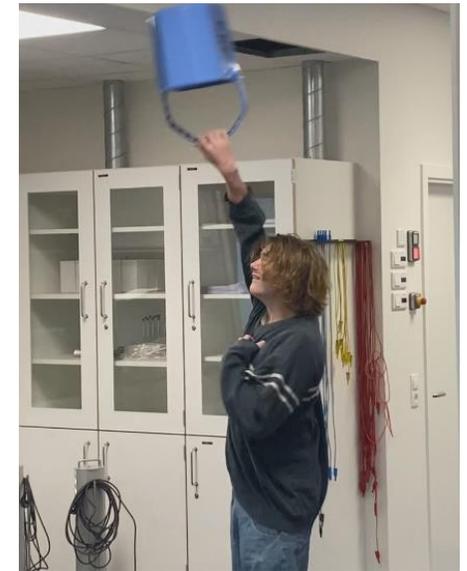
**S5 and S6:**

Investigating motion  
with water rockets



**S6 advanced  
physics circular  
motion:**

Find the lowest  
angular speed of  
the rotation  
(bucket filled with  
water) without  
getting wet...



# S5 Biology: 4 Topics

## 5.1. Evolution

The history of life on earth, leading to the framing theory that makes sense of everything in biology, natural selection, constructed from its components: variation, inheritance, the struggle for existence, and time.

## 5.3 Chromosomal Inheritance

Establishing the physical location of genes on chromosomes, showing that the events of meiosis correspond to Mendelian predictions. Sex determination in mammals and other organisms.

## 5.2 Mendelian Inheritance

A simple model that allows us to treat inheritance quantitatively, leading to the beginnings of a more sophisticated understanding.

## 5.4 Molecular Inheritance

DNA as the universal molecule encoding genes. Its structure, function, and replication. A synthesis of the themes of evolution and genetics in discussion of eugenics and current issues raised by the application of genetic knowledge to human beings

# S6 Standard 2P Biology: 3 Topics

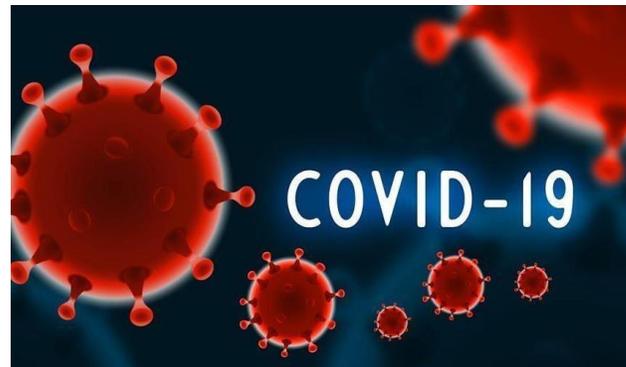
## 6-1. Nutrition

Food composition  
Role of different food components  
Food and health



## 6-2. Disease

Pathogens  
Transmission of disease  
Non-specific defense  
Specific defense



## 6-4. Impact of Man on Nature

Treatment and recycling of waste.  
Biodiversity  
Atmospheric pollution  
Water purification



# S6-S7 Adv 4P Biology: 4 Topics

## 6.1 Cell scale

Cells as the fundamental organising of organisms. The fundamentals of biochemistry. In-depth study of three crucial aspects of life at the cellular scale: membranes, enzymes, and the central role of ATP in energy transfer.

## 6.2 Human Scale

How the nervous system coordinates and controls the actions and interactions of vertebrates, including humans. The brain as the location of learning, memory, and consciousness.

## 6.3. Time scales

Consideration of biological phenomena over two time scales:

- The scale of individual reproduction and inheritance, comprising molecular, Mendelian, and chromosomal genetics.
- The scale of evolution, comprising an enriched understanding of the action of natural selection, and the construction of evolutionary phylogenies

## 6.4. Planet scale

An introduction to ecological theory, practice, and modelling. A grounding in population ecology. Repercussions of human effects on ecologies at scales from local to global, and possible solutions to anthropogenic problems.

# **Chemistry in S5**

- The focus in the first semester is on the fundamentals: the atom, the periodic table and bonding.
- In the second semester the focus is on educative topics: acids and bases, organic chemistry and redox reactions.

# Chemistry in S6 and S7

- First semester in S6: Further focus on the fundamentals (the atom, the periodic table, bonding).
- Second semester in S6: Thermodynamics, rate of reaction, organic chemistry I
- S7: Equilibria, acids and bases, electrochemistry, organic chemistry II

# **Physical Education ( PE/idræt)**

## **Obligatory all 3 years 2p per week**

### **Teamsport**

- Basketball
- Floorball
- Football
- Handball
- Volleyball

### **Individual sport**

- Athletics
- Gymnastics
- Racket sport
- Dance/Aerobics
- Swimming

### **Complementary activities**

- Orienteering
- Beach Volleyball
- Ultimate Frisbee
- Skating

**Afterschool PE and Football club**