



CERENA

Centro de Recursos
Naturais e Ambiente

CERENA SEMINARS
2025 / 2026

20th CERENA's Anniversary

From Academy to Industry: Exploring Scientific Frontiers

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September 25th, 2025

13:00

Room C13 - IST

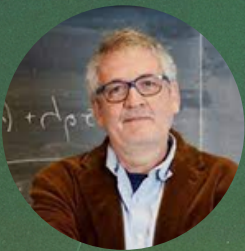
Room F405 - FEUP

The Modern Mining Engineering Transformations (I)

The concept of digital mining innovation lies at the heart of the transformation of modern Mining Engineering. Digital innovation in mining involves the adoption of Industry 4.0 technologies—such as artificial intelligence (AI) and data analytics—to optimize production, improve safety, and enhance sustainability across the mining value chain.

This presentation highlights two key areas of digital innovation:

- i) The application of spatial data science methods and technologies for mineral resource prediction, and the integration of risk into production scheduling through stochastic mine planning. Professor Amílcar Soares.
- ii) Digitization in underground mining operations to increase safety and optimize production and / or productivity leading to improved economics in a globally competitive industry, including a discussion about communications, automation, and the Internet of Things (IoT). Engº António Salvador.



Amílcar Soares is a Full Professor at the Instituto Superior Técnico (University of Lisbon) and a Visiting Professor at several other institutions in the UAE, Australia, and Brazil. He was a Distinguished Lecturer for the International Association of Mathematical Geosciences. His core research and development work centers on geostatistics and spatial data science methods applied to environmental, mineral, and energy resource assessments. In the environmental and health domains, his recent projects have focused on extreme drought risk characterization and COVID-19 risk assessment. In the energy sector, his latest work involves geostatistical seismic inversion for geomechanical characterization and risk assessment of subsurface targets of CO₂ sequestration.

He has coordinated numerous international research projects in mineral resource assessment, with recent efforts emphasizing critical raw material resource evaluation.



António Salvador is a seasoned mining executive with over three decades of international experience spanning four continents. As Managing Director of SOMINCOR SA, he led Europe's largest zinc mine and sixth largest copper mine—Neves-Corvo—through transformative growth, overseeing a workforce of 2,600 and managing capital projects exceeding €500 million. His strategic leadership not only elevated production but also strengthened the mine's role in Portugal's economy, engaging with stakeholders from local communities to EU-level institutions.

Antonio's career is defined by his ability to bridge technical expertise with operational excellence. From his early days in rock mechanics in South Africa and Canada to senior roles in Brazil, the UK, and Portugal, he has consistently driven innovation and performance. His tenure as Director of Operational Technology at Lundin Mining Corporation saw the rollout of cutting-edge automation and digital infrastructure across global assets, including private LTE networks and advanced process control systems.

He holds a BSc in Geological Engineering from the Department of Civil Engineering at the University of Toronto and is a Chartered Engineer with multiple professional affiliations, including IOM3 (UK), AusIMM (Australia), and the Chamber of Mines (South Africa).

Applied Research and Development in Textile Industry: a traditional tool operating in an unfamiliar framework

October 30th, 2025

12:30

Room C13 - IST

Room F405 - FEUP

Industrial processes and products go typically through cycles of expansion – profit – decline and finally end of life.

Innovation has allowed industrial activities to extend their lives by creating more cycles. This mechanism has worked well when the following "generally" apply: consumers recognize and value quality, intellectual property is respected and actors abide by the rules: labor laws, fair taxes, safety and environmental regulations, etc. These were valid within certain geographical and political contexts, but the much-heralded globalization made the above principles inoperative and instead turned into subject of mockery, as we see every day in the highest international instances.

Fisipe/SGL was the last producer of acrylic fiber in Western Europe to shut down: at least a few things were done the right way. For several decades, the drive for innovation kept the company running when the decline in the sector was evident.

But even considering that R&D alone is not enough, without it, it's not even worth trying. This is a truth that will hold, no matter what.



Ana C. Marques is an Associate Professor in the Department of Chemical Engineering at Instituto Superior Técnico and a full member of the Center for Natural Resources and Environment (CERENA). She established the Technological Platform for Microencapsulation and Immobilization (TPMI) at IST, which is currently her main research focus, along with the development of sustainable and biodegradable polymers. As part of a Pedagogical Innovation Project, she also implemented the Hands-on Polymers Laboratory. She holds approximately 15 international patents and has co-authored over 90 publications. She is currently the Principal Investigator of 5 research projects, co-supervisor of 12 PhD students (3 of whom have already completed their degrees), and supervisor of 4 postdoctoral researchers. She has been recognized for Excellence in Teaching in recent years and currently serves on the Executive Committee of the Department of Chemical Engineering as the member responsible for International Affairs (Mobility Coordinator). From 2007 to 2011, she was a researcher at Dow Corning SA (Belgium), and during a sabbatical, she joined Prof. Markus Niederberger's group in the Department of Materials at ETH Zürich (Switzerland) from April to July 2019.



Rui Dias graduated in Chemical Engineering (IST, 1991) and earned a PhD in Organic Chemistry (IST, 1996), followed by postdoctoral research at the Technological and Nuclear Institute. In 1999, he joined Fisipe as a process engineer in the R&D team, where he led the development of innovative fibers and processes until the company's closure in August 2025. Key projects include: modified cross-section fiber for fake fur (2001), gel-dyeing of acrylic fiber (2002), Panox precursor fiber (2009), carbon fiber precursor (2015), and pigmented fiber for outdoor fabrics (2009). These products significantly expanded Fisipe's market reach and profitability. Rui maintained strong ties with Portuguese universities, supervising master's theses and integrating students into industrial projects, many of whom later pursued careers in the chemical industry. His work was instrumental in sustaining the company through challenging market conditions.

November 27th, 2025

12:30

Room C13 - IST

Room F405 - FEUP

Process Heat Integration in Industry

Increasing energy efficiency in industry requires sectoral and cross-cutting technological developments, as well as measures to regulate energy consumption and greenhouse gas emissions. It can be said that energy efficiency is the only source of clean energy, as it eliminates the need for other types and is available in any country, including those with limited natural energy resources.

Among the cross-cutting measures to increase energy efficiency with application in different industrial sectors, Process Heat Integration stands out. The main objective of heat utilization through the Process Integration methodology is to make the best possible use of the excess heat potential of process areas that have excess heat at temperatures higher than that required by process areas with a heat deficit. In this seminar, we will address two case studies in the Portuguese industrial reality: energy integration in the companies 'Anilina de Portugal, SA' and 'Renoeste'. In the first case, the production of aniline and mononitrobenzene took place, and in the second, the production of salt from brine obtained in the construction of caves for natural gas storage.



Henrique Matos is Full Professor at Instituto Superior Técnico (IST), where he graduated in Chemical Engineering, in 1986, having joined the teaching activity at IST in the same year. In April 1993, he completed his PhD in Chemical Engineering at IST. In March 2010, he obtained unanimously the habilitation at IST / UTL. In scientific terms, his interests are in the field of Process Systems Engineering and Supercritical Fluids Technology. He developed work in Process Integration, Process Dynamic Simulation and Sustainability Analysis of Process. His research work has resulted in 217 publications in scientific articles published in international journals, international conference papers in national journals, articles in Proceedings of national conferences, etc. He participated in several Scientific and/or Technological Development projects, supported by Public Institutions or by industrial companies. He is currently the President of the Department of Chemical Engineering (DEQ) at IST.



Mário Jorge Pinho graduated in Industrial Chemistry Engineering (FEUP, 1971) and has developed a solid and progressive career in the chemical and industrial sector. Since 1978, he has worked with the CUF industrial group, currently known as Bondalti. He began as a Process Engineer, joining the team responsible for revamping the Ammonia Synthesis and Gasification Unit, and later became Plant Manager in the same area.

Later, he took on technological support and programme coordination roles in the Organic Chemistry Division, gaining experience in process optimisation and control. Subsequently, he was responsible for planning and control at the Estarreja Fertiliser Manufacturing Unit. He served as Manager of the Adiabatic Nitration Project and then as Industrial Director of Anilina de Portugal, accumulating responsibilities in administrative, financial and human resources management. Over time, he took on management and technical direction positions in leading companies, including Quimigal, Uniteca, Quimigest, Renoeste and Asiquim. Between 2015 and 2022, he ended his active career as Senior Consultant at Pool CUF, currently Bondalti, consolidating a trajectory of technical and strategic leadership marked by his dedication to the Portuguese chemical industry.



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