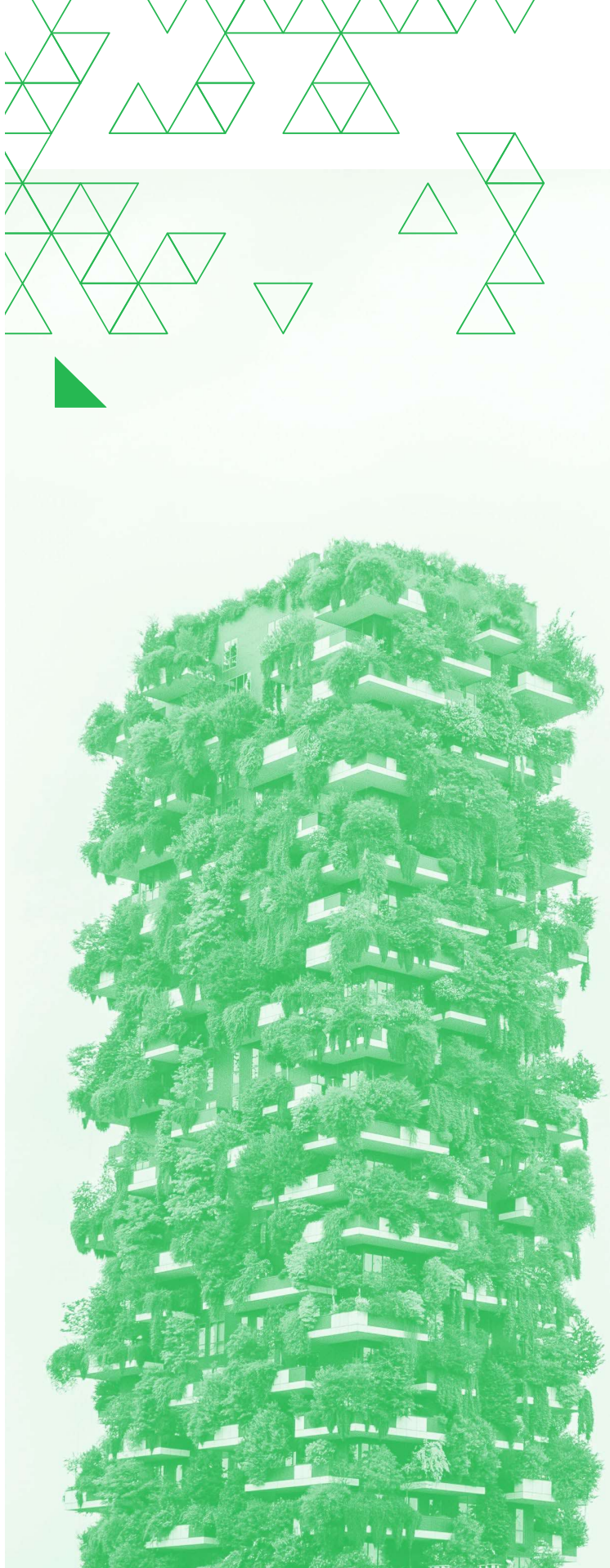


Sustainable Production:

Towards Green Economy

8 - 19 November 2021



“Sustainable consumption and production is about doing more and better with less. It is also about decoupling economic growth from environmental degradation, increasing resource efficiency

and promoting sustainable lifestyles.”

17 Goals to Transform Our
World from United Nations

All over the world, the demand for more sustainable products is increasing.

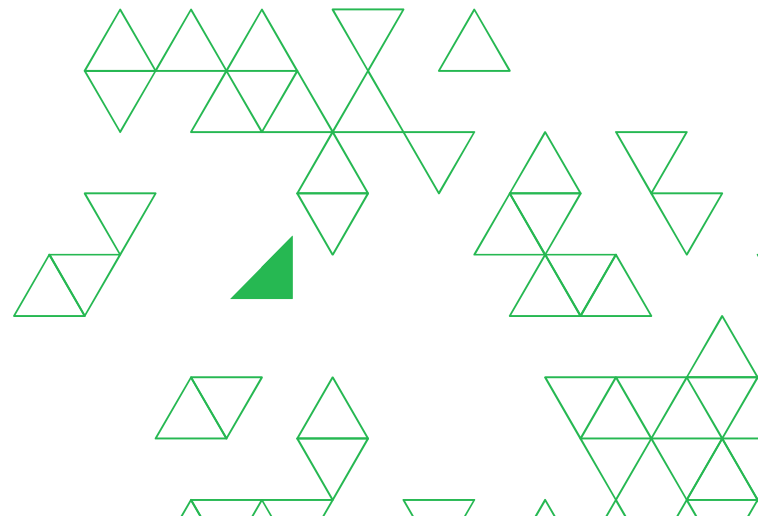
Consumers want to know about the environmental impacts of the products they buy and use. Industry leaders are announcing initiatives to be carbon neutral. Investors are focusing on sustainability initiatives as they set their financial strategies.

While industries are showing greater interest in sustainable production and are undertaking a number of Corporate Social Responsibility initiatives, progress falls far short of meeting these pressing challenges.

Overview

Industry must be restructured, and existing and breakthrough technologies must be more innovatively applied to realise green growth.

Raising efficiency in resource and energy use and engaging in a broad range of innovations to improve environmental performance will help to create new industries and jobs in coming years, towards a green economy and a more sustainable World.





Rational and cost-effective production systems have been key to industrialisation and wealth for decades. However, the area is experiencing change and pressure in different dimensions, which are altering the role of production systems. Requirements of more renewable energy use and circular material flow, increased digitalisation and automation, new manufacturing technologies, as well as service integration and the emergence of new business models are among the phenomena shaping production system development and change.

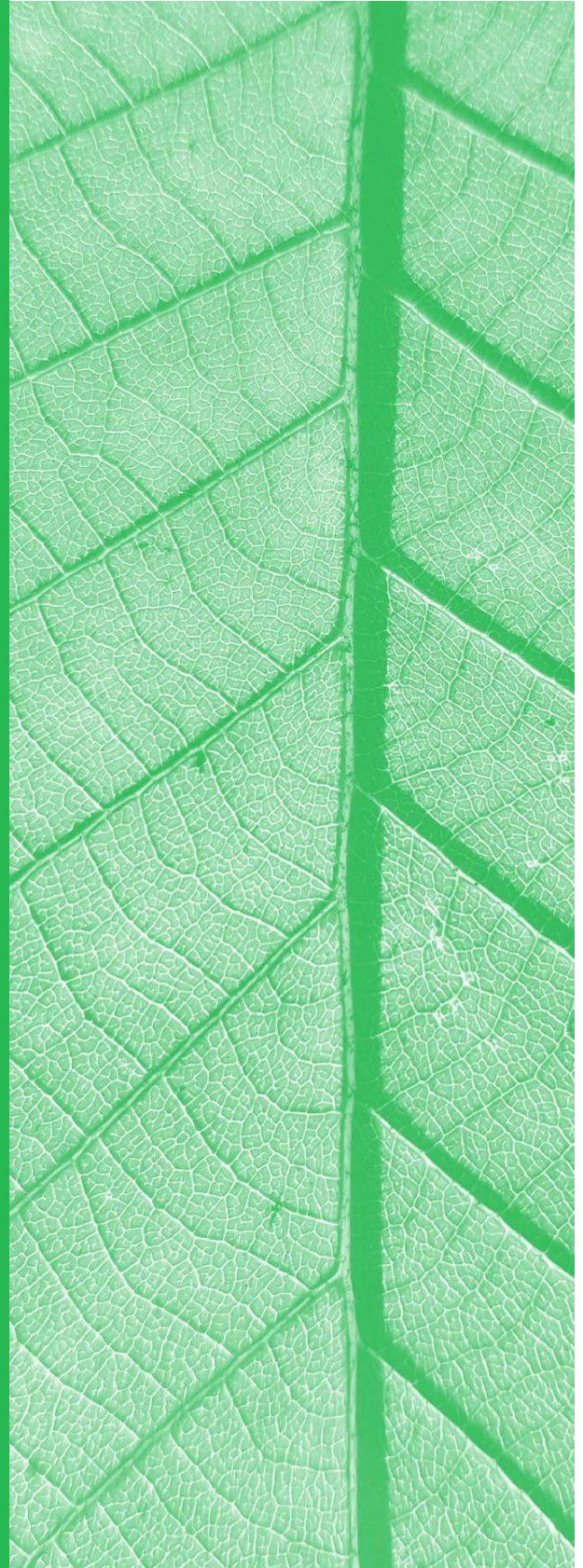
Advanced knowledge and skills in the design and development of production systems are needed in order to address emerging challenges. **The Executive Program in Sustainable Production** fosters knowledge and skills of participants that contribute to a renewal of industrial production. Through Principles of Green Chemistry, Green Engineering and Metrics with an holistic perspectives and case studies, the program provides a basis for interesting and important roles in industry, consultancy and research studies.

The Executive Program in Sustainable Production has strong focus on systems thinking and the underlying need to be proactive in creating production systems with minimal impact on the climate and people while keeping businesses profitable.

Participants will come away with tangible tools to manage and leading advance production systems and transition existing systems with a focus on circular material flow, increased digitalisation and automation, energy usage as well as new manufacturing technologies, as a part of the solution towards a sustainable society.



Content



Program

Day one

Principles of Sustainable Production

João Crespo

- **Principles of Green Chemistry**

The use of green chemistry and eco-design for the development of sustainable and safe products. Practice and discuss case studies.

- **Design through the principles of Green Engineering**

These principles demonstrate the breadth of the concept of green engineering towards a circular economy. They are a framework for decision-makers to engage in when designing new materials, products, processes, and systems that are benign to human health and the environment.

- **Green Metrics**

These metrics serve to quantify the efficiency or environmental performance of chemical processes, and allow changes in performance to be measured and drive a sustainable behaviour.

During this first day, the principles discussed and their application will be illustrated with the support of real life case studies.



Day two

Energy Systems and Climate Impact

Joe da Costa

- **Principles of energy systems**

Renewable and non-renewable energy production, energy storage, energy base power and energy matrix.

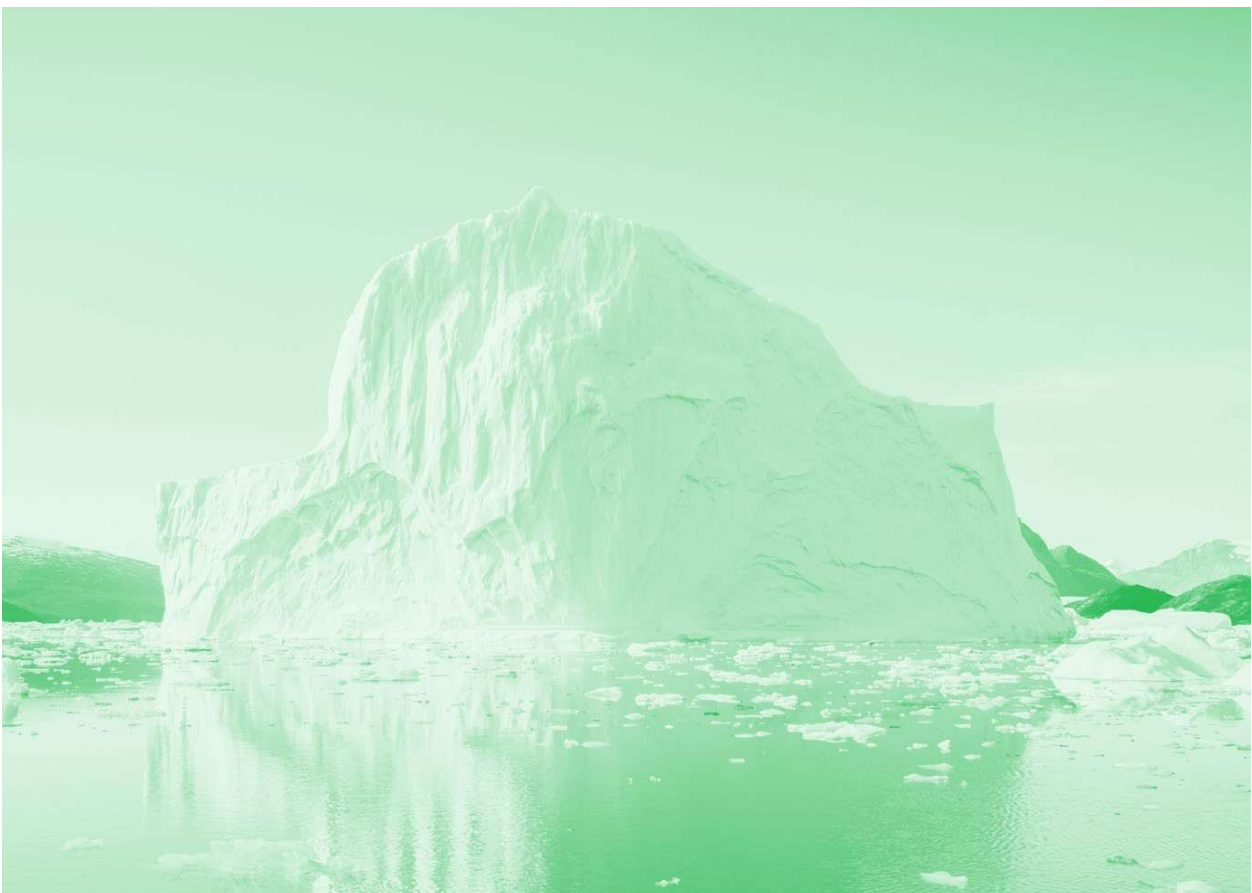
- **CO2 capture and storage, and climate impact**

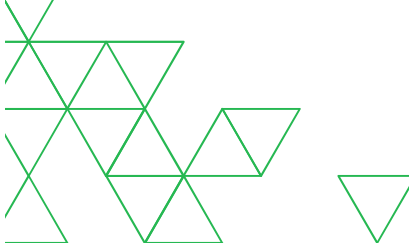
International historical protocols, principles of climate impact, CO2 capture and storage technologies, scenarios to abate CO2 emissions, costs and perspectives.

- **Hydrogen and e-fuels**

Hydrogen is the key to a more environmentally friendly mobility ecosystem. Explore the ways to produce, process, distribute and store hydrogen. At the end, participants will know how hydrogen is essential across a wide range of industrial processes.

Zero emission principles, hydrogen production, fuel cells, biomass to e-fuel production, new European directives, opportunities and perspectives.





Day three

Life Cycle Assessment (LCA)

Nuno Lapa

As companies begin to develop new products and alter existing products to reduce usage and waste, the agility of the entire manufacturing process must be improved. The ability to quickly adapt existing procedures and equipment to enable manufacturing of new and improved products is essential to maintaining competitiveness. Collecting and analysing production information and comparing batch profiles can be very valuable to both process engineers and product development teams as they assess new products and determine how they impact production.

In this module participants will experiment with a software that works with data analytics and reporting tools enabling them to understand the environmental impacts of the entire life cycle, specially the impact of waste, to identify hotspots and make fact-based decisions to improve sustainability in their organizations.

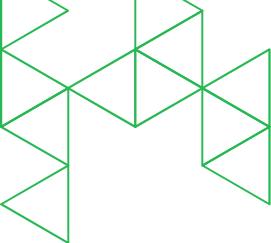
Day four

Life Cycle Assessment (LCA)

Nuno Lapa

Discussion of the results obtained by participants on the case-studies.





Day five

Regulatory Framework: REACH & CLP Regulations

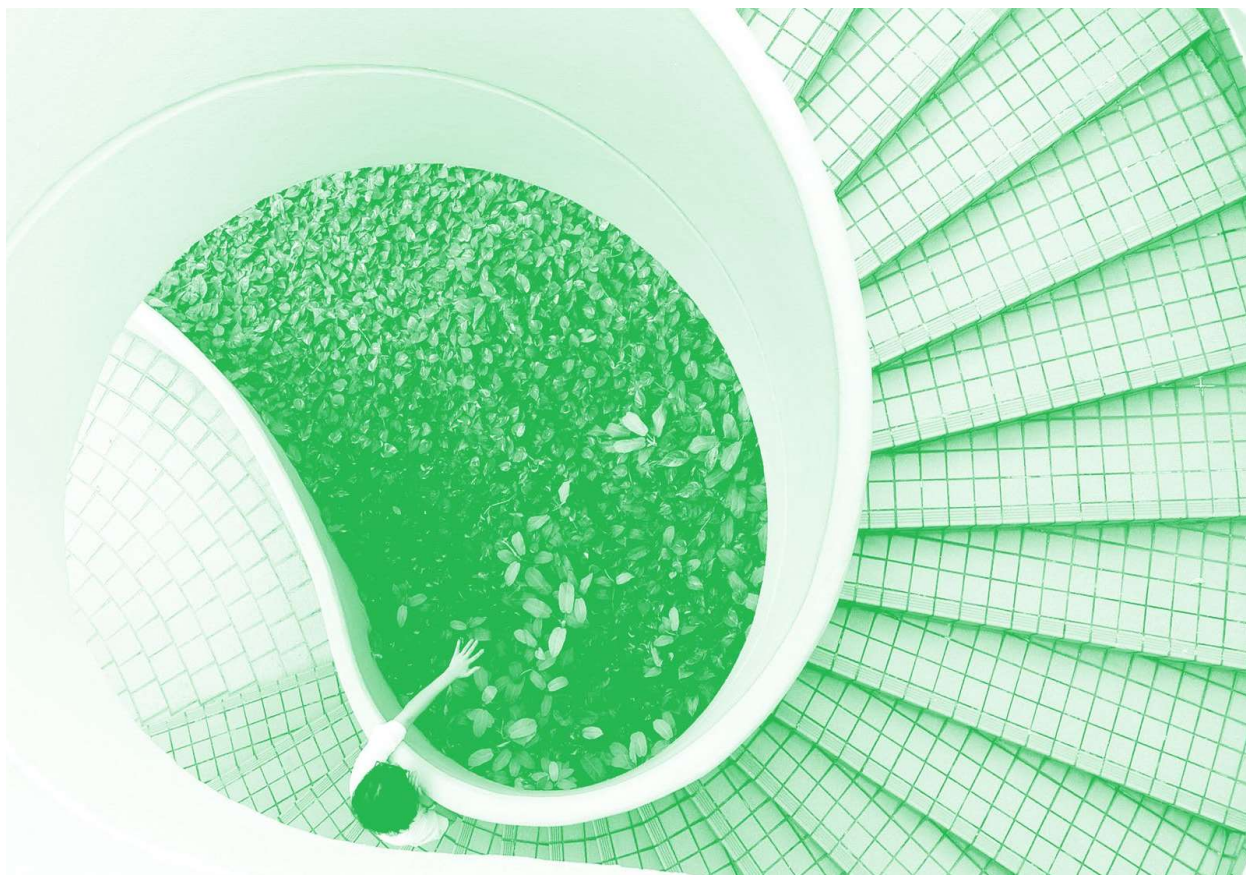
António Bruto da Costa

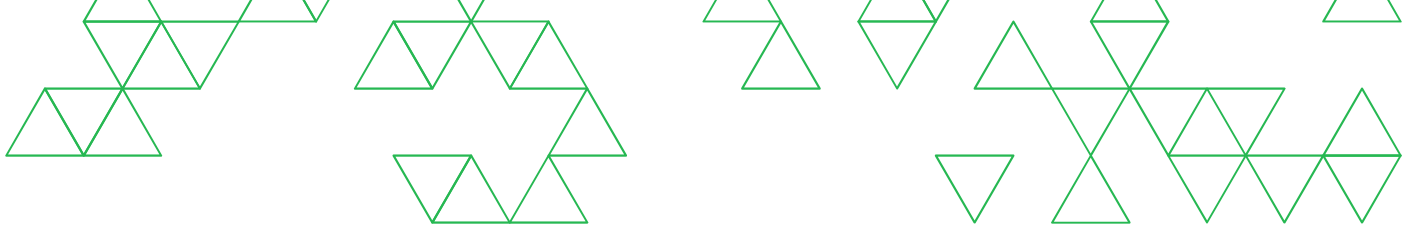
One of the main areas of action set up by the EU Chemicals Strategy for Sustainability towards a toxic-free environment is to strengthen the existing EU legal framework to address pressing environmental and health concerns. According to the new strategy, REACH and CLP regulations should be reinforced as EU's cornerstones for regulating chemicals.



This session will focus on the:

- Key elements of REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) and CLP (Classification, Labelling and Packaging of substances and mixtures)
- Importance of REACH and CLP to companies





Day six

Entrepreneurship for Sustainability

Fernanda Llusa

Entrepreneurship for sustainability is a way of doing business that delivers tremendous economic value to companies and opens up new opportunities. Ultimately, companies will find that they can generate substantial business value through sustainability while both enhancing the quality of life around the world and protecting the environment. This session will discuss sustainable business models that go beyond employing and serving people but that also have a social purpose, either through a lean approach in order to reduce the carbon footprint, or through integrated models and circular economy.

The topics covered during this session are:

- The myth of infinite growth
- Sustainability and Entrepreneurship
- Business models: How to create, capture and deliver value in a sustainable way
- Case-study discussions: What are companies doing in practice?

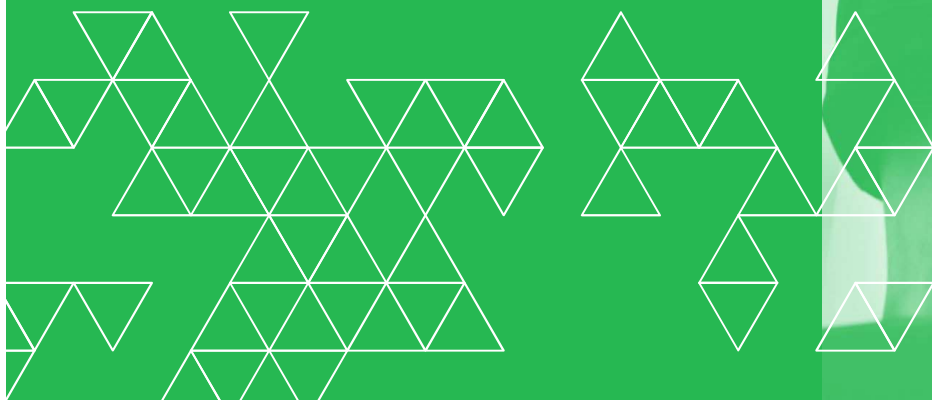


Structure of lectures

The program is run with LAQV at NOVA, the largest research institute the Portugal in the domain of green chemistry and sustainable technologies, and guest lecturers from the industry sector.

The programme presents and discusses real-life problems allowing participants to learn from proven practices.

Each 3 hours session comprises 2 components, conceptual and case studies. This way we want participants to understand the concept, technology and innovation behind sustainable production and the eco-design applied to different industries.



Learning Outcomes

Bring real-world experiences into the course from companies like GE, Ben & Jerry's or DuPont, and learn to apply sustainable solutions to address business challenges. With

participants across various sectors, the Sustainable Production Executive Program is designed to be interactive with built-in networking opportunities to connect with peers.

At the end of this course you will be able to take decisions about:



Implement innovations that can result in new technological and systemic solutions to help your industries/governments go-green

Enhance understanding of how to embed Sustainable Production into your business strategy

Explore business opportunities arising from the circular economy

Create a high-level action plan to implement sustainability strategies

Learn how to maximize resources while designing robust sustainability products that fuel productivity, innovation and profits within your organization

Finally, participants will have the knowledge in Sustainable Production necessary for the creation of goods and services using processes and systems that are:

- **Non-polluting**
 - **Rationalizing energy and using natural resources**
 - **Economically viable**
 - **Safe and healthful for workers, communities, and consumers**
 - **Socially and creatively rewarding for all working people**
- 



Participants Profile

This Program is Designed For:



Experienced professionals

in positions of leadership or management who are interested in creating value by designing and incorporating sustainability production practices into their business environments.



Mid-level professionals

in technical and sustainability-focused roles who wish to strengthen their business acumen around this topic, with the goal of creating value for their organizations, and gain tangible takeaways and leadership skills to communicate with purpose in a rapidly changing environment.



Mid-level sustainability professionals

and those in leadership positions including: Engineering/ Finance/ Marketing/ Operations/ Research and Development/ Supply Chain.



Entrepreneurs

who have launched—or plan to launch—start-ups that aim to create sustainable products and services.



Master students

who want to follow a career in companies with production management and change activities that are pushing the industry forward.

Typically represented Industries:

**Healthcare / Pharmaceutical/
Energy/ Agro-Food And Forestry/
Environmental**



João Crespo

Full Professor of Chemical Engineering at NOVA School of Science and Technology. Director of the Laboratory of Membrane Processes at iBET. Former Vice-Rector for Research and Innovation and former Coordinator of NOVA Doctoral School.

Former Vice-President of Fundação para a Ciência e a Tecnologia (Portuguese National Science Foundation). Member of the Portuguese Academy of Engineering.

First director of the Doctoral Programme “EngIQ”, the first PhD programme in Portugal performed in corporate environment, in association with APQuímica. President of the Industry-Academia Council at APQuímica.

Author of circa 300 publications referred in Scopus and 3 international patents, editor of the book “Green Separation Processes”, published by Wiley-VCH in 2005.

Co-founder of the spin-off company “Zeyton Nutraceuticals”.

Program Director

Faculty



Joe da Costa is an Emeritus Professor at the School of Chemical Engineering, University of Queensland, Australia, with over 35 years working experience in industrial, consultancy and academic roles in Australia, Portugal, Brazil and England. He has been involved in technology R&D for clean energy production.

His R&D portfolio includes industrial projects with Johnson Matthey (UK) Fuel Cells, Saudi Aramco Petroleum hydrogen production from oil, hydrogen separation supported by Australian and German power companies, oxyfuel technology for CO₂ capture via the European Framework Seven program, hydrogen from coal gasification and solid sorbents to capture CO₂ via the Australian Cooperative Research Centres.

Currently, Joe is an Invited Professor at FCT NOVA.





Nuno Lapa is an Assistant Professor at FCT NOVA. He has a Ph.D. in Environmental Engineering in the framework of a European project coordinated by the Company Soletanche-Bachy (FR) and with the participation of the Companies Inertec (FR), Sobry-Shanks (BE), and Solvay (BE).

This European consortium developed several new materials for civil engineering applications based on the reuse of bottom ashes from the incineration of municipal solid wastes. Nuno Lapa has been responsible for studying the chemical and ecotoxicological behaviour of the new materials. Nuno was a visiting professor at the Catholic University of Leuven where he has been involved in the Life Cycle Analysis of wood products from the European forests.

Nuno has developed several national and European projects with Companies. The most recent project involves Valorpneu S.A. and aims to recycle spent tire rubber to be used in the recovery of rare-earth elements from wastes of electric and electronic equipment.

In all his works, he includes the Life Cycle Analysis methodology to support the environmental assessment of new products or production processes.



António Bruto da Costa has a degree in Chemical Engineering and an MBA in management. He has over 30 years of experience working in the oil & gas industry, at Petrogal and Galp. At these companies, he worked as a Quality Manager, implementing and improving quality management systems in compliance with ISO standards, a Quality Auditor, and a Product Safety Manager, notably in the implementation of REACH and CLP regulations.

In this last position, he represented Galp at several associations and REACH consortia, as the European Petroleum Refiners Association - Concawe Division, the Lower Olefins and Aromatics REACH Consortium and the Hydrocarbon Solvents REACH Consortium.

After completing the MBA, António joined a medical device start-up team.

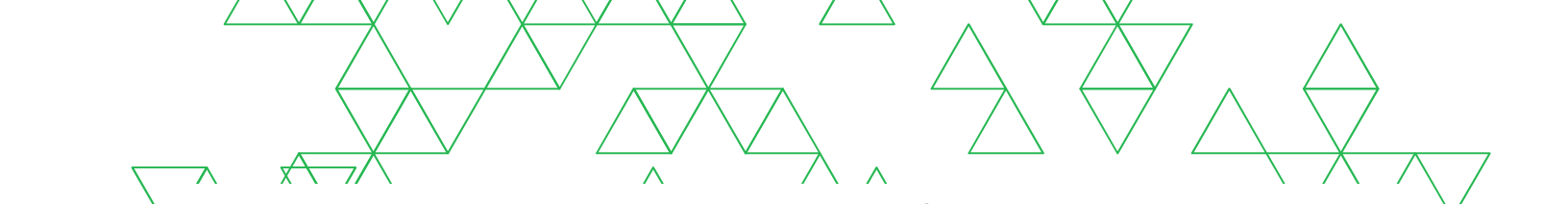
Since 2021, he has been working at the Portuguese Chemical, Petrochemical and Refining Association (APQuímica), where his work is focused on the European Chemicals Strategy for Sustainability.



Fernanda Llussá is a Professor at FCT NOVA. She holds a PhD in Economics at the University of California, Los Angeles (UCLA, USA). She also held a visiting position on Innovation and Entrepreneurship at Deshpande Entrepreneurship Center at the MIT. Her research interests are in the fields of entrepreneurship, technology market transfer, financial constraints and economic growth.

Several students of Fernanda have gone on to develop new businesses one of which, in a project where she is involved as a member of the founder team, was distinguished with a second place in the Richard Branson innovation prize in 2009, received finance from EDP, and is well under way to become a successful start-up.

Fernanda Llussá is involved in projects funded by national and international funding agencies such as the PURE project, which has just got approved funding under the FET-Open Horizon 2020 (2020-2024), an extremely competitive collaborative research and innovation action which envisions breakthrough technologies and ambitious interdisciplinary research teams. Llussá's role in the PURE project is on defining the technology market transfer strategy.



ABOUT NOVA School of Science and Technology



Founded in 1977, the NOVA School of Science and Technology (FCT NOVA) is one of the most prestigious Portuguese and European engineering and science public schools.



FCT NOVA partners with foreign universities such as the Massachusetts Institute of Technology (MIT), the Carnegie Mellon University (CMU) and the University of Texas at Austin (UTAustin) to offer some of its advanced study programs, pioneers nationwide.

FCT NOVA has a broad expertise in cutting edge R&D+I due to its multidisciplinary nature and strong experience in fundamental and applied research in several areas particularly in Digital Innovation & Big Data, Biomedicine & Bio-medical Devices, Circular Economy & Sustainability, Manufacturing & Automation, Nano & Smart Materials, Security & Defence Technologies.

Being a higher education international institution, FCT NOVA scientific research and quality teaching are well recognised, which ensures a high level of professional success for its students and researchers. FCT NOVA has published about 12 thousand papers indexed in Scopus and Web of Science, in top journals and conferences with high impact.

The differentiation of FCT NOVA is to have the complementarity of Sciences and Technology which provides a unique profile to the students and also in the research activities and collaboration with industry and society.

More than 30.000 students,
alumni and professors make up an ecosystem that is rich
in vision and ideas.

Important facts:

+ 7500 students **+ 420 faculty**

+ 525 researchers

+ 90 programs
(including BSc, Master, PhD
and Executive Programs)

#1

in Portugal

in Grants awarded by the
European Research
Council, with a total
of **9 Grants**

TOP 9

in Europe

NOVA was ranked in the
top 9 in Europe in the QS
World University Rankings
2021 among universities
founded less than
50 years ago

22

researchers

from FCT NOVA
among **World's Top 2%**
in 2020, according to the
prestigious Ranking from
Stanford University,
in a pool of more than
159.000 names

#1

in Portugal

in Research Excellence
recognised by the Foundation
for Science and Technology,
with a total of **9 research
centers** with Outstanding
grade and **5 centers** with
Very Good grade

#1

in Portugal

in Horizon 2020 projects,
with a total of **109
projects between
2014 - 2020**



European Research Council
Established by the European Commission



FCT
Fundação
para a Ciência
e a Tecnologia



Co-funded by the Horizon 2020 programme
of the European Union

Executive Education

Other useful information

1st Edition:
November 2021

Classes:
Mondays,
Wednesdays and
Fridays, from 5:30
p.m. to 8:30 p.m.

Format:
On-campus

Duration:
2 weeks
total of 18 hours

Fee:
1500€

(Special prices for Master students from NOVA
University of Lisbon)

**For more
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