



# Wood material science

**CLOSING 16.2.2024**

CHEM-E2225 5 cr

# Thank you!



Dr. Kristiina Lillqvist



Dr. Daniela Altgen



Dr. Callum Hill



Prof. Mark Hughes



Prof. Lauri Rautkari

Wood material technology & Wood material science  
Department of Bioproducts and Bioprocesses  
School of Chemical Engineering

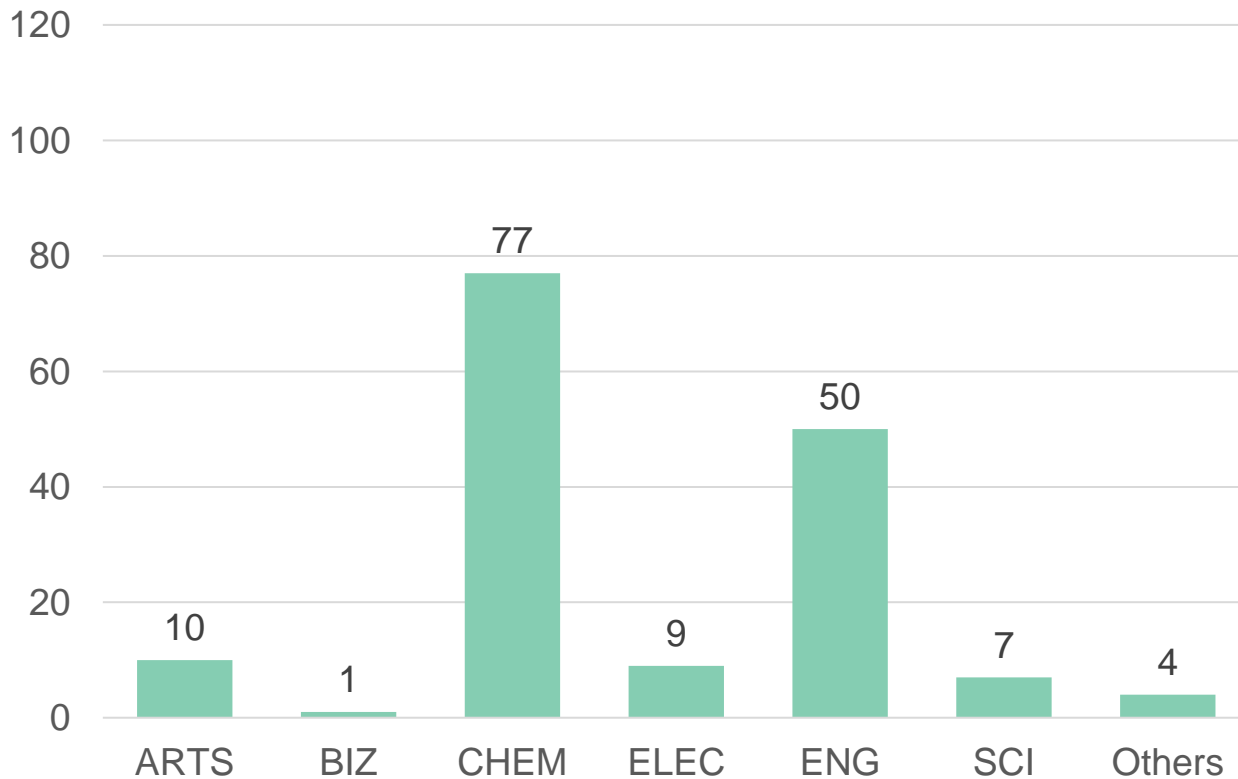
**wood-teaching@aalto.fi**

# Finished students

15.2.2024

**158** students finished

- 87 % out of 182 registered



# After the course, students know...

- the **key anatomical features** of wood and can identify wood species from their microstructures
- the **anisotropic nature** of wood and be able to describe how the anatomical structure of wood **affects its physical and mechanical properties**.
- how **moisture** affects the mechanical and physical properties of wood
- anatomical factors influencing wood **density**
- some of the thermal, acoustic, electrical and combustion **properties** of wood
- the short-term and the long-term **mechanical behavior** of wood and how structure/anatomy, density and moisture affect these
- the key **degrading** organisms that are responsible for the breakdown of wood

## LEARNING MATERIAL

**Interactive Books:** ✓  
Learning material with some exercises. Mark as **completed** by yourself.

+

**Quizzes:** ✓  
Exercise questions related to the topic. To **complete** the quiz you need to answer *everything correctly*.



Unlimited attempts  
No time limitation  
**Not graded**

## EXAMS

**Exam:**  
The exam are available once you have completed the interactive books and the quizzes of the section.

One attempt  
Time limitation  
**Graded**

## SECTIONS

### Forest and trees



1) Forest and harvested products



2) The tree

Forest and trees Exam 20 %

### Fundamentals



1) Wood anatomy and microstructure



2) The wood cell



3) Softwood and hardwood anatomy



4) Wood water relation

Fundamentals Exam 40 %

### Wood properties



1) Physical properties



2) Short-term mechanical properties



3) Long-term mechanical properties



4) Wood degradation

Wood properties Exam 40 %

# Notes about exams

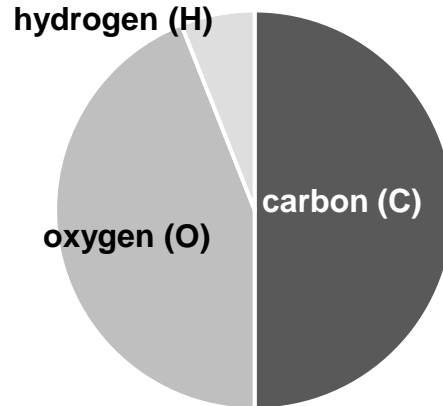
See recording for the correct answer

Approximately how many tons of carbon (C) does 2 tons of dry wood contain? Only provide a number (no units).

3.66

1

3.77



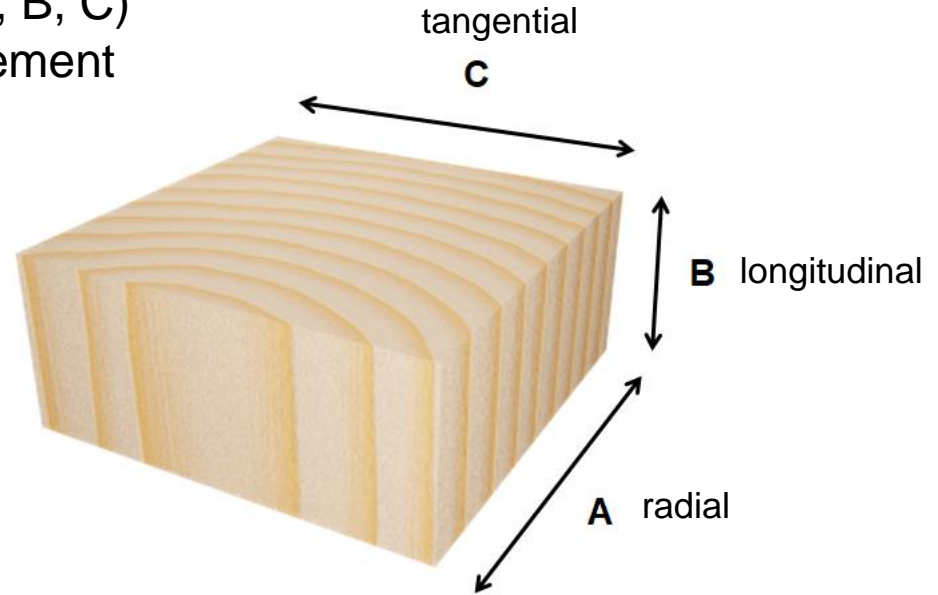
**C ≠ CO<sub>2</sub>**

$$\text{dry mass (CO}_2\text{)} = \frac{44}{12} * 1000 \text{ kg} \approx 3\,666 \text{ kg CO}_2$$

# Notes about exams

*See recording for the correct answer*

Arrange the different grain directions (A, B, C) into the correct order from highest movement to lowest movement.



# Notes about exams

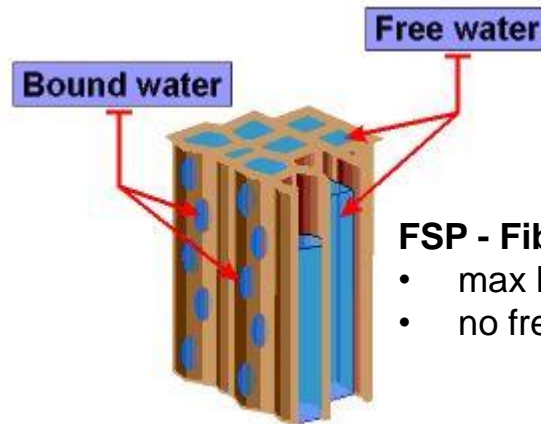
See recording for the correct answer

True or false: Moisture content of wood influences wood **density** only up to FSP.

True

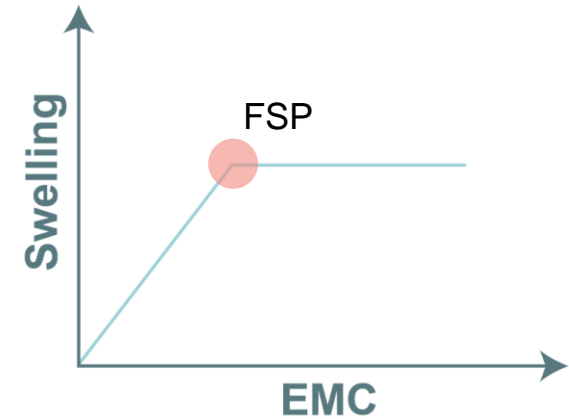
False

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$



**FSP - Fibre saturation point**

- max bound water (water within the cell wall)
- no free water (water in the voids)

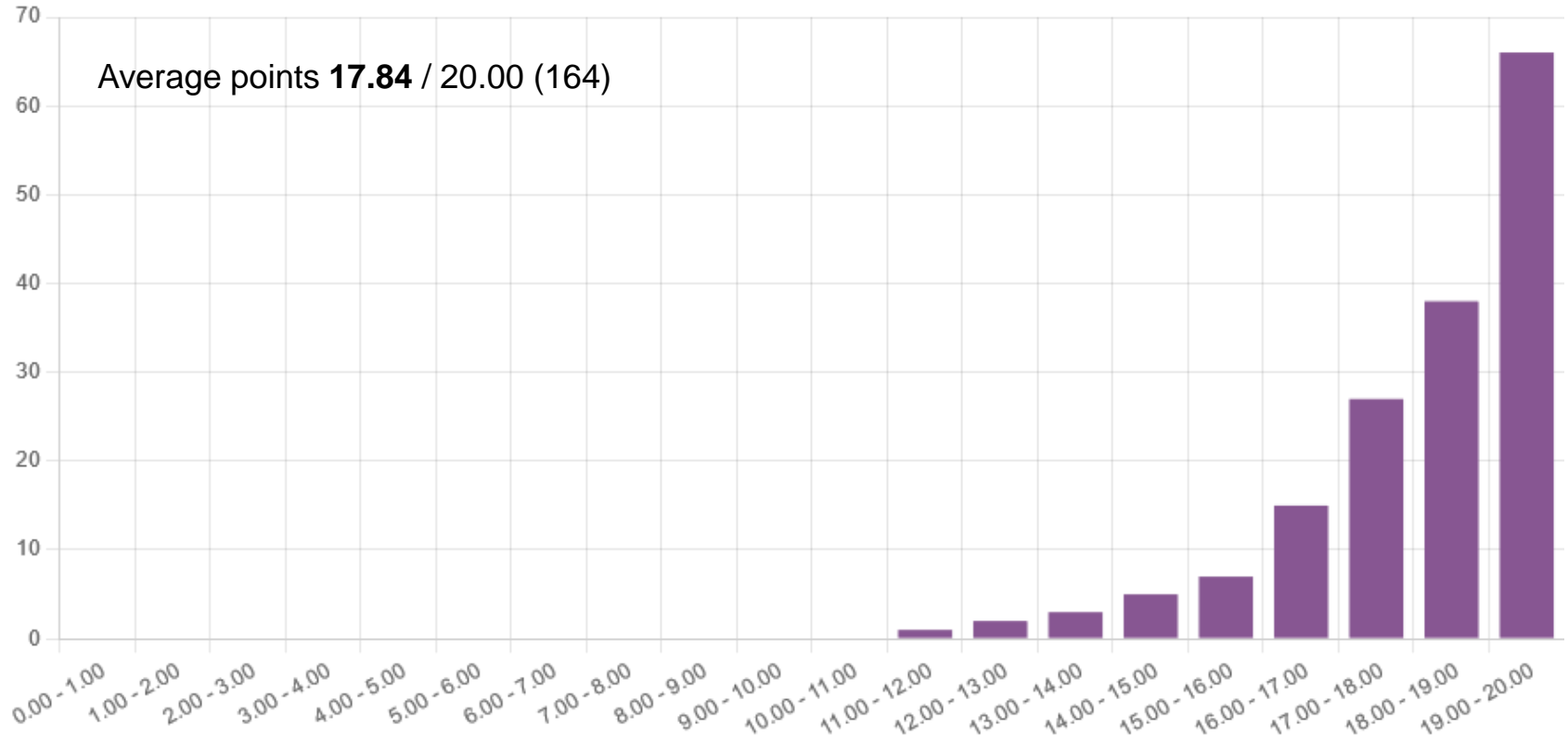


Above FSP

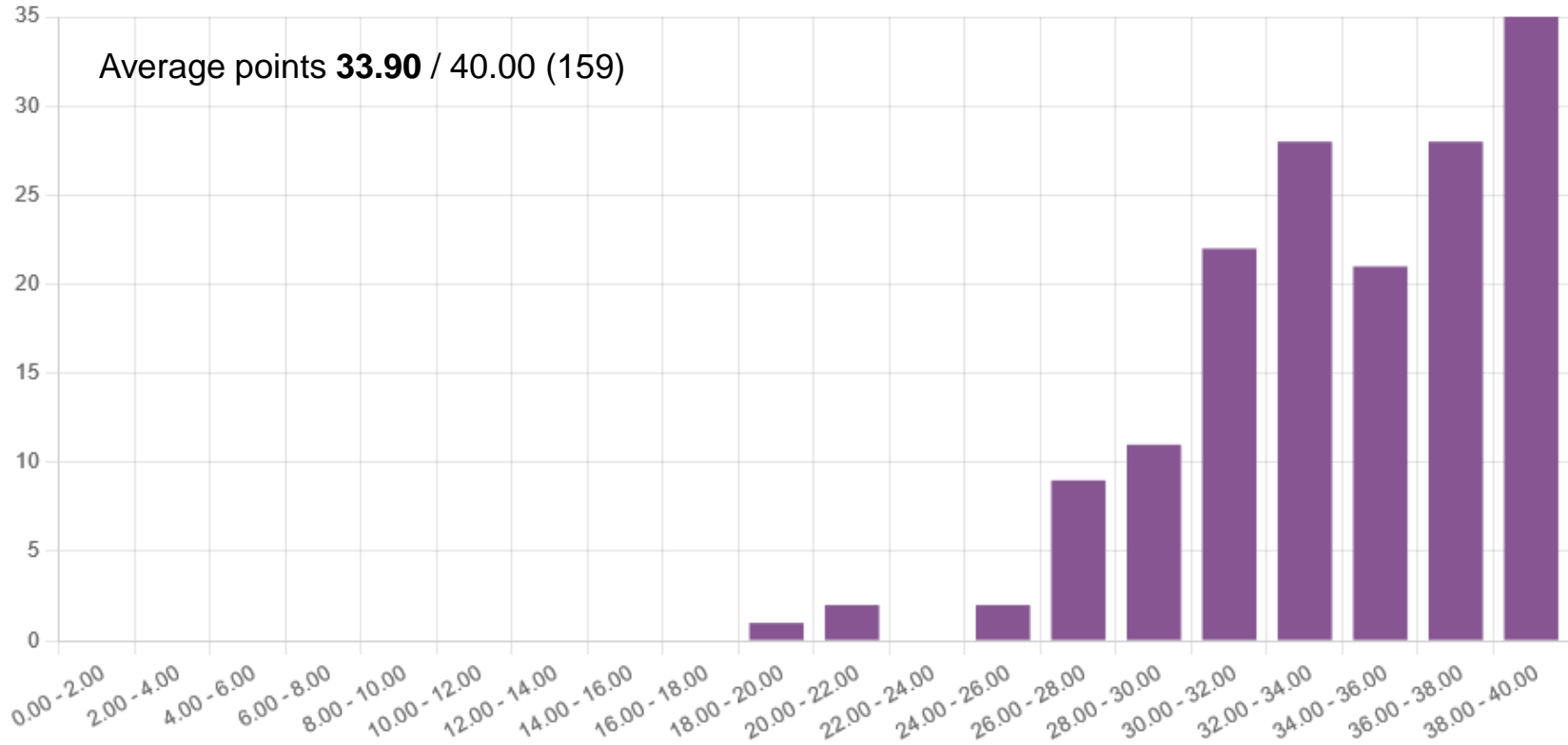
- dimensions remain the same
- mass increases



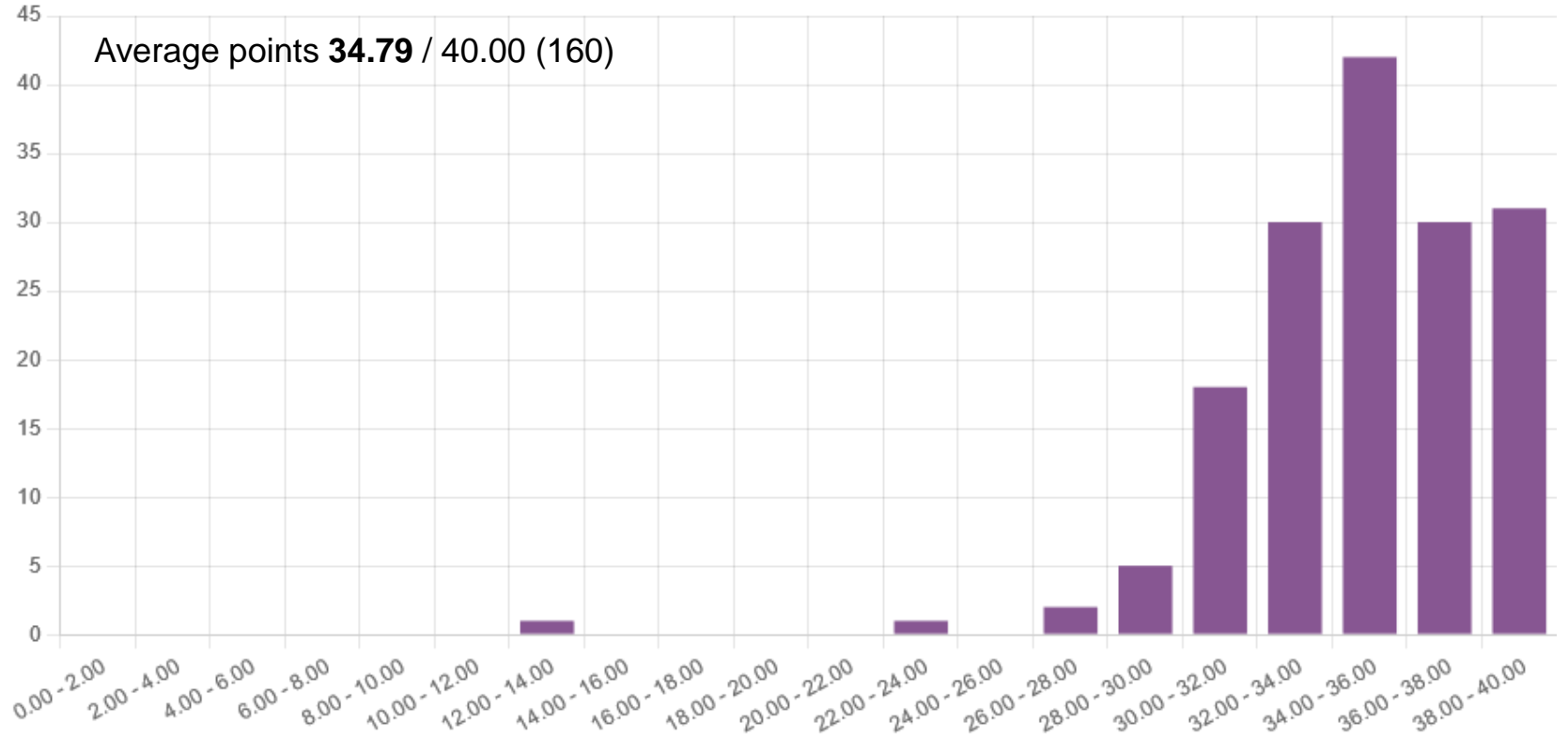
# EXAM: FOREST AND TREES



# EXAM: FUNDAMENTALS



# EXAM: WOOD PROPERTIES



# Exam points in MyCourses

×

- > COURSE INFO
- > Forest and trees
- > Fundamentals
- > Wood properties
- > EXAMS

## CHEM-E2225 - Wood Material Science, Online teaching, 8.1.2024-16.2.2024

? Feedback Forums HSP Quizzes Resources

Course feedback

Syllabus

Course

Grades

Course feedback

### COURSE INFO

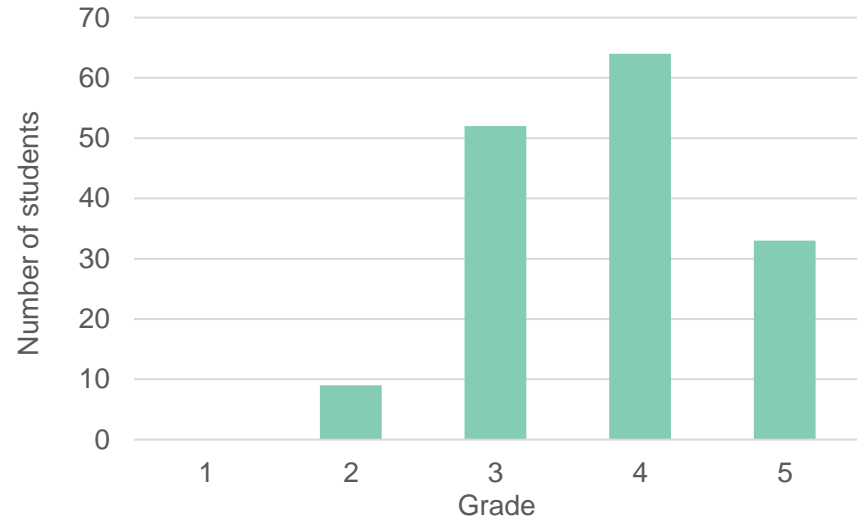
The course is organized as **online course**. You may follow the course **independently** whenever it is suitable for you during the III period / 2024. The course includes reading materials, short videos, exercises and online exams. Teaching language is English.

# Grading

- Max points 100
- Grading 0-5

grade	min. points	amount	%
1	55	0	0 %
2	65	9	6 %
3	75	52	33 %
4	85	64	41 %
5	95	33	21 %

= 158 students



# Course Feedback

- **95% (150 students) has to answer**
  - So far 111 answered
- **Open in MyCourses until **Fri 23<sup>rd</sup> Feb!!****
- Also another Aalto-level webropol form



## Feedback form

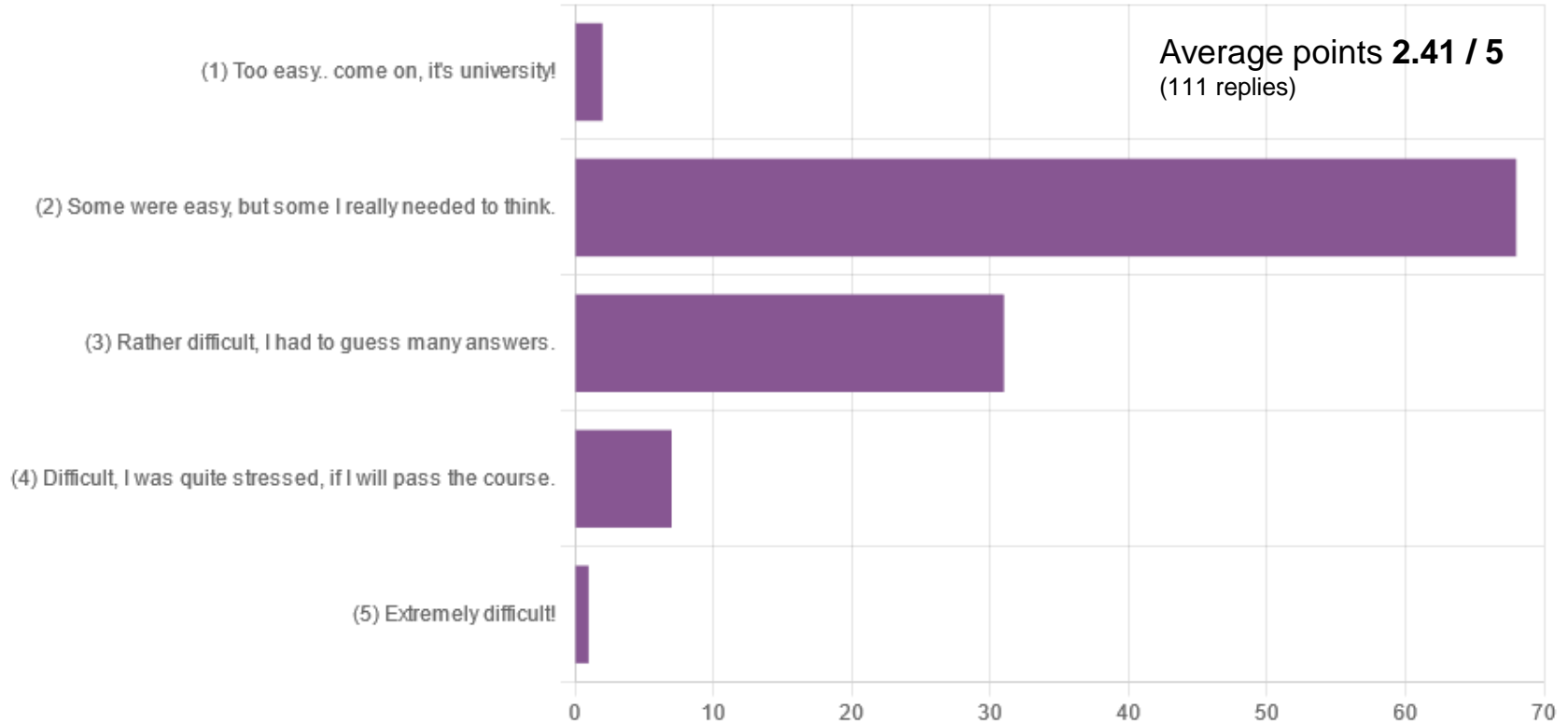
**To do:** Submit feedback

**After** completing all the exams, you need to give comprehensive feedback to pass the course. This way you can **reflect** your learning and we can **develop** online courses in the future.

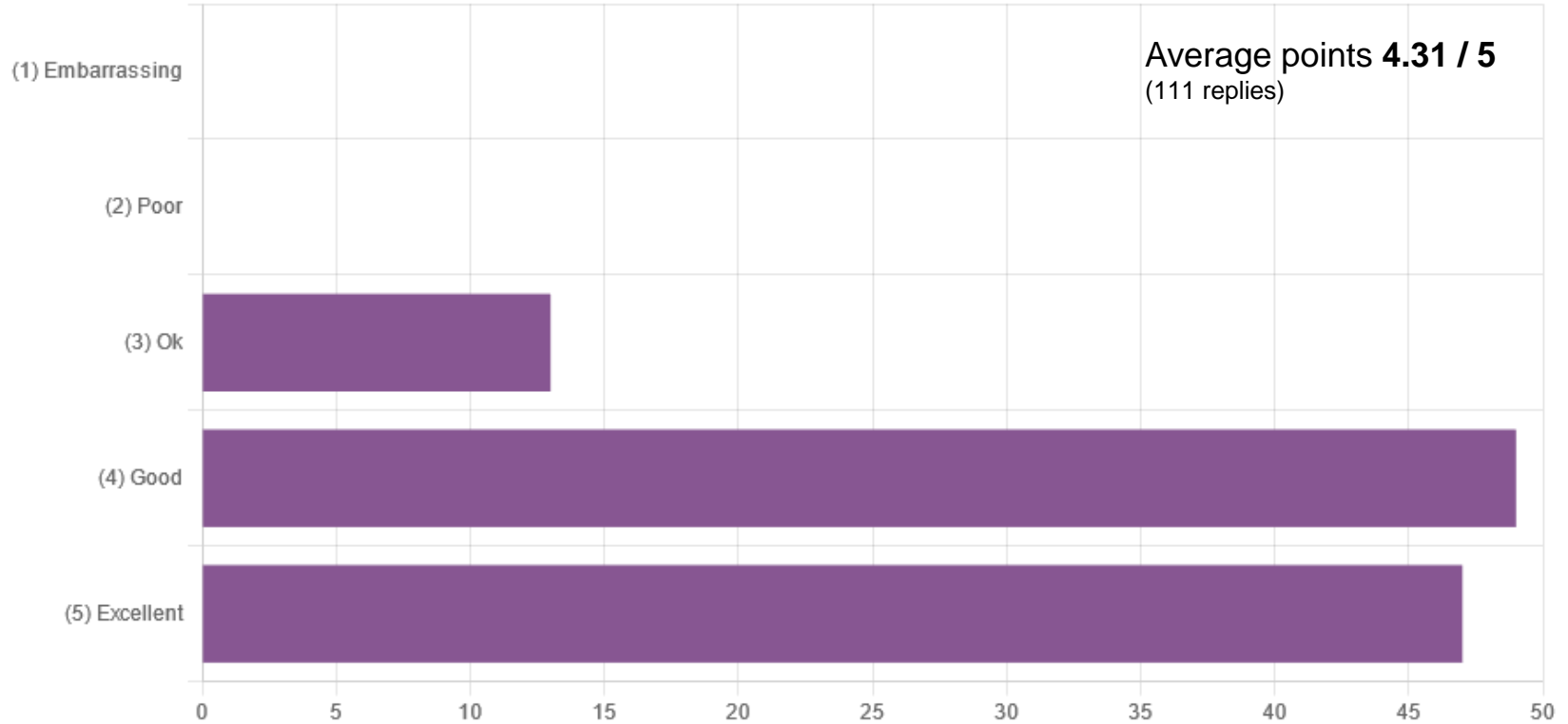
Fill in the feedback form by **Fri 23.2.2024!**

There are ~40 questions, so reserve enough time for this!

# Were the final exams difficult or easy?

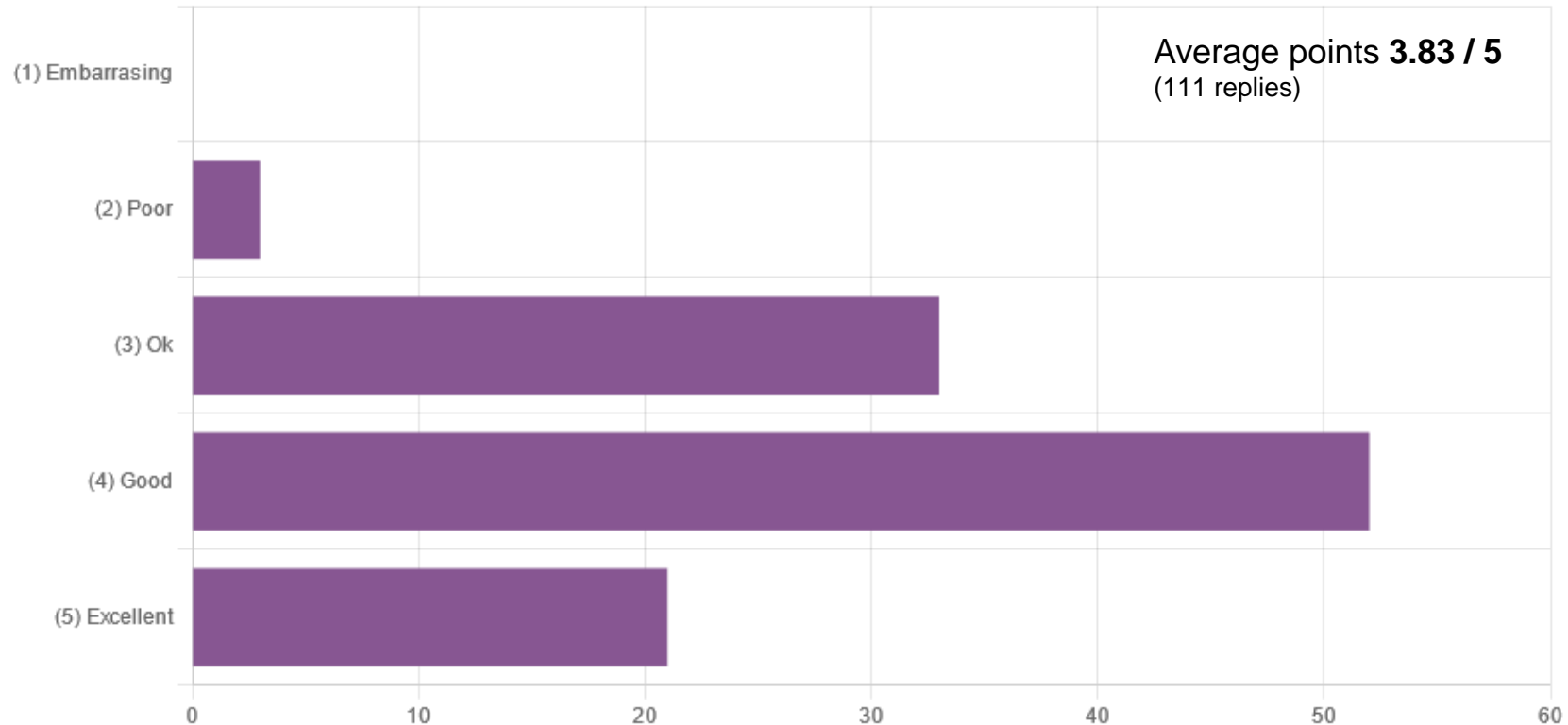


# What overall grade would you give to the course?





# How well did YOU do? Were you able to keep your schedule and do your best?

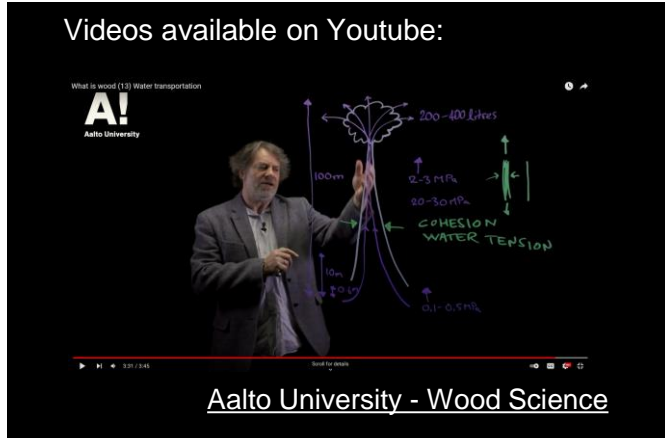


# Revision

- If you have any questions about the exam or other topics
- Fri 1<sup>st</sup> March, 13:00 – 14:00
- Vuorimiehentie 1 / room L2
- **Book a time** by 28<sup>th</sup> Feb: [wood-teaching@aalto.fi](mailto:wood-teaching@aalto.fi)
  
- **Re-take the course / improve grade → Next year**
  - Instructions: <https://www.aalto.fi/en/applications-instructions-and-guidelines/detailed-instructions-on-registering-for-courses-on-sisu>

# See you again?

wood-teaching@aalto.fi



## Aalto Wood –minor (MSc)

### Pre-requisite

CHEM-C2470 Forests, Wood and Carbon **online** 5 op  
• Next time in V-period (22.4.-7.6.2024)

### Mandatory courses (10 cr):

CHEM-E2225 Wood Material Science **online** 5 op  
CHEM-E2235 Wood Products + Processes **online** 5 op

### Elective courses (to fulfil 20-25 cr):

CHEM-E2170 Advanced Wood Science **1 / 2025** 5 op  
CHEM-E1100 Plant Biomass 5 op  
CHEM-E2128 Wood Science Laboratory 5 op  
CHEM-E2127 Applied Mechanics of Wood Materials 5 op  
CIV-E4110 Timber Engineering 5 op  
CIV-E4120 Timber Structures 5 op  
ARK-E401201 Wood in Architecture Construction 5 op  
ARK-E4008 Industrial Wood Construction 5 op  
SARK-E5016 Woodstudio: Design Project 10 op

# ONLINE COURSE

- IV-period
- Starting Mon 26<sup>th</sup> Feb 13:15
- Learn about wood product properties and applications



## Wood products and processes

ONLINE  
course

✓ This course presents the production processes of selected wood products, such as plywood, cross-laminated timber, particleboards, fiberboards and modified wood products starting from raw material to the end product.

✓ Students will learn the links between wood product properties and typical applications in the living environment.

**26.2.–14.4.2024**

For students in all fields  
Proceed at own pace!  
Registration in Sisu by 4.3.2024

