

Nano Proteomics-based Personalized Medicine Summer Course 2024

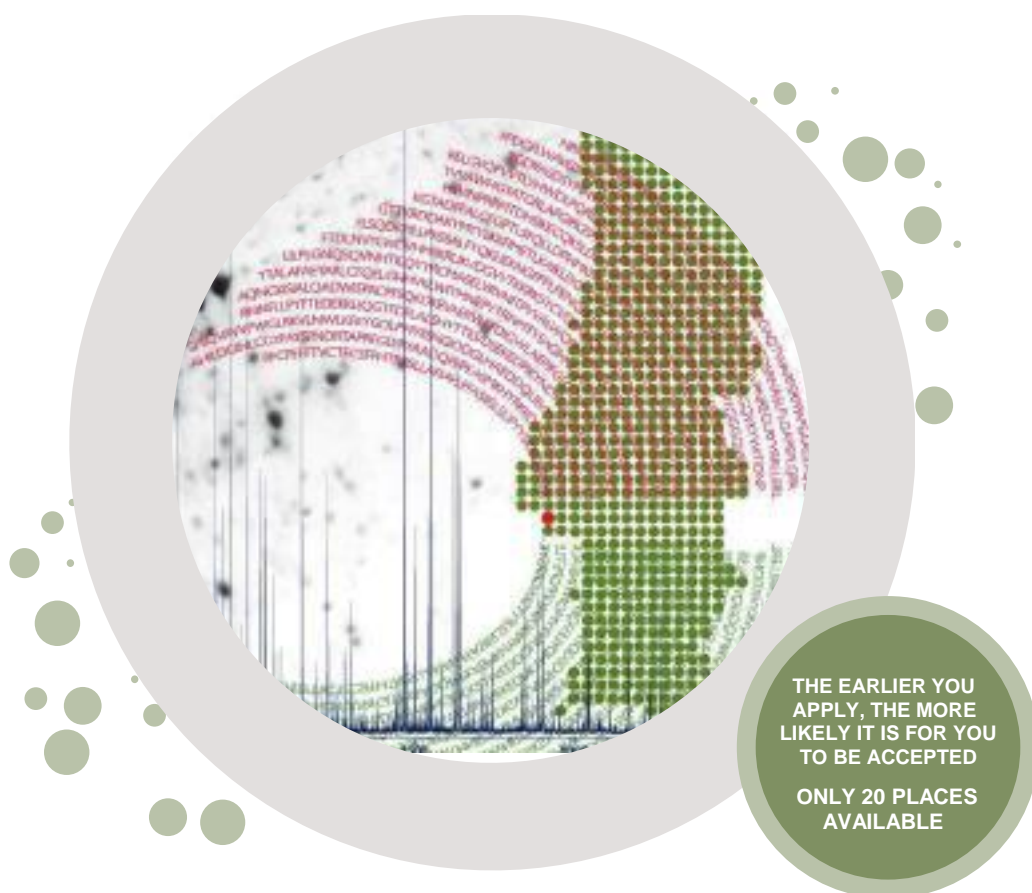
Powered by the BIOSCOPE Research Group

3rd – 7th June 2024

NOVA School of Science and Technology (FCT – NOVA), Caparica, Portugal

<https://summercourse.bioscopegroup.org>

INNOVATION. COLLABORATION. BEYOND SCIENCE



THE EARLIER YOU
APPLY, THE MORE
LIKELY IT IS FOR YOU
TO BE ACCEPTED

ONLY 20 PLACES
AVAILABLE

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THE HISTORY OF...

NANOTECHNOLOGY

1857

Michael Faraday discovered the metallic gold colloids, which led to the discovery of the Faraday-Tyndall effect. For this reason, Faraday is considered one of the first researchers into the nanoscience and nanotechnology field

1959

Richard Feynman gave the first lecture on nanotechnology and nanoscience entitled, "There's Plenty of Room at the Bottom"

1974

Norio Taniguchi first used the term "Nanotechnology" in a paper where he described the characteristic controls on the order of a nanometer

1981

Gerd Binnig and Heinrich Rohrer invented the scanning tunneling microscope, which allowed scientists to see individual atoms for the first time

1985

The Interagency Working Group on Nanotechnology (IWGN) was formed

2000s

National Nanotechnology Initiative (NNI). Nanotechnology reaches the marketplace

2006

James Tour and colleagues at Rice University build a nanoscale car

2010s

Development of targeted drug delivery systems using nanoparticles, modernizing medicine and healthcare

2017

Nanomaterials began revolutionizing energy efficiency, with advancements in solar cells and fuel cells promising more efficient and sustainable energy

2020

Advancements in electronics toward smaller sizes, with the development of nanometric transistors and materials like graphene

2023

Moungi G. Bawendi, Louis E. Brus and Alexei I. Ekimov won Nobel Prize of Chemistry in *Quantum Dots* synthesis

PROTEOMICS

1971

Automated Edman sequencing, ELISA technique

1977

DNA Sequencing (Sanger Method)

1979

First software for DNA sequence assembly

1988

MALDI-TOF (>10 kD), phage display, DNA pyrosequencing invented

1994

Introduction of the concept of PROTEOME. Correlation of tandem MS data with protein databases

1996

Yeast PROTEOME (MALDI/ESI), real-time DNA pyrosequencing. Data-controlled automated LC-MS/MS

2002

Yeast phosphoproteome, SILAC labelling, PAI

2005

454 pyrosequencing, emPAI

2008

Absolute SILAC

2010

Aptamer-based multiplexed proteomics

2015

Advancements in Data-Independent Acquisition (DIA) Mass Spectrometry

2016

Trapped Ion Mobility Spectrometry

2018

Parallel accumulation-serial fragmentation (PASEF)

2023

Prescriptomics

“... With the sequencing of the human genome, personalized medicine is becoming a reality. In the future, medical treatments will be tailored to the individual genetic needs of each patient...”

James D. Watson

OUR TEACHING STAFF

INVITED PROFESSORS



Jacek Wisniewski, PhD
Max-Planck-Institute of Biochemistry
(Germany)



Laura Mercolini, PhD
University of Bologna
(Italy)



António Jacinto, PhD
NOVA Institute for Medical
Systems Biology
(Portugal)

BIOSCOPE PROFESSORS



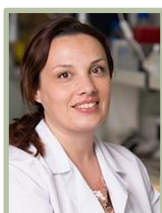
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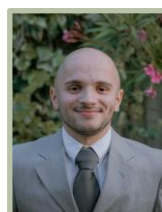
Javier F. Lodeiro, PhD
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Luís Carvalho, PhD
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(Course Coordinator)



Inês Domingos, MSc
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(Course Manager)



André Figueiredo, MSc
NOVA University of Lisbon
(Portugal)



Gonçalo Pedro, MSc
NOVA University of Lisbon
(Portugal)

THE COURSE

LEARNING OUTCOMES

- Synthesis of magnetic nanoparticles
- Functionalization of magnetic nanoparticles
- Use of nanoparticles in proteomics: Proteomic fractionation
- Protein identification & quantification
- Mass spectrometry-based personalized medicine
- Bioinformatics I: Protein identification and quantification
- Bioinformatics II: Prescriptomics and Personalized Medicine

COURSE OUTLINE

Nano-synthesis and characterization

- Synthesis of magnetic gold nanoparticles
- Characterization of magnetic nanoparticles by DLS and Z-potential

Proteomics and Personalized Medicine

- Proteome extraction in liquid biopsies and total protein quantification
- Proteomic sample preparation: Filter Aided Sample Preparation (FASP)
- Protein identification by Mass Spectrometry: MaxQuant
- Label-free quantification by MS: Total Protein Approach (TPA)
- Bioinformatics: MaxQuant, Perseus & Cytoscape
- Differential Personalized Pathway Index (dPPI) for Personalized Medicine

Summer Course 2024

3rd – 7th June

3rd June | Monday

9:00	Registration
9:30	Introduction to Proteomics Professor Capelo
10:30	Coffee break
11:30	Introduction to Nanoparticles Professor Lodeiro
12:30	Networking Lunch
14:00	Hands-on A: Nanosynthesis I Professor Fernández & Professor Pedro Hands-on B: Proteomics I Professor Carvalho & Professor Domingos
16:00	Coffee break
16:30	Hands-on A: Proteomics I Professor Carvalho & Professor Domingos Hands-on B: Nanosynthesis I Professor Fernández & Professor Pedro

4th June | Tuesday

9:00	Introduction to Biopsies Sampling and Preservation Professor Mercolini
11:00	Coffee break
11:15	Hand-on A B: Filter Aided Sample Preparation protocol (FASP)
13:15	Networking Lunch
14:00	Hand-on A B: Filter Aided Sample Preparation protocol (FASP)
16:00	Coffee break
16:30	Hand-on A B: Filter Aided Sample Preparation protocol (FASP)

5th June | Wednesday

9:30	Personalized Medicine & dPPi Professor Carvalho
10:30	Coffee break
11:30	Hand-on A B: MS data acquisition Professor Carvalho, Santos & Capelo
12:30	Networking Lunch
14:00	Hand-on A B: Bioinformatics I – MaxQuant Professor Carvalho, Santos & Capelo
16:00	Coffee break
16:30	All together – Beach time @ Costa de Caparica
19:30	Sunset @ Costa de Caparica

6th June | Thursday

9:30	Personalized Medicine in 21 st century Professor Jacinto
10:30	Coffee break
11:30	Hand-on A B: Bioinformatics I – MaxQuant Professor Carvalho, Santos & Capelo
12:30	Networking Lunch
14:00	Hand-on A B: Bioinformatics II – Perseus & Cytoscape Professor Carvalho, Santos & Capelo
16:00	Coffee break
16:30	Hand-on A B: Bioinformatics II – Perseus & Cytoscape Professor Carvalho, Santos & Capelo

7th June | Friday

9:00	Total Protein Approach (TPA) Professor Wisniewski
10:30	Coffee break
11:00	Hands-on A B: Bioinformatics III – Total Protein Approach Professor Wisniewski
13:00	Networking Lunch

THE VENUE

Faculty of Science and Technology, FCT – NOVA Caparica Campus

Take a look at this → <https://www.youtube.com/watch?v=8DAZq40wmMo>



PRICES

SINGLE TICKET: **1 000 €**

GROUP OF 2: **800 € (each ticket)**

GROUP OF 3 OR MORE: **700 € (each ticket)**

APPLY NOW

For more information visit: <https://summercourse.bioscopegroup.org>

Or e-mail Prof. Capelo at jlcm@fct.unl.pt (subject **Summer Course 2024**)

Or e-mail Inês Domingos at ines.domingos@bioscopegroup.org

Or via whatsapp **+351 919 404 933 (Prof. Capelo)**



RECOMMENDED ACCOMODATION

MERCURE Almada (****)

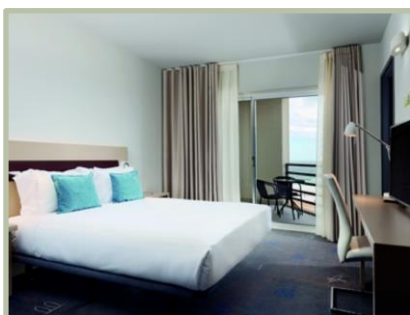


WHY THIS HOTEL?

This Hotel has direct connection with the University through the tram. The Tram station is 450m away from the Hotel and there you can purchase a ticket to take you to the University (line 3 of the Tram Station. Destination: University). The Tram Station near the Hotel is called "Ramalha". A single Tram ticket (one way) costs 0,85€ or 0,75€ (if you purchase 10 at a time).

<https://www.mercure.com/gb/hotel-A040-mercure-lisboa-almada-hotel/index.shtml>

TRYP Lisboa Caparica Mar Hotel (****)



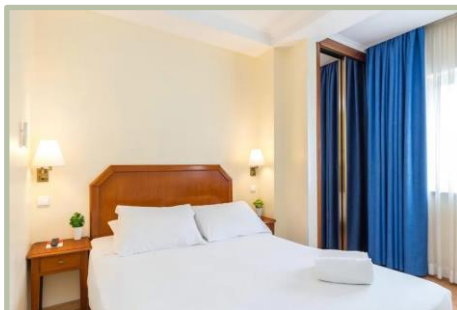
WHY THIS HOTEL?

This Hotel has an excellent location as it is just in front of the Caparica Beach. In order to go to the University you should pick a Taxi. One single journey costs approximately 5 to 8€. You can call for a taxi in the reception of the hotel.

<https://www.tryplisboacaparica.com>

RECOMMENDED ACCOMODATION

Hotel Residencial COLIBRI (**)



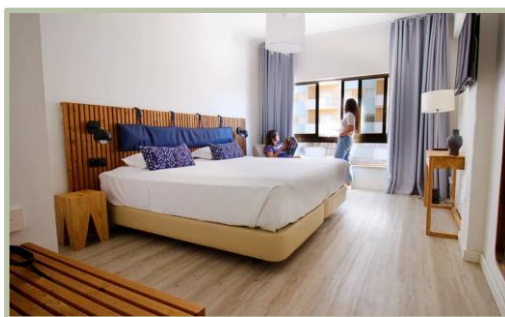
WHY THIS HOTEL?

This Hotel Colibri is located 400 meters from Caparica beach with low-cost rooms and an excellent breakfast.

In order to go to the University you should pick a Taxi. One single journey costs approximately 5 to 8€. You can call for a taxi in the reception of the hotel.

<https://hcolibri.com/>

WOT Costa da Caparica Hotel (**)



This WOT Hotel is located 500 meters from Caparica beach and an excellent breakfast.

In order to go to the University you should pick a Taxi. One single journey costs approximately 5 to 8€. You can call for a taxi in the reception of the hotel.

<https://www.wotels.com/wotcostadacaparica/>