Optoelectronică

Curs 1

2025/2026

- La facultate, profesorul intreaba:

  - Intrebare de "nota 10": cum ma numesc?
  Toti tac.

  - Intrebare de "nota 8": la ce obiect aveti examen?
  Toti tac.

  - Intrebare de "nota 5": ce culoare are manualul (site-ul laboratorului)?

  Din ultimele randuri se aude o voce:
  - Vrea sa ne pice magaru'!

Disciplina 2025/2026

- 2C/1L Optoelectronică OPTO
- **Minim** 7 prezente curs + laborator
- Curs – conf. Radu Damian
  - an IV μE
  - Marti 14:00-16:00, P8
  - E – 70% din nota (50%+20%)
    - **20% test (VP) la curs**, saptamana 4-6?
  - probleme + (2p prez. curs)
  - toate materialele permise
- Laborator – sl. Catalin Iov
  - an IV μE
    - Marti 16-18
    - Max. 7 prezente
  - L – 30% din nota (+Caiet de laborator +Probleme)

Orar 2025/2026

- Curs
  - Marti 14:00-16:00, P8
  - ~~2C ⇨ 3C~~
    - ~~14*2/3 ≈ 9.33~~
    - ~~9÷10 C ≈ 9C + E~~

Cuprins

- **Lumina ca undă electromagnetică*** (ecuaţiile lui Maxwell, ecuaţia undelor, parametrii de propagare)
- **Elemente de fotometrie şi radiometrie*** (mărimi energetice/luminoase)
- **Fibra optică** (realizare, principiu de funcţionare, atenuare, dispersie, banda de frecvenţă)
- **Cabluri optice** (tehnologie, conectori, lipire – splice)
- **Proiectare sistemică a legăturii pe fibra optică** (bandă de frecvenţă, balanţa puterilor)
- **Emiţătoare optice** (LED şi dioda laser – realizare fizică şi functionare)
- **Receptoare optice** (dioda PIN, dioda cu avalanşă – realizare fizică şi functionare)
- **Amplificatoare transimpedanţă** (parametri, scheme tipice, TIA în buclă deschisă, cu reacţie, diferenţiale, control automat al câştigului)
- **Realizarea circuitelor pentru controlul emiţătoarelor optice** (parametri, scheme tipice, controlul puterii, multiplexoare)
- **Dispozitive de captare a energiei solare** (principiu de functionare, utilizare, proiectare)

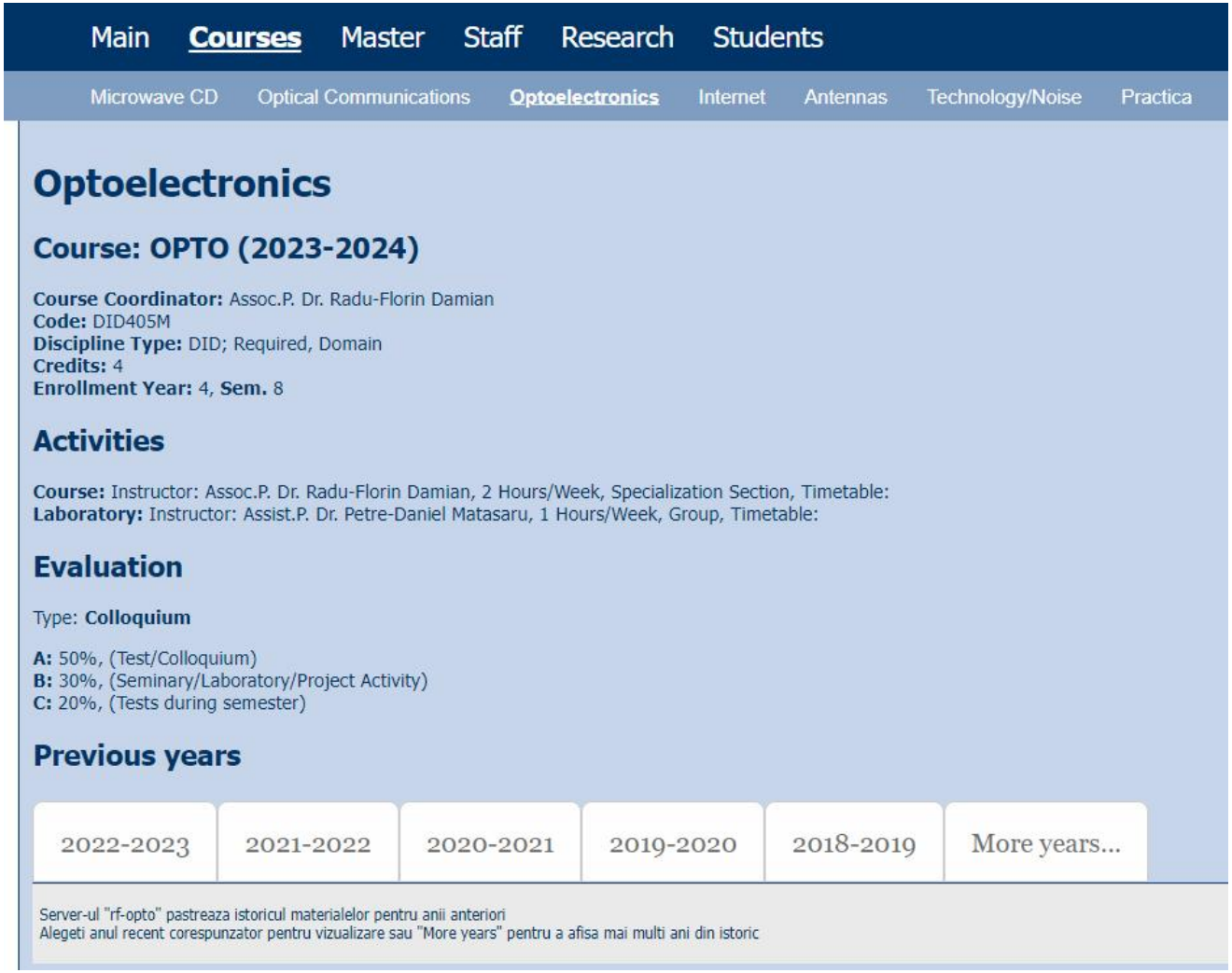
*** – VP**

Bibliografie

- https://rf-opto.etti.tuiasi.ro
- Irinel Casian-Botez, "Structuri Optoelectronice", Ed. "CANOVA", Iasi 2001, ISBN 973-96099-2-9
- Behzad Razavi – Design of Integrated Circuits for Optical Communications, Mc Graw Hill
- John Powers – An Introduction to Fiber Optic Systems
- IBM – Understanding Optical Communications: on-line http://www.redbooks.ibm.com
- Radu Damian, I Casian, D Matăsaru – „Comunicatii Optice” , Indrumar de laborator * , 2005
- MIT Course – Fundamentals of Photovoltaics, https://ocw.mit.edu

Documentatie

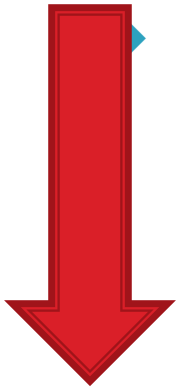
Documentatie

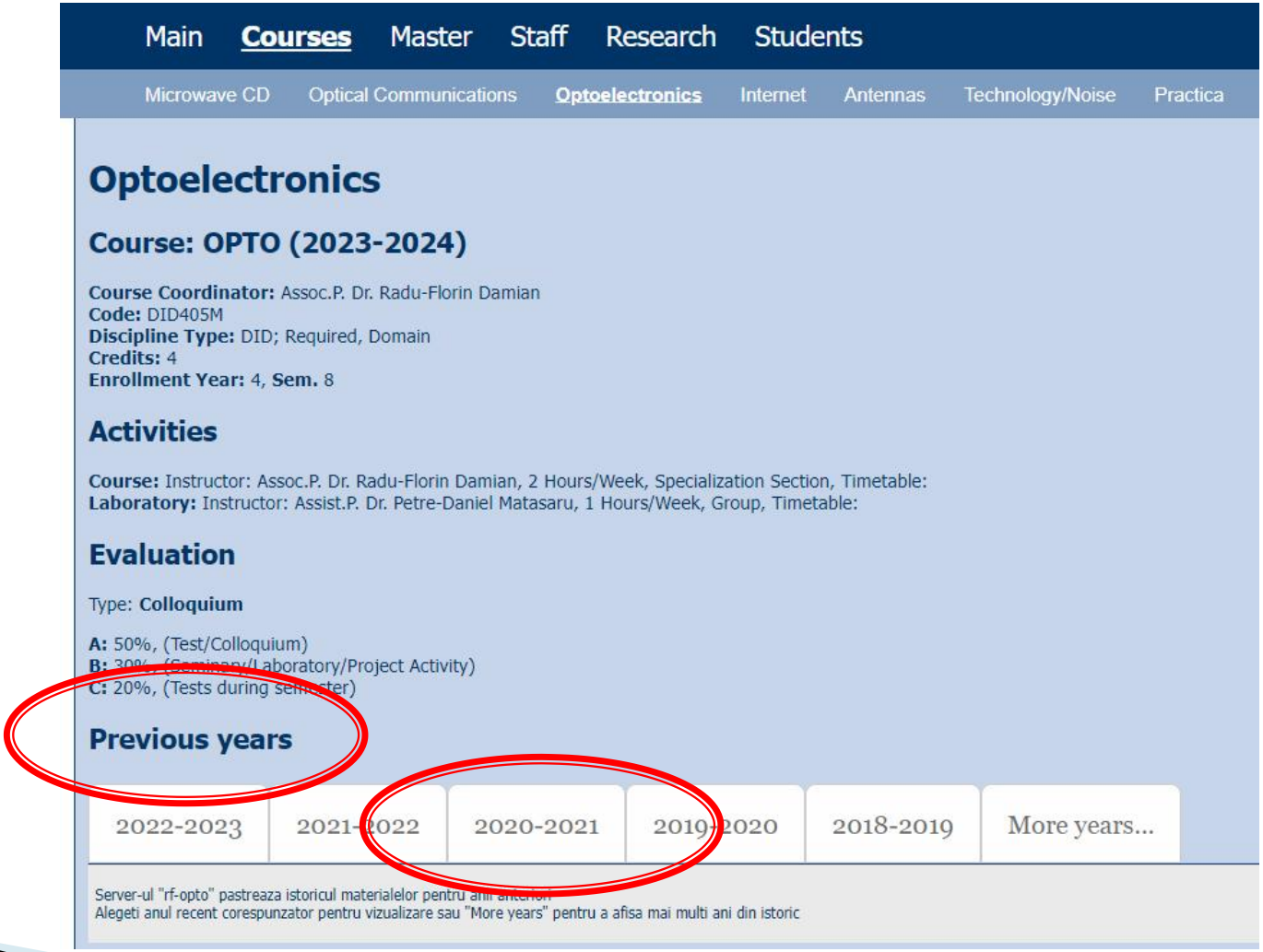


Documentatie

- RF-OPTO
  - https://rf-opto.etti.tuiasi.ro
- Fotografie
  - “examen” online
  - necesara la laborator/curs

Istoric




Main Courses Master Staff Research Students
Microwave CD Optical Communications Optoelectronics Internet Antennas Technology/Noise Practica
Optoelectronics
Course: OPTO (2023-2024)
Course Coordinator: Assoc.P. Dr. Radu-Florin Damian
Code: DID405M
Discipline Type: DID; Required, Domain
Credits: 4
Enrollment Year: 4, Sem. 8
Activities
Course: Instructor: Assoc.P. Dr. Radu-Florin Damian, 2 Hours/Week, Specialization Section, Timetable:
Laboratory: Instructor: Assist.P. Dr. Petre-Daniel Matasaru, 1 Hours/Week, Group, Timetable:
Evaluation
Type: Colloquium
A: 50%, (Test/Colloquium)
C: 20%, (Tests during
Previous years
2022-2023
2021-2022
2020-2021
2019-2020
2018-2019
More years...
Alegeti anul recent corespunzator pentru vizualizare sau "More years" pentru a afisa mai multi ani din istoric

Istoric 2004–2025

Fotografii

Date:

Grupa	5304 (2015/2016)
Specializarea	Tehnologii si sisteme de telecomunicatii
Marca	5184

Trimite email acestui student | Adauga acest student la lista (0)

Detalii curente

Finantare	Buget
Bursa	Fara Bursa

Observatii

Date:

Grupa	5304 (2015/2016)
Specializarea	Tehnologii si sisteme de telecomunicatii
Marca	5244

Trimite email acestui student | Adauga acest student la lista (0)

Detalii curente

Finantare	Buget
Bursa	Bursa de Studii

Observatii

Date:

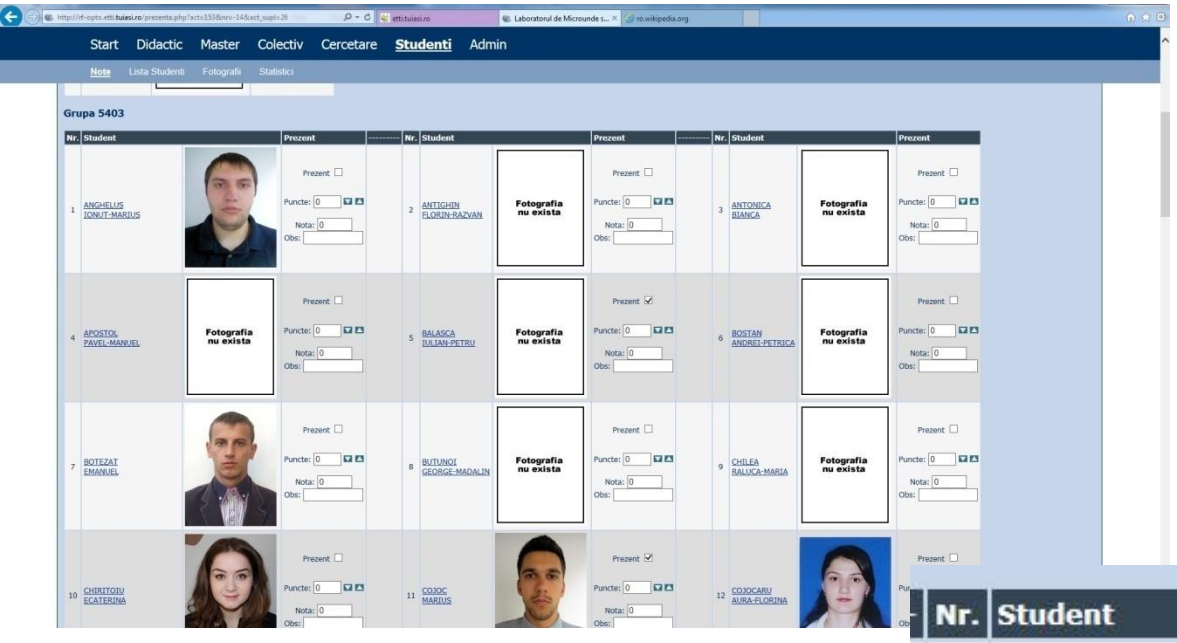
Grupa	5304 (2015/2016)
Specializarea	Tehnologii si sisteme de telecomunicatii
Marca	5184

Acceseaza ca acest student

Note obtinute

Disci...	Tip	Data	Descriere	Nota	P...	Obs.
TW	Tehnol... Web					
	N	17/01/2014	Nota finala	10	-	
	A	17/01/2014	Colocviu Tehnologii Web 2013/2014	10	7.55	
	B	17/01/2014	Laborator Tehnologii Web 2013/2014	9	-	
	D	17/01/2014	Tema Tehnologii Web 2013/2014	9		

Fotografii


Start Didactic Master Colectiv Cercetare Studenti Admin
Note Lista Studenti Fotografii Statistici
Grupa 5403
Nr. Student Prezent
1 ANGHELUS IONUT-MARIUS
2 ANTIGHIN FLORIN-RAZVAN
3 ANTONICA BIANCA
4 APOSTOL PAVEL-MANUEL
5 BALASCA IULIAN-PETRU
6 BOSTAN ANDREI-PETRICA
7 BOTEZAT EMANUEL
8 BUTUNOI GEORGE-MADALIN
9 CHILEA RALUCA-MARIA
10 CHIRITOIU ECATERINA
11 COJOC MARIUS
12 COJOCARU AURA-FLORINA
Fotografia nu exista
Prezent
Puncte: 0
Nota: 0
Obs:


Nr.
Student
Prezent
2
ANTIGHIN FLORIN-RAZVAN
Fotografia nu exista
Prezent
Puncte: 0
Nota: 0
Obs:

Bonus (~0.5-4.15)

Disciplina: Optoelectronica, structuri, tehnologii, circuite
An: 2015/2016

Bonus-uri care se aplica la nota de la teza obtinute prin:
- prezenta la curs (0.5p / 3pr)
- 3 miniteste aplicate la curs (max. 3 X 1.5p)
- contributie la site rf-opto (foto <C5=1p, >C5=0.5p)

Nr.	Student	Grupa	Prezente curs	Bonus prezenta	Bonus foto	Bonus T1	Bonus T2	Bonus T3	Total Bonus	Obs.
1	CIOLPAN OCTAVIAN	5306	3	0.5					0.5	-
2	NITA COSTEL-CATALIN	5307	4	0.5	1				1.5	-
3	BARON BOGDAN-IONUT	5405	12	2	1	0.5		0.75	4.25	-

Prezenta

Curs
Laborator

Liste

Studenti care nu pot intra in examen
Bonus-uri acumulate

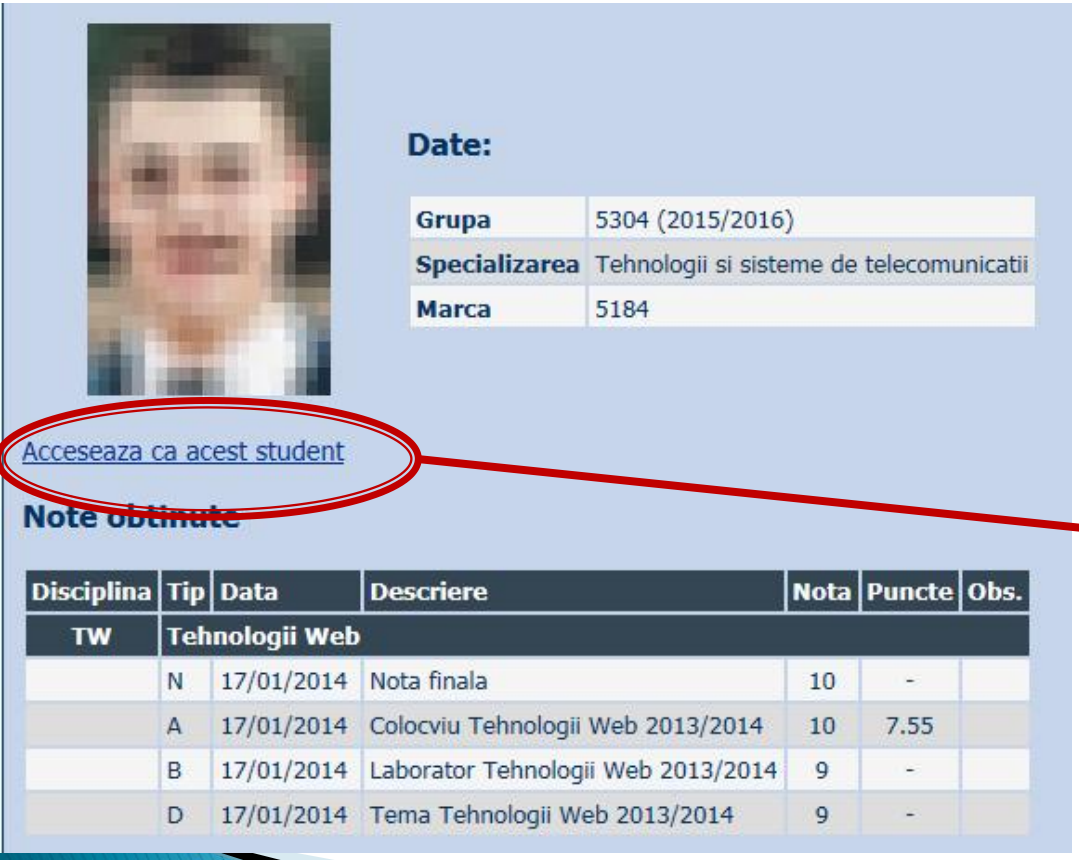
- **Minim** 7 prezente
- 0.5p/3prez
- 3 teste
- foto <C3(4)/<C5(6)

Adrese email

- **Sefii de grupa!**
  - lista cu adrese de email **utilizate** de toti studentii care doresc acces la toate informatiile de pe site
    - poate fi @student.etti.tuiasi.ro (@gmail ~~@yahoo~~ etc.)
  - -> **rdamian@etti.tuiasi.ro**

Acces

- Personalizat (parola), Generic (email)



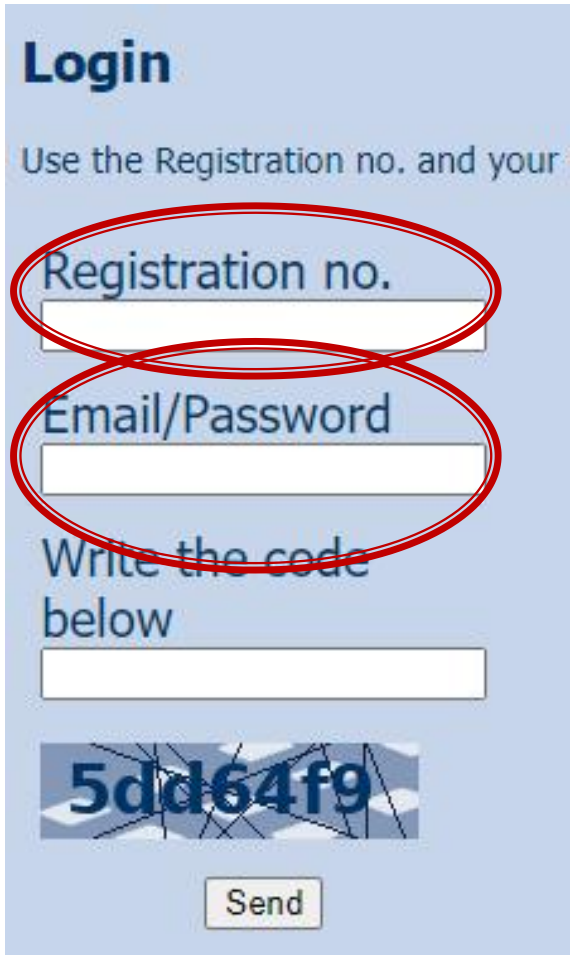
Date:

Grupa	5304 (2015/2016)
Specializarea	Tehnologii si sisteme de telecomunicatii
Marca	5184

Acceseaza ca acest student

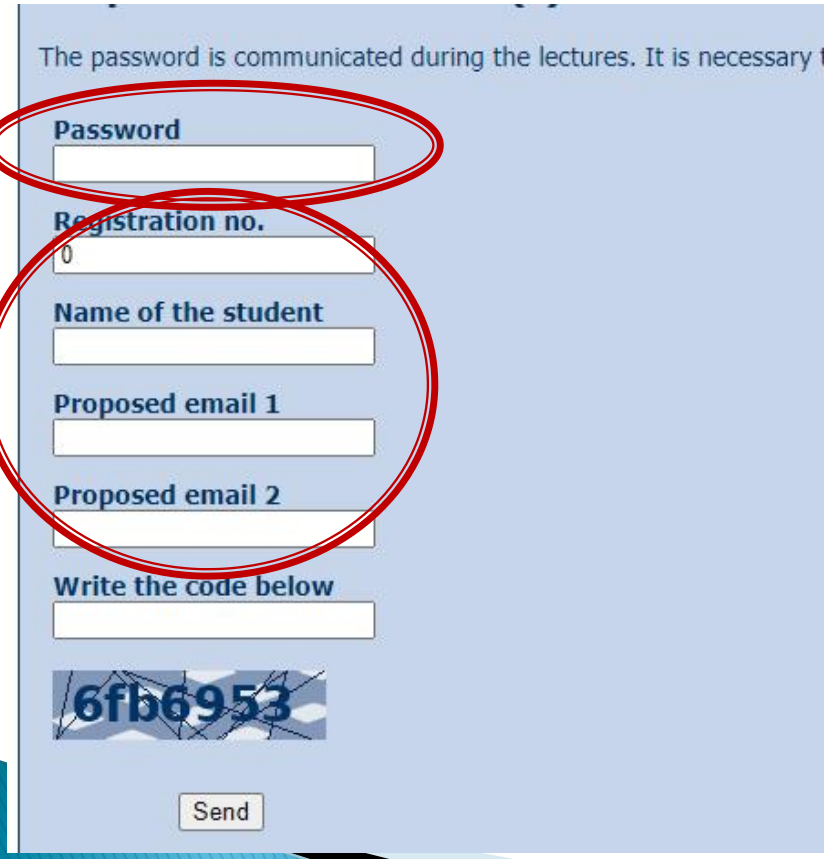
Note obtinute

Disciplina	Tip	Data	Descriere	Nota	Puncte	Obs.
TW	Tehnologii Web					
	N	17/01/2014	Nota finala	10	-	
	A	17/01/2014	Colocviu Tehnologii Web 2013/2014	10	7.55	
	B	17/01/2014	Laborator Tehnologii Web 2013/2014	9	-	
	D	17/01/2014	Tema Tehnologii Web 2013/2014	9	-	



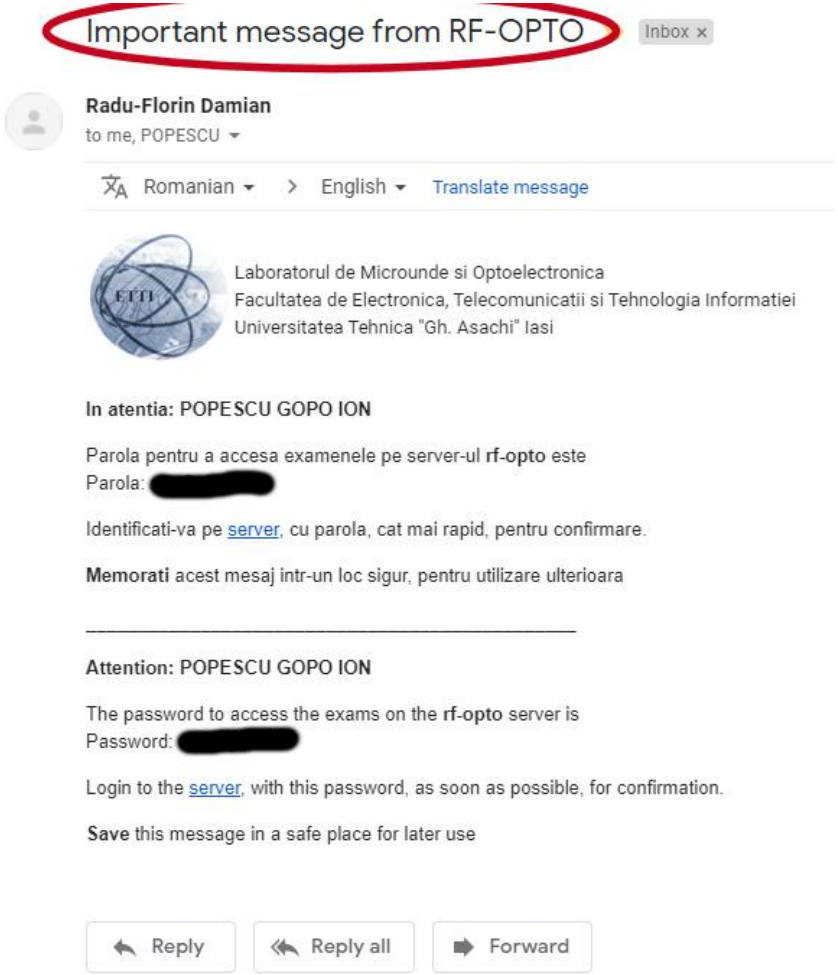
Online – Numar matricol (marca)

- accesul la **examene** necesita **parola** primita prin email



Parola

- primita prin **email**



Important message from RF-OPTO Inbox ×

Radu-Florin Damian
to me, POPESCU

Romanian > English Translate message

Laboratorul de Microunde si Optoelectronica
Facultatea de Electronica, Telecomunicatii si Tehnologia Informatiei
Universitatea Tehnica "Gh. Asachi" Iasi

In atentia: POPESCU GOPO ION

Parola pentru a accesa examenele pe server-ul **rf-opto** este
Parola: [redacted]

Identificati-va pe server, cu parola, cat mai rapid, pentru confirmare.

Memorati acest mesaj intr-un loc sigur, pentru utilizare ulterioara

---

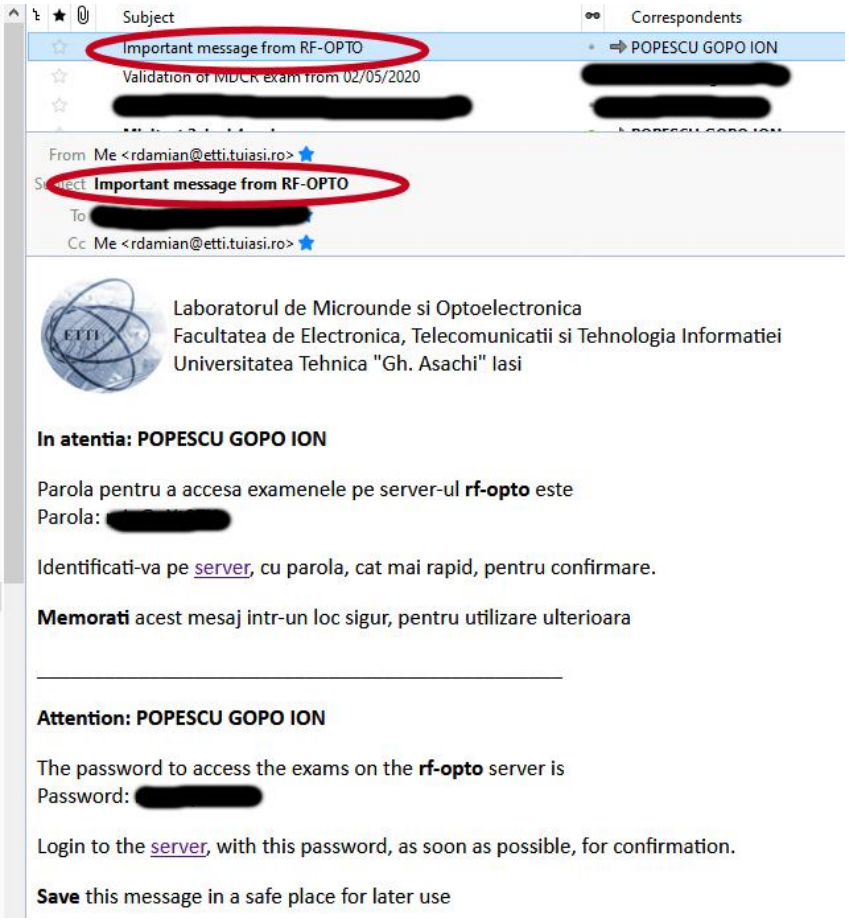
Attention: POPESCU GOPO ION

The password to access the exams on the **rf-opto** server is
Password: [redacted]

Login to the server, with this password, as soon as possible, for confirmation.

Save this message in a safe place for later use

Reply Reply all Forward



Subject | Correspondents

Important message from RF-OPTO | POPESCU GOPO ION

Validation of MDCR exam from 02/05/2020 | [redacted]

[redacted]

From Me <rdamian@etti.tuiasi.ro>
Subject **Important message from RF-OPTO**
To [redacted]
Cc Me <rdamian@etti.tuiasi.ro>

Laboratorul de Microunde si Optoelectronica
Facultatea de Electronica, Telecomunicatii si Tehnologia Informatiei
Universitatea Tehnica "Gh. Asachi" Iasi

In atentia: POPESCU GOPO ION

Parola pentru a accesa examenele pe server-ul **rf-opto** este
Parola: [redacted]

Identificati-va pe server, cu parola, cat mai rapid, pentru confirmare.

Memorati acest mesaj intr-un loc sigur, pentru utilizare ulterioara

---

Attention: POPESCU GOPO ION

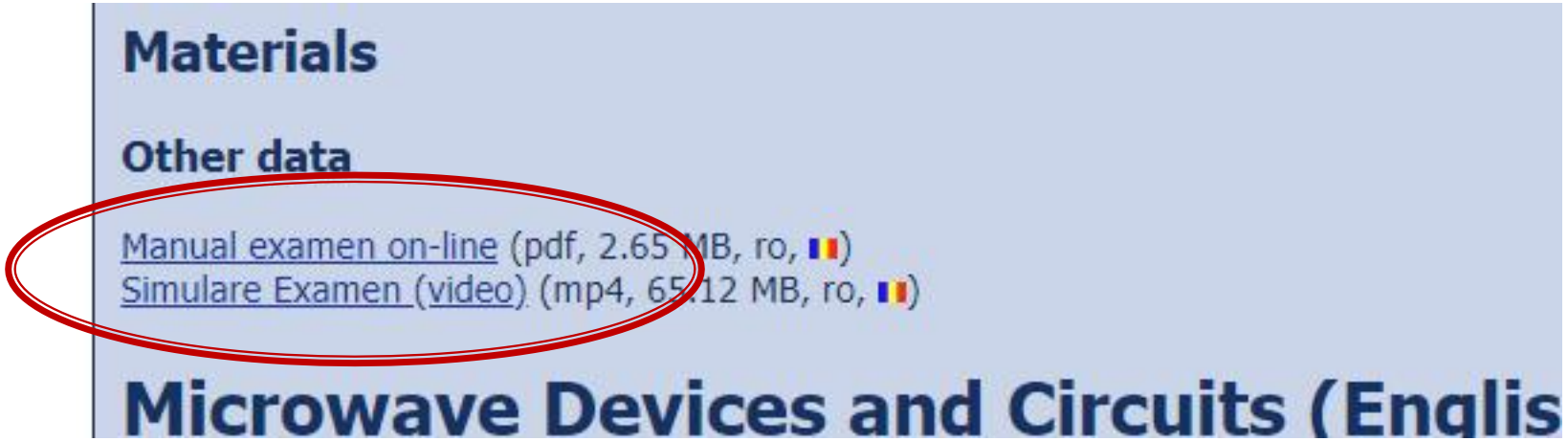
The password to access the exams on the **rf-opto** server is
Password: [redacted]

Login to the server, with this password, as soon as possible, for confirmation.

Save this message in a safe place for later use

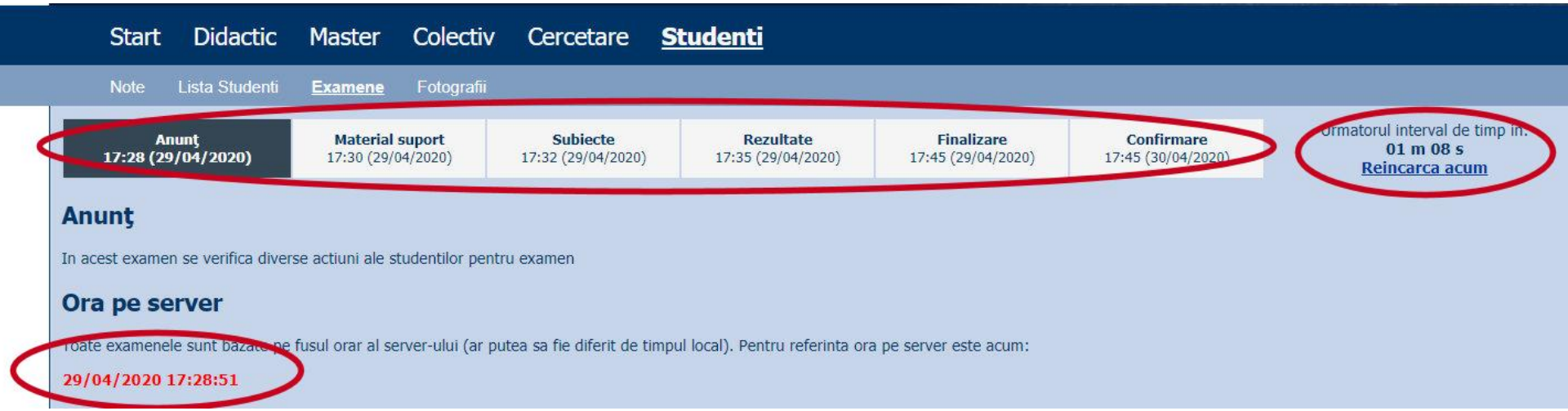
Manual examen online

- Aplicatia de examen online utilizata la:
  - ~~curs (prezenta)~~
  - ~~miniteste~~
  - ~~examen~~

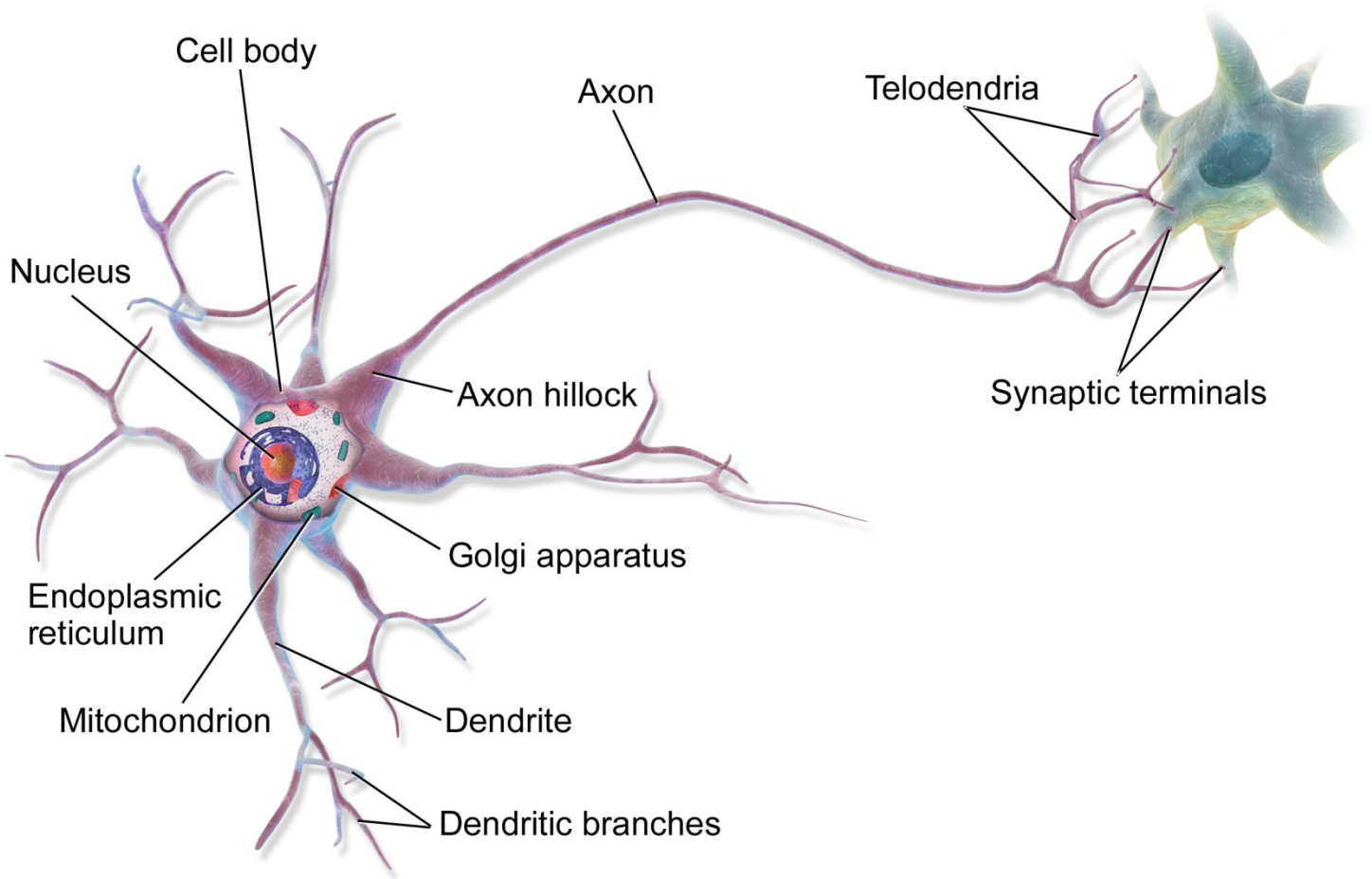


Examen online

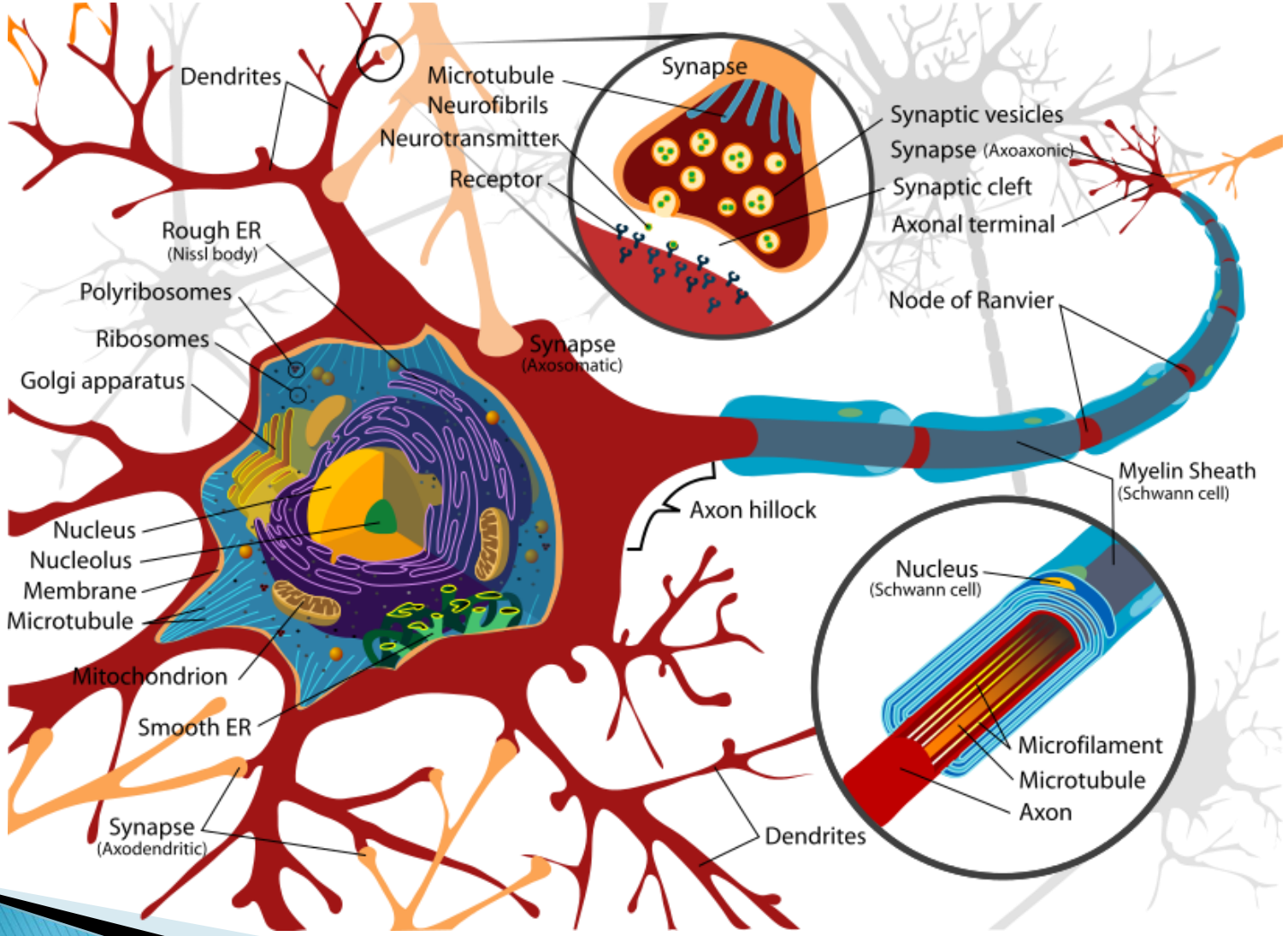
- intotdeauna **contratimp**
  - perioada lunga (prezenta curs/fotografii)
  - ~~perioada scurta (teste: 15min, examen: 2h)~~



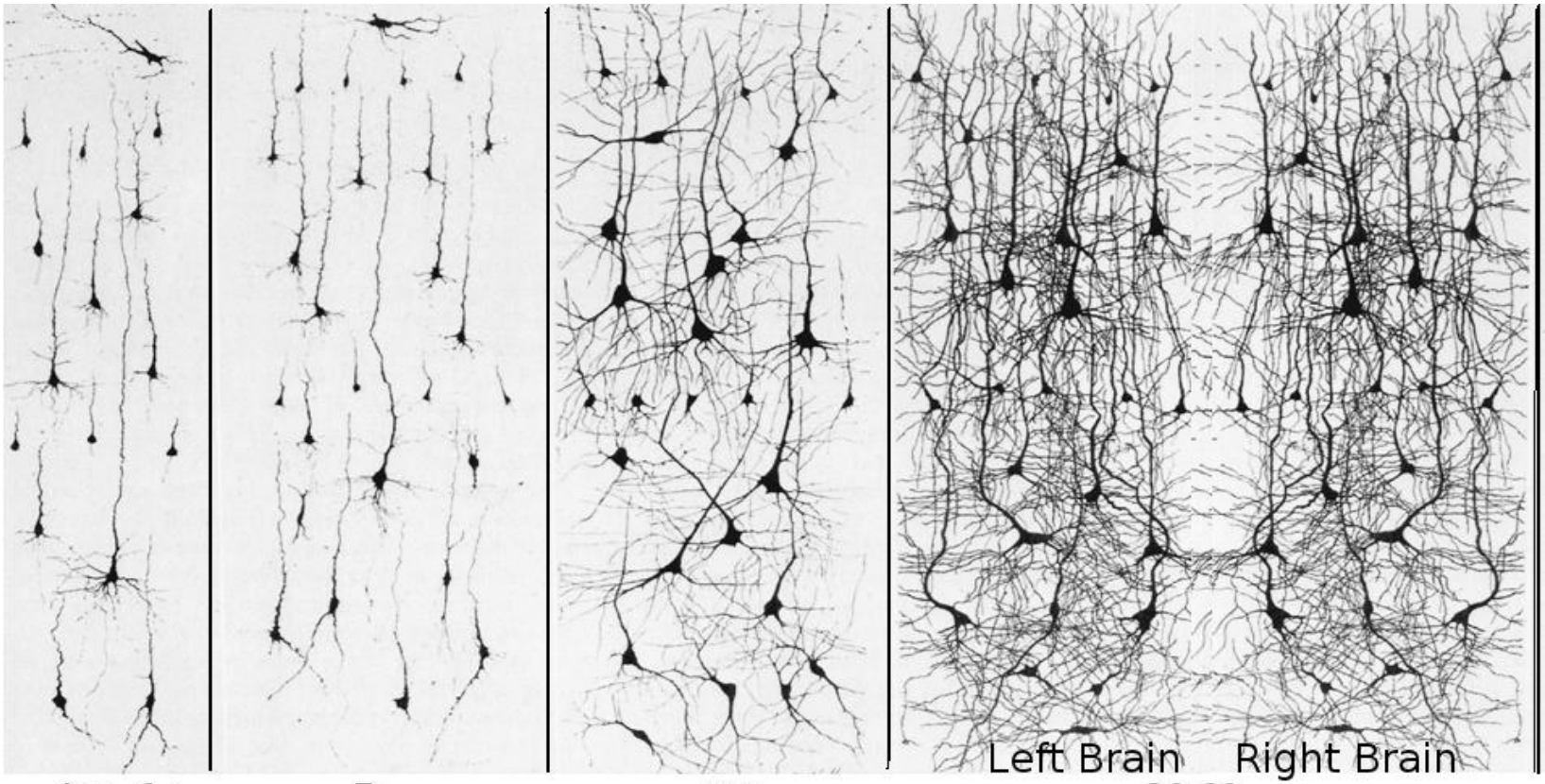
Scop 1


Cell body
Axon
Telodendria
Nucleus
Axon hillock
Synaptic terminals
Golgi apparatus
Endoplasmic reticulum
Mitochondrion
Dendrite
Dendritic branches

Scop 2


Dendrites
Microtubule
Neurofibrils
Neurotransmitter
Receptor
Synapse
Synaptic vesicles
Synapse (Axoaxonic)
Synaptic cleft
Axonal terminal
Rough ER
(Nissl body)
Polyribosomes
Ribosomes
Golgi apparatus
Synapse
(Axosomatic)
Node of Ranvier
Myelin Sheath
(Schwann cell)
Axon hillock
Nucleus
Nucleolus
Membrane
Microtubule
Mitochondrion
Smooth ER
Synapse
(Axodendritic)
Dendrites
Nucleus
(Schwann cell)
Microfilament
Microtubule
Axon

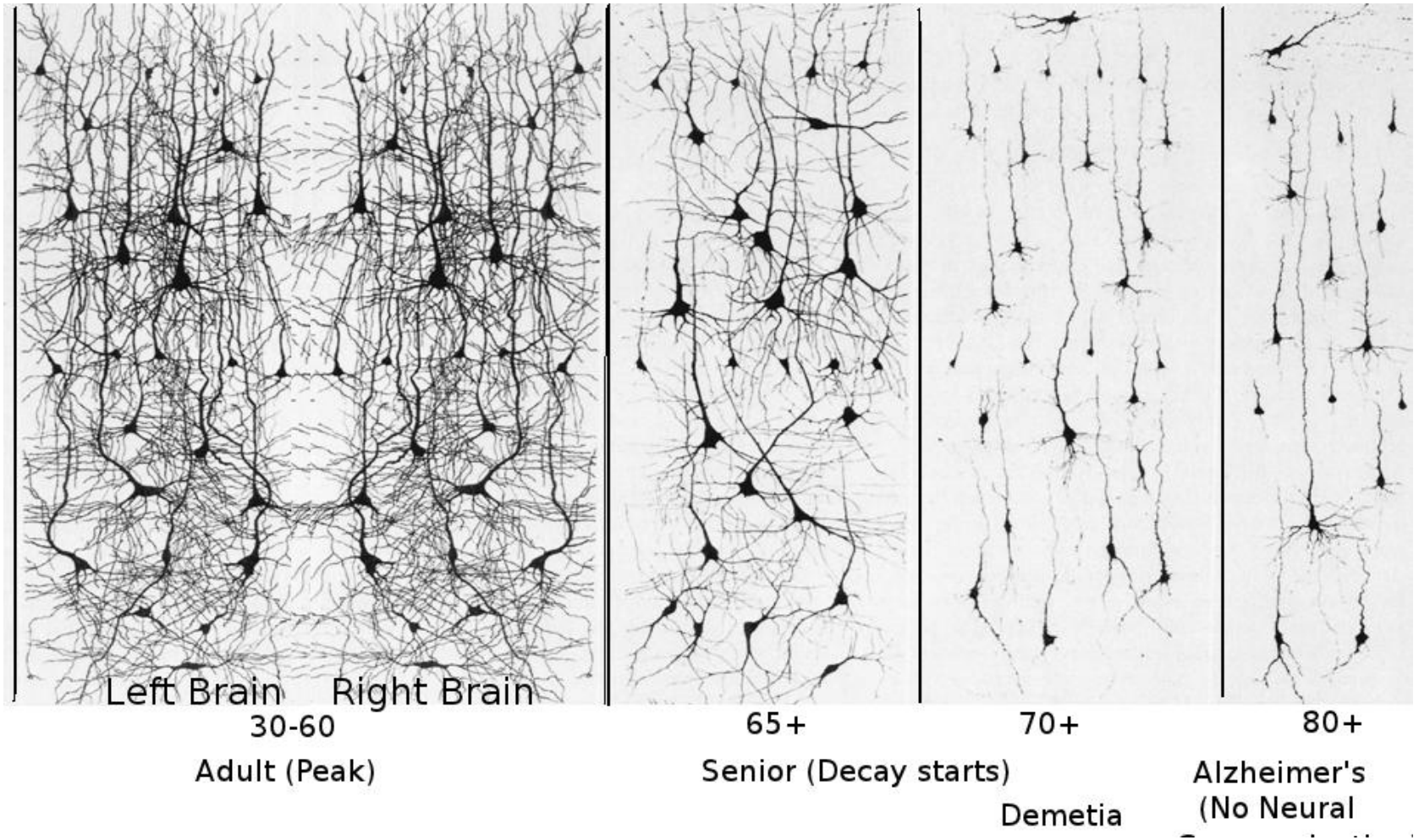
Scop 3


Left Brain
Right Brain
Age 1+
Infant-
-birth
7+
Child-
13+
-Teen
30-60
Adult (Peak)
(Stimulation and Growth)

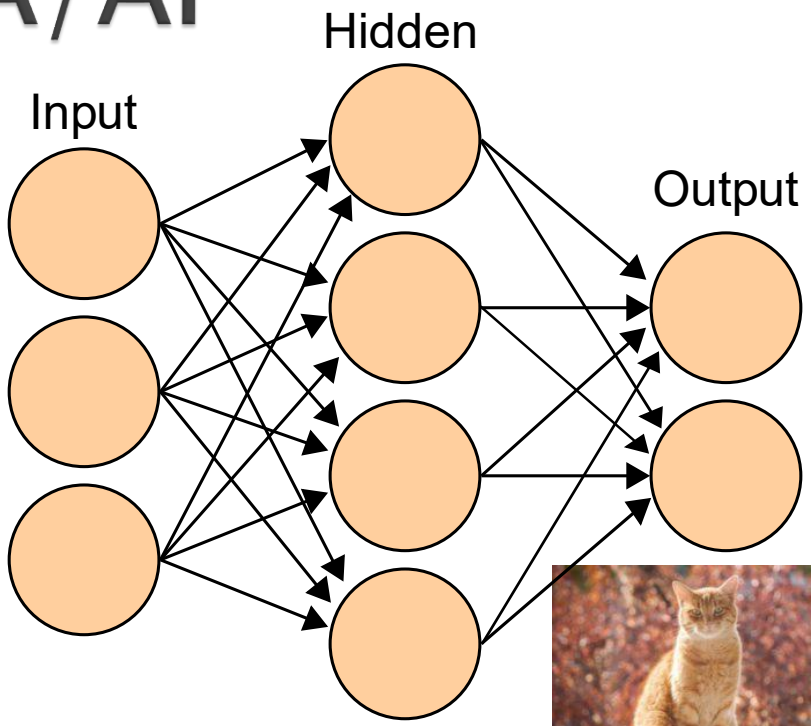
Scop 4

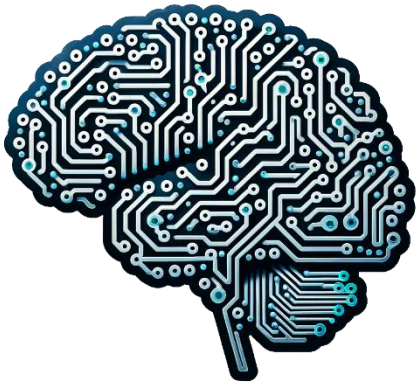
Sinapse “inginerești”

Termen


Left Brain
Right Brain
30-60
Adult (Peak)
65+
Senior (Decay starts)
70+
Demetia
80+
Alzheimer's
(No Neural

IA/AI





IA/AI+ IN/NI

SUPERVISED LEARNING

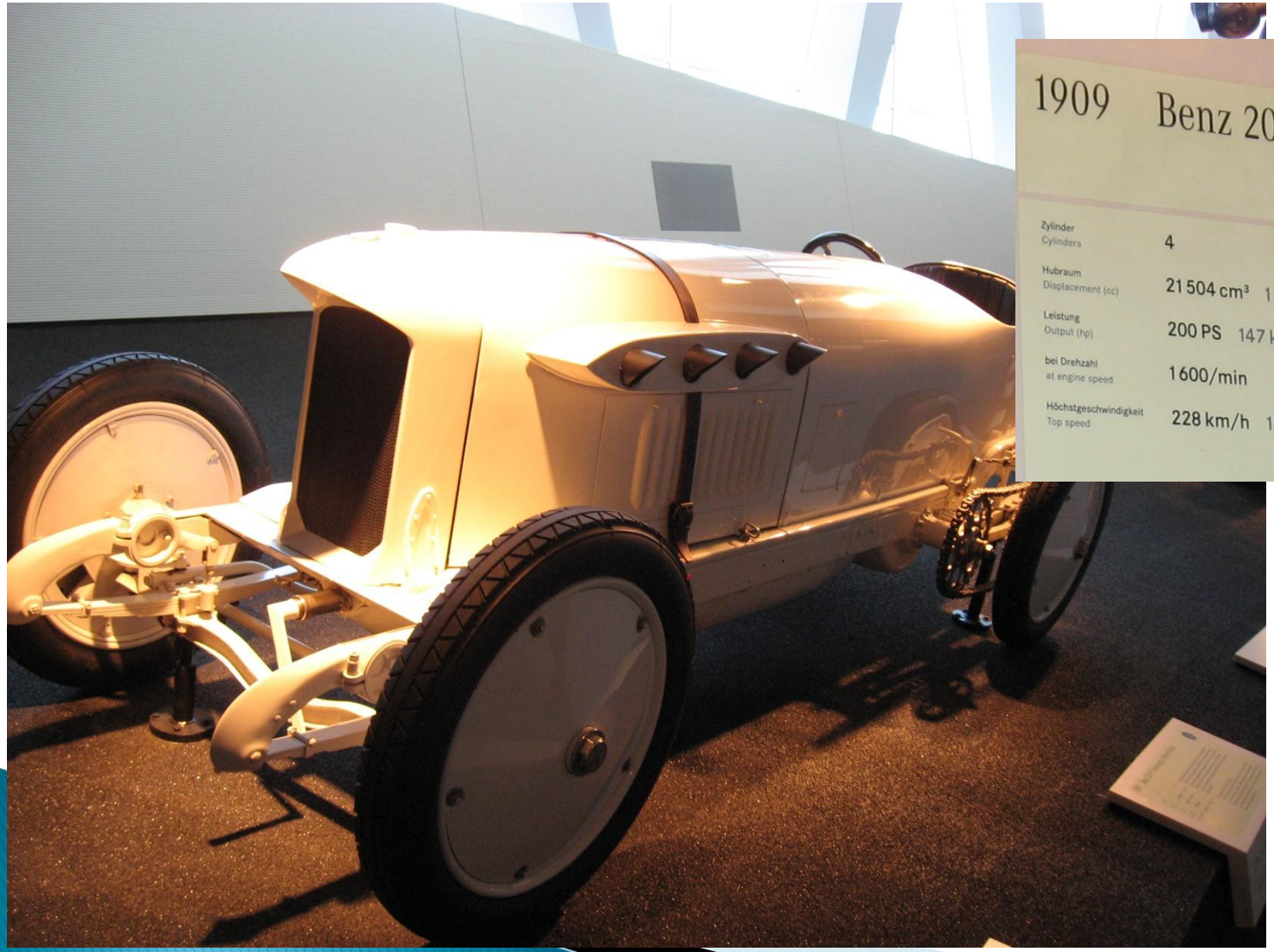
UNSUPERVISED LEARNING

REINFORCEMENT LEARNING

~1930

~1930

1909



1909 Benz 200 PS Rennwagen »Blitzen

Zylinder Cylinders	4	
Hubraum Displacement (cc)	21 504 cm³	1 312 cu in
Leistung Output (hp)	200 PS	147 kW
bei Drehzahl at engine speed	1 600/min	
Höchstgeschwindigkeit Top speed	228 km/h	142 mph

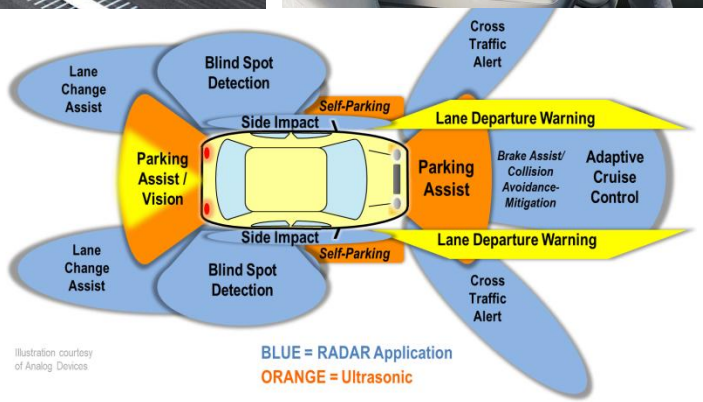
Der »Blitzen-Benz« ist 1909 der erste
200 km/h fährt. Seine größten Erfo
zylindermotor ausgestattete Rekor
Burman mit 228 km/h über die Sa
ist damit das schnellste Fahrzeug
jede Eisenbahn.

Benz »Lightning Benz« 200 hp rac
In 1909 the Lightning Benz

1930-1950

Tehnologie

> 2010



< 1950

Tehnologie

1x1 = 1 1x2 = 2 1x3 = 3 1x4 = 4 1x5 = 5 1x6 = 6 1x7 = 7 1x8 = 8 1x9 = 9 1x10 = 10	2x1 = 2 2x2 = 4 2x3 = 6 2x4 = 8 2x5 = 10 2x6 = 12 2x7 = 14 2x8 = 16 2x9 = 18 2x10 = 20	3x1 = 3 3x2 = 6 3x3 = 9 3x4 = 12 3x5 = 15 3x6 = 18 3x7 = 21 3x8 = 24 3x9 = 27 3x10 = 30	4x1 = 4 4x2 = 8 4x3 = 12 4x4 = 16 4x5 = 20 4x6 = 24 4x7 = 28 4x8 = 32 4x9 = 36 4x10 = 40	5x1 = 5 5x2 = 10 5x3 = 15 5x4 = 20 5x5 = 25 5x6 = 30 5x7 = 35 5x8 = 40 5x9 = 45 5x10 = 50
6x1 = 6 6x2 = 12 6x3 = 18 6x4 = 24 6x5 = 30 6x6 = 36 6x7 = 42 6x8 = 48 6x9 = 54 6x10 = 60	7x1 = 7 7x2 = 14 7x3 = 21 7x4 = 28 7x5 = 35 7x6 = 42 7x7 = 49 7x8 = 56 7x9 = 63 7x10 = 70	8x1 = 8 8x2 = 16 8x3 = 24 8x4 = 32 8x5 = 45 8x6 = 48 8x7 = 56 8x8 = 64 8x9 = 72 8x10 = 80	9x1 = 9 9x2 = 18 9x3 = 27 9x4 = 36 9x5 = 45 9x6 = 54 9x7 = 63 9x8 = 72 9x9 = 81 9x10 = 90	10x1 = 10 10x2 = 20 10x3 = 30 10x4 = 40 10x5 = 50 10x6 = 60 10x7 = 70 10x8 = 80 10x9 = 90 10x10 = 100

2x1 = 2
2x2 = 4
2x3 = 6
2x4 = 8
2x5 = 10
2x6 = 12
2x7 = 14
2x8 = 16
2x9 = 18
2x10 = 20

Examen

- subiecte individuale
- Note
  - 2007: 9.67±0.66/8.81±1.22
  - 2008: 6.24±1.36/ 4.82±2.10
  - 2009: 5.10±1.46
  - 2010: 3.89±1.32
- La prima aplicare (neanuntata)
  - 50% din studenti au parasit examenul in primele 10 minute
  - 50% din cei ramasi nu au promovat
  - promovabilitate totala **25%**, rata contestatiilor: **0%**
- Urmatoarele examinari (anuntate)
  - rata contestatiilor: 0%

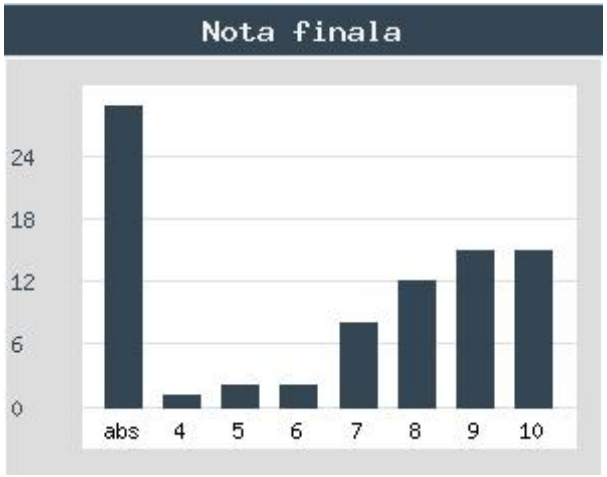
Examen

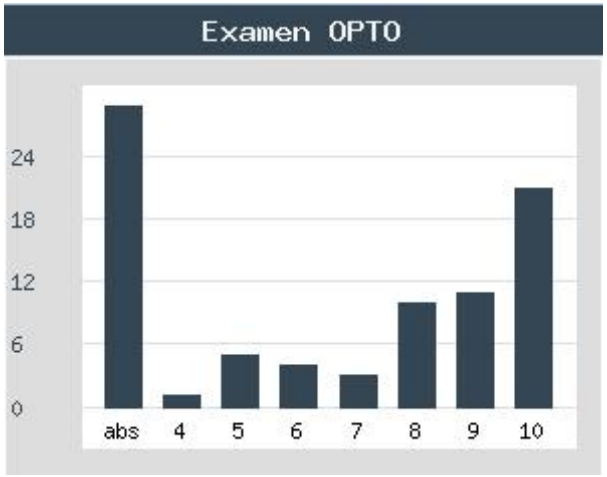
Examen

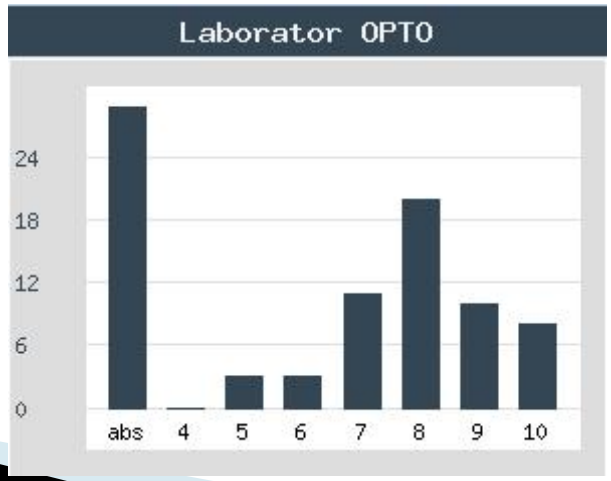
- subiecte **individuale**

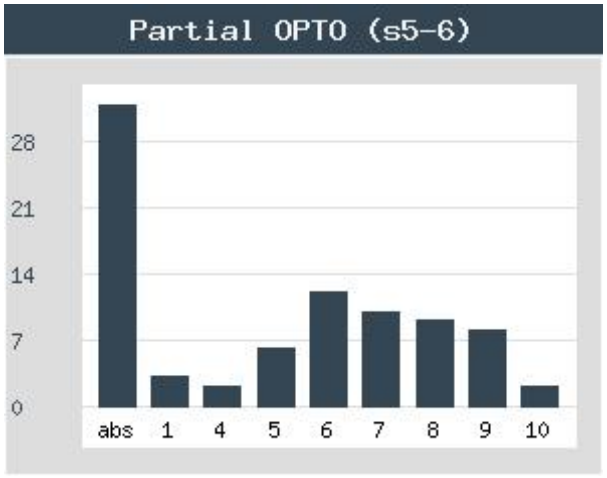
Note

- 2018/2019 – clasic



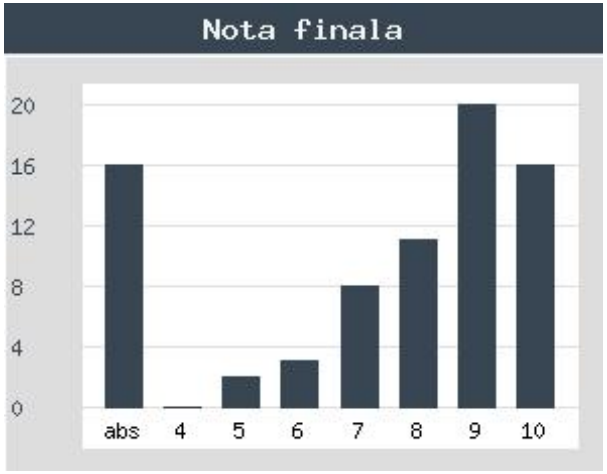


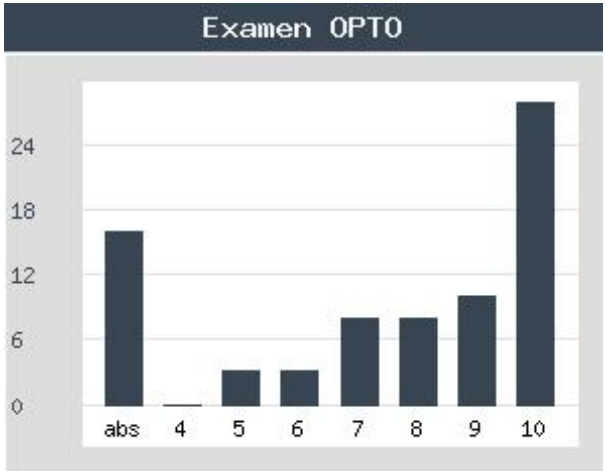


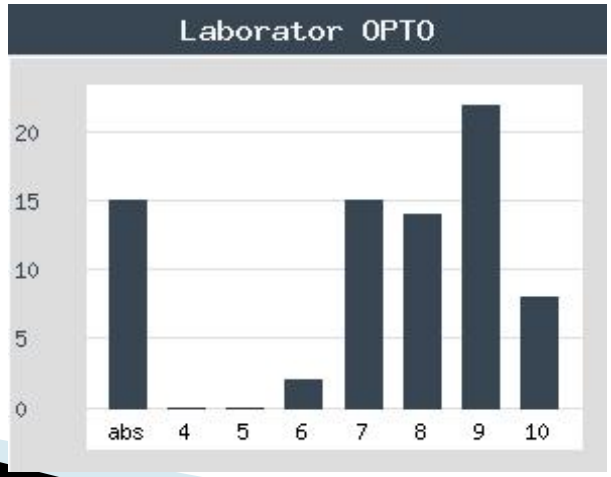


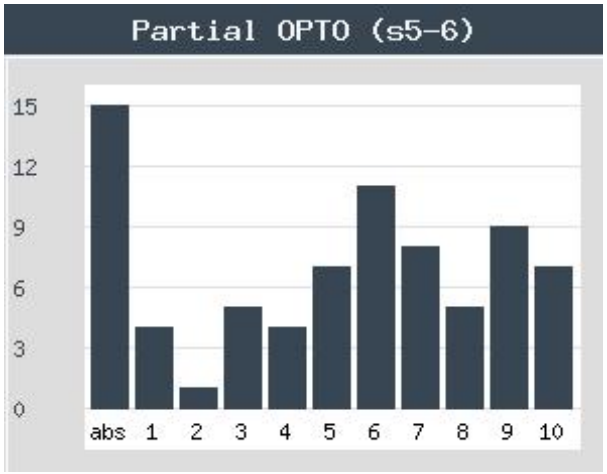
Note

- 2019/2020 – online



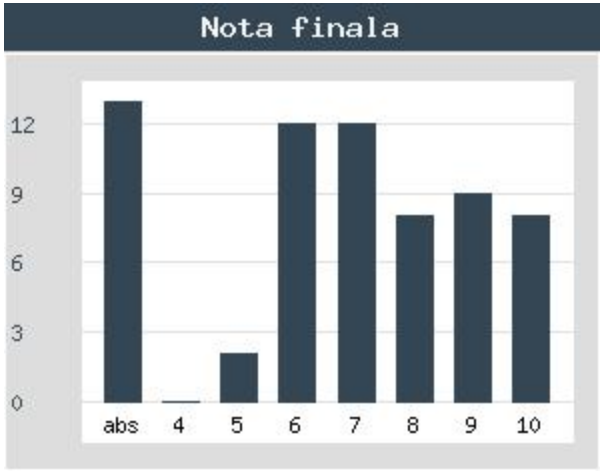


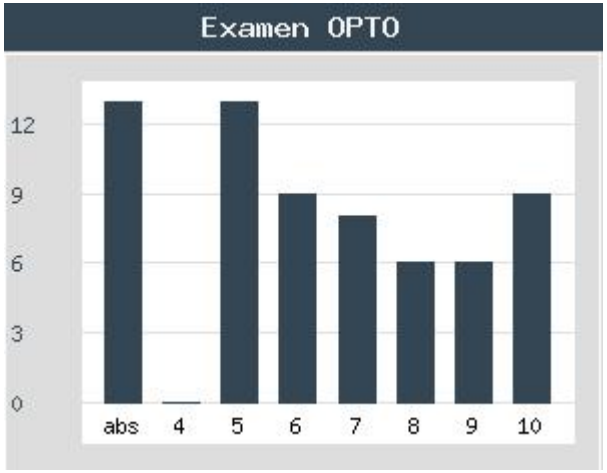


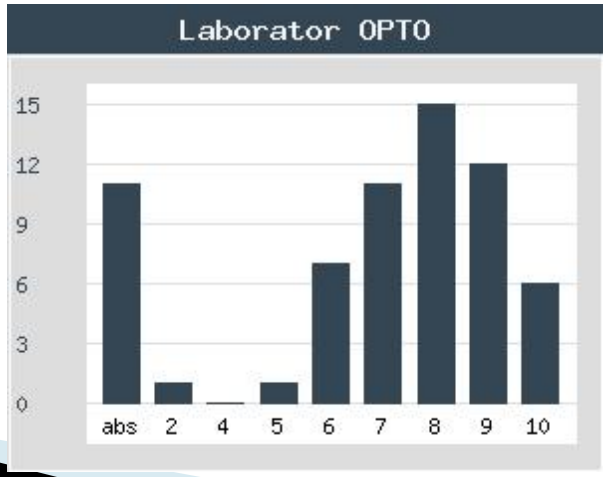


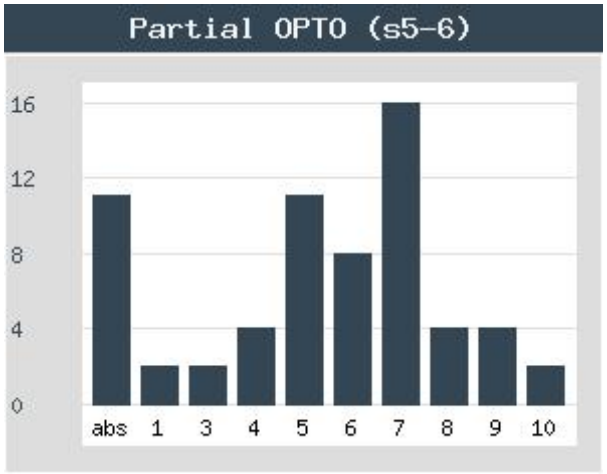
Note

- 2022/2023 – clasic



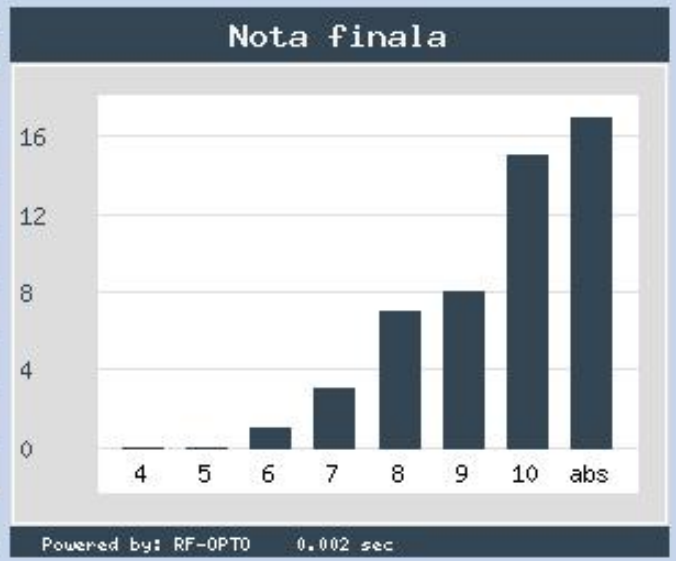




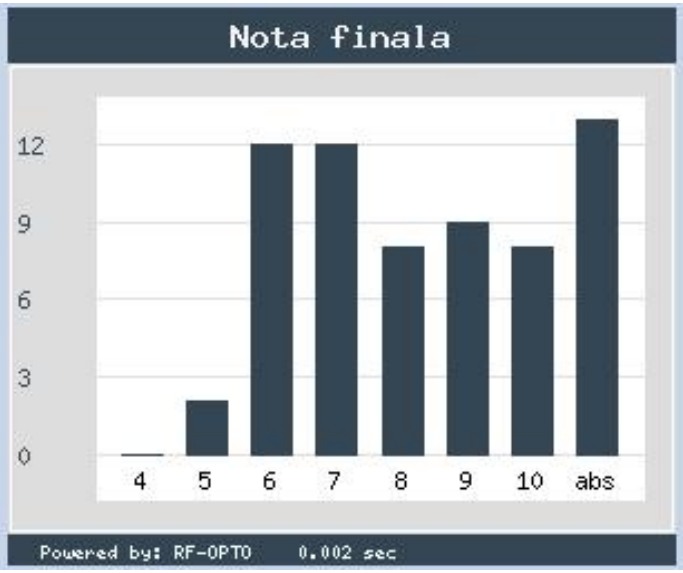


Optoelectronica 2023/2024

Nota.	Numar
4	0
5	0
6	1
7	3
8	7
9	8
10	15
abs	17
TOTAL	51



Nota.	Numar
4	0
5	2
6	12
7	12
8	8
9	9
10	8
abs	13
TOTAL	64



2023/2024

- **Bonus**
  - max: 5.4
  - med: 3

2022/2023

Reprezentare logaritmică

$dB = 10 \cdot \log_{10}(P_2 / P_1)$

$dBm = 10 \cdot \log_{10}(P / 1\ mW)$

0 dB	= 1
+ 0.1 dB	= 1.023 (+2.3%)
+ 3 dB	= 2
+ 5 dB	= 3
+ 10 dB	= 10
−3 dB	= 0.5
−10 dB	= 0.1
−20 dB	= 0.01
−30 dB	= 0.001

0 dBm	= 1 mW
3 dBm	= 2 mW
5 dBm	= 3 mW
10 dBm	= 10 mW
20 dBm	= 100 mW
−3 dBm	= 0.5 mW
−10 dBm	= 100 μW
−30 dBm	= 1 μW
−60 dBm	= 1 nW

[dBm] + [dB] = [dBm]

[dBm/Hz] + [dB] = [dBm/Hz]

[x] + [dB] = [x]

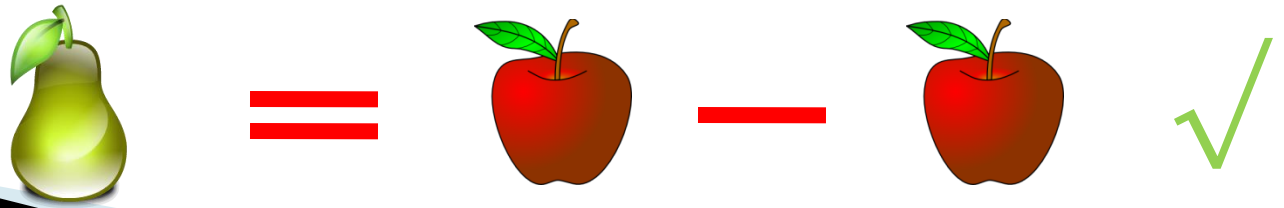
Calculul atenuarii/amplificarii

$$\text{Atenuare/Amplificare} = \frac{P_{out}}{P_{in}}$$

$$\text{Atenuare}[\text{dB}] = [-]10 \cdot \log_{10}\left(\frac{P_{out}}{P_{in}}\right)$$

$$\text{Atenuare}[\text{dB}] = [-]10 \cdot \log_{10}\left(\frac{P_{out}}{P_0} \cdot \frac{P_0}{P_{in}}\right) = [-]10 \cdot \left[\log_{10}\left(\frac{P_{out}}{P_0}\right) - \log_{10}\left(\frac{P_{in}}{P_0}\right)\right]$$

$$\text{Pierderi}[\text{dB}] = [-]\left(P_{out}[\text{dBm}] - P_{in}[\text{dBm}]\right)$$



Calculul atenuarii/amplificarii

$$\text{Atenuare} = \frac{P_{out}}{P_{in}} < 1 \qquad \text{Pierderi[dB]} = 10 \cdot \log_{10}\left(\frac{P_{out}}{P_{in}}\right) < 0$$

$$\text{Pierderi/Atenuare[dB]} = [-]\ 10 \cdot \log_{10}\left(\frac{P_{out}}{P_{in}}\right)$$

$$\text{Castig} = \frac{P_{out}}{P_{in}} > 1 \qquad \text{Castig[dB]} = 10 \cdot \log_{10}\left(\frac{P_{out}}{P_{in}}\right) > 0$$

$$\text{Atenuare[dB/km]} = \frac{\text{Pierderi[dB]}}{\text{Lungime[km]}}$$

Calculul atenuarii/amplificarii

Pierderi/Atenuare $\rightarrow P_{out} < P_{in} \rightarrow P_{out}[\text{dBm}] < P_{in}[\text{dBm}]$

$$P_{out}[\text{dBm}] = P_{in}[\text{dBm}] - \text{Pierderi/Atenuare}[\text{dB}]$$

Castig/Amplificare $\rightarrow P_{out} > P_{in} \rightarrow P_{out}[\text{dBm}] > P_{in}[\text{dBm}]$

$$P_{out}[\text{dBm}] = P_{in}[\text{dBm}] + \text{Castig/Amplificare}[\text{dB}]$$

Contact

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