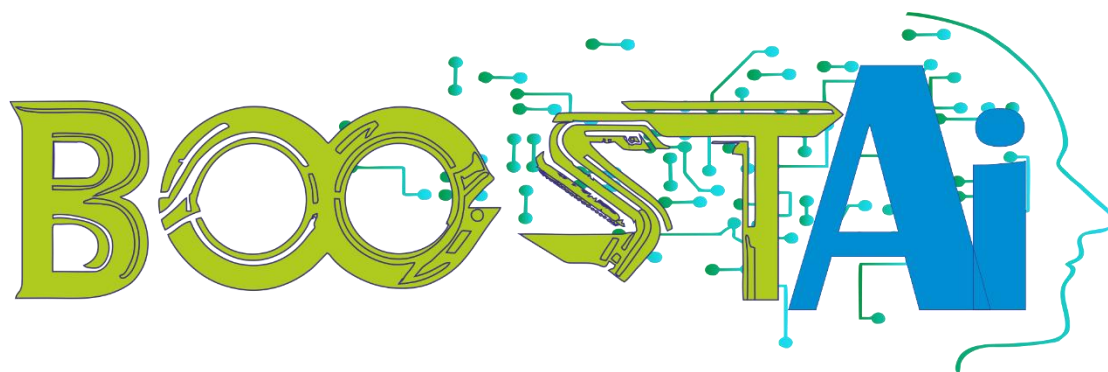




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CURRICULUM

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Overview of BOOST-AI curriculum

The proposed curriculum is a HED curriculum related to AI-enhanced tools for Sustainable Entrepreneurship in Industry 5.0 and SDG (addressed both to students and staff).

The courses are offered in a blended format consisting on face-to-face lectures, online lessons, hands-on practical training in to AI-enhanced tools for Sustainable Entrepreneurship in Industry 5.0 and SDG.

On the basis of the findings of the transnational report, the partners drafted the BOOST-AI HED curriculum. This is a joint curriculum, agreed upon all 3 universities (taking in to consideration future implementation).

The curriculum include the twelve units/modules focused on the elements of essential theory to help learners and in particular those aiming to acquire skills related to the use of AI-tools in order to become more entrepreneurial in Industry 5.0 implementations and SDG.

Each unit includes dedicated e-learning resources, power point presentations, word document, learners activities, and assessment methods.



1. Introduction to Industry 5.0

1.1 Objectives

The module aims to introduce learners to the evolving concept of Industry 5.0, highlighting its human-centric, sustainable, and resilient approach to industrial transformation. Participants will explore how Industry 5.0 can be promoted by integrating human intelligence with advanced digital systems, fostering collaboration between humans and machines (cobots). The module will also examine its alignment with European priorities, such as the Green Deal and Digital Transition, and its impact on workforce development, innovation, and competitiveness.

1.2 Outcomes

1.2.1 Knowledge

By the end of the module, learners will:

- Be able to understand the key principles and components of Industry 5.0
- Gain insight into enabling technologies (e.g., AI, IoT, robotics)
- Grasp the implications for sustainability, social responsibility, and future labor markets.

1.2.2 Skills

Learners will:

- Develop the ability to critically analyze Industry 5.0 applications and assess their relevance across sectors
- Develop skills in evaluating the ethical, environmental, and social impacts of Industry 5.0 technologies

1.3 Course Outline

The module begins with an overview of industrial revolutions, leading to the emergence and definition of Industry 5.0. It then delves into key enabling technologies and explores how they support human-machine collaboration. Sub-topics will cover sustainability, resilience, and ethical considerations, along with case studies from different sectors (e.g., manufacturing, healthcare, logistics). Learners will also explore EU strategies and funding opportunities related to Industry 5.0, concluding discussions on future trends and the evolving role of human capital in a digitized economy.



1.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

2. AI tools for Industry 5.0 technologies

2.1 Objectives

This module aims to equip learners with a comprehensive understanding of how Artificial Intelligence (AI) tools drive and support Industry 5.0 technologies. Participants will explore AI's role in fostering human-machine collaboration, personalizing production processes, enhancing decision-making, and promoting sustainable, efficient, and ethical industrial practices. The module will focus on practical AI applications tailored to Industry 5.0 priorities, such as human-centricity, resilience, and environmental sustainability.

2.2 Outcomes

2.2.1 Knowledge

Upon completion of the module, learners will:

- Be able to understand core AI concepts and how they integrate with Industry 5.0 technologies
- Gain knowledge of different AI tools (e.g. machine learning algorithms, natural language processing, and computer vision)

2.2.2 Skills

Learners will:

- Acquire practical skills in selecting, applying, and evaluating AI tools within Industry 5.0 contexts
- Learn to analyze data, train AI models, and use AI platforms to develop solutions that support human operators
- Develop competencies in assessing the ethical and social implications of AI deployment



2.3 Course Outline

The module begins with an introduction to AI fundamentals and their evolution towards supporting Industry 5.0 objectives. It then explores specific AI tools used in various industrial applications, including machine learning, deep learning, and edge AI. Learners will engage in case studies and practical demonstrations of AI in actions such as predictive maintenance, quality control, and adaptive production. The module concludes with information on ethical AI and foresight on the future integration of AI with human-centric innovation in the workplace.

2.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

3. AI Sustainable Entrepreneurship and SDG

3.1 Objectives

The goal of this module is to familiarize learners with the convergence of Artificial Intelligence (AI), sustainable entrepreneurship, and the United Nations Sustainable Development Goals (SDGs). Learners will investigate how AI technologies can foster innovation in sustainable business models, aid green transitions, and tackle global issues like climate change, inequality, and resource shortages. The course additionally aims to provide learners with the understanding to ethically and strategically incorporate AI into sustainable business initiatives that align with the SDGs.

3.2 Outcomes

3.2.1 Knowledge

By the end of this module, learners will:

- Understand the principles of sustainable entrepreneurship and how these relate to the SDGs
- Gain insights into how AI tools can support sustainable innovation, optimize resource use, and measure environmental and social impact



- Learn about European Green Deal priorities and digital sustainability strategies

3.2.2 Skills

Learners will:

- Develop skills to design and manage sustainable business models that integrate AI solutions
- Learn to identify market opportunities for green and social innovation
- Learn how to use AI to assess sustainability performance and align business activities with SDG targets

3.3 Course Outline

The module begins with an introduction to sustainable entrepreneurship, the SDGs, and their relevance in today's global economy. It then examines the role of AI in enabling sustainability, the role of AI in promoting SDGS, AI-driven sustainable entrepreneurship models, the challenges and risks from AI integration to sustainable entrepreneurship, the policies and frameworks supporting sustainable AI entrepreneurship and future expectations. Learners will explore practical tools and methodologies for integrating AI into business planning, such as AI for energy efficiency, waste reduction, and social inclusion. The module concludes with information on impact assessment frameworks and ethical considerations in AI deployment for sustainable development.

3.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1



4. Ethical use of AI in HED – guidelines, case studies

4.1 Objectives

This module aims to familiarize learners with the ethical dimensions of AI deployment in Higher Education (HED). It focuses on fostering an understanding of responsible AI usage in teaching, learning, assessment, and administration, in line with European values and legal frameworks. It also seeks to equip learners with tools and strategies for implementing AI ethically and transparently, while ensuring data privacy, inclusivity, and accountability.

4.2 Outcomes

4.2.1 Knowledge

Upon completion of the module, learners will:

- Be able to understand the core ethical principles related to AI use in education, including transparency, fairness, non-discrimination, and data protection.
- Get familiar with official guidelines on AI ethics in HE (e.g. EU's Ethics Guidelines for Trustworthy AI)
- Understand better best practices and challenges in AI integration within HE contexts via relevant case studies

4.2.2 Skills

Learners will:

- Gain the ability to critically assess AI tools and their alignment with ethical standards in HED settings
- Develop skills in identifying potential ethical risks
- Be able to practice applying ethical evaluation frameworks and policy guidelines to real-world scenarios

4.3 Course Outline

The module begins with an overview of AI applications in Higher Education and the ethical challenges they pose. It then introduces key ethical frameworks and guidelines, including EU and global standards for trustworthy AI. Through in-depth



case studies, participants will analyze real examples of AI usage—both positive and problematic—across European universities and beyond. The module includes information on ethical concerns in the use of AI in higher education, guidelines for ethical use of AI in higher education, an overview of AI applications in higher education, balancing innovation and ethics, key ethics of AI – rules and regulations in place, UNESCO – Global Standard on AI Ethics, European Commission – AI & Data in Teaching, institutional & sector frameworks, key ethical themes across guidelines and provides several recommendations for institutions

4.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

5. Green Applications of Industry 5.0 and AI – guidelines and case studies for SMEs

5.1 Objectives

This module aims to introduce SMEs to the green applications of Industry 5.0 and AI technologies, focusing on sustainability, efficiency, and resilience. It will guide learners in identifying how AI-driven Industry 5.0 solutions can reduce environmental impact, optimize resource use, and align with EU sustainability policies such as the Green Deal and the Circular Economy Action Plan. Emphasis is placed on practical tools, guidelines, and case studies to enable SMEs to implement eco-friendly innovations effectively.

5.2 Outcomes

5.2.1 Knowledge

When this module is completed, learners will:

- Gain a thorough understanding of how Industry 5.0 and AI contribute to green transitions (e.g. waste management/ reduction, logistics)



- Become familiar with EU regulations and incentives for green innovation in SMEs
- Understand the challenges and measurable impacts that European SMEs face when integrating green AI solutions

5.2.2 Skills

Learners will:

- Develop the skills to identify and apply AI and Industry 5.0 tools that support green practices
- Learn to leverage data analytics for monitoring emissions, optimizing supply chains, and achieving circular economy objectives

5.3 Course Outline

The module begins with an introduction to Industry 5.0 and AI in the context of sustainability, specifically tailored to the SME sector. It then explores practical green applications, such as AI-powered energy management, predictive maintenance for resource optimization, and intelligent waste sorting systems. Learners will examine EU guidelines and access tools for sustainability assessment and reporting. Case studies will provide real-world insights into SME-driven green innovations across various industries.

5.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1



6. Social Impact of the use of AI in industrial applications

6.1 Objectives

The module aims to explore the social impact of integrating Artificial Intelligence (AI) into industrial applications, with a focus on human-centricity, inclusivity, and societal well-being—key pillars of Industry 5.0. Learners will assess how AI-driven industrial transformation affects workers, communities, and broader social structures while learning to apply responsible and ethical approaches that maximize positive impact and minimize potential harm.

6.2 Outcomes

6.2.1 Knowledge

Upon completion of the module, learners will:

- Be able to understand the multifaceted social implications of AI adoption in industry, including changes to employment, skills demand, workplace safety, equality, and social cohesion
- Gain insight into frameworks and policies guiding the ethical and socially responsible use of AI in the industrial sector

6.2.2 Skills

Learners will:

- Develop the ability to analyze and evaluate the social impact of AI tools in various industrial settings
- Learn to conduct stakeholder impact assessments, engage in inclusive decision-making processes, and design strategies to promote fair labour practices, upskilling, and diversity in AI-driven workplaces
- Develop their skills in social impact measurement, reporting, and communication

6.3 Course Outline

The module begins with an overview of AI technologies in industrial contexts and their potential social ramifications. Sub-topics cover key impact areas such as employment shifts, workforce upskilling, workplace inclusivity, and AI's role in enhancing or hindering social equity. Learners will study international guidelines and apply tools for social impact assessment (e.g., SROI – Social Return on



Investment). The module concludes with the development of action plans for ensuring AI implementation, supporting positive social outcomes and adhering to ethical standards.

6.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

7. The Role of AI in Industry 5.0

7.1 Objectives

The module focused on equipping students with a deep understanding of how AI technologies integrate within the Industry 5.0 framework. Thus, it involves understanding the shifts from previous industrial revolutions, particularly how human-AI collaboration, advanced automation, and sustainability play central roles in shaping future industries.

7.2 Outcomes

7.2.1 Knowledge

Upon completion of the module, learners will:

- Understand the fundamental concepts that distinguish Industry 5.0 from its predecessors (4.0, 3.0, etc.)
- Identify and evaluate how AI can be applied across various industrial sectors such as manufacturing, logistics, healthcare, and more
- Understand the importance of ethical frameworks when deploying AI in industrial environments

7.2.2 Skills

Learners will:

- Be able to clearly define and describe Industry 5.0 and its relationship with AI technologies.



- Evaluate the role of AI in advancing sustainability goals (e.g., reducing emissions, optimizing energy use, etc.).
- Acquire skills in Critically assess the risks and benefits of using AI in different industrial contexts, focusing on efficiency, human labor, and environmental impact

7.3 Course Outline

- Understand Industry 5.0 framework (introducing the key principles of Industry 5.0, especially in contrast with Industry 4.0 and recognize the balance between human creativity, AI automation and sustainable practices within industrial processes)
- Examine and key AI technologies in Industry 5.0 (explore technologies such as machine learning, robotics, natural language processing, and computer vision in the context of industrial applications and understand how these technologies interact with IoT, blockchain, and other Industry 5.0 technologies)
- Explore the role of AI in Industry 5.0 examine how AI is driving new trends in manufacturing, supply chains, design, and customer experience; analyze the capabilities of AI to enhance human potential and collaboration in the workforce)
- Study AI's role in sustainability and ethical decision-making (investigate how AI can contribute to sustainable and ethical practices in industry, from energy efficiency to waste reduction and discuss the ethical implications of AI in Industry 5.0, focusing on human welfare and safety)
- Develop critical thinking about human-AI collaboration (understand how humans and AI can work together to solve complex industrial problems)

7.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1



8. Using AI to optimize the sustainability of the supply chain in Industry 5.0

8.1 Objectives

The module aims to provide learners with the knowledge and tools to leverage Artificial Intelligence (AI) for optimizing the sustainability of supply chains within the industry 5.0 framework. The focus is on reducing environmental impact, improving resource efficiency, and enhancing transparency and resilience across the supply chain. The course also emphasizes aligning supply chain practices with EU sustainability goals, such as the European Green Deal, and integrating human-centric AI solutions for ethical and inclusive decision-making.

8.2 Outcomes

8.2.1 Knowledge

Upon completion of the module, learners will:

- Be able to understand how AI technologies can be applied to optimize supply chain operations sustainably
- Gain insight into key concepts such as circular supply chains, green logistics, carbon footprint reduction, and lifecycle analysis
- Become familiar with regulatory and market drivers for sustainable supply chains

8.2.2 Skills

Learners will:

- Acquire skills in identifying inefficiencies and sustainability gaps in supply chains and applying AI tools to address them
- Develop competencies in using AI for demand forecasting, inventory optimization, transportation planning, and supplier evaluation
- Be able to design AI-driven sustainability dashboards and KPIs to measure, track, and improve supply chain performance over time

8.3 Course Outline

The module begins with an introduction to Industry 5.0 and sustainable supply chain principles, followed by an overview of AI tools applicable to supply chain management. Sub-topics include practical applications of AI in areas such as emissions monitoring, waste reduction, and energy-efficient logistics. Learners



will also explore EU guidelines, funding opportunities, and digital compliance tools. The module concludes with a practical workshop where participants create a sustainability optimization plan for a supply chain using AI, tailored to their own organizational context.

8.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

9. AI-Driven Smart Decision-Making

9.1 Objectives

This module aims to equip learners with an in-depth understanding of how Artificial Intelligence can support and enhance smart decision-making in industrial and business contexts. Participants will explore the principles of data-driven decision-making, AI-driven insights, and predictive analytics to improve operational efficiency, strategic planning, and innovation. The course will focus on the role of human-AI collaboration in making ethical, sustainable, and effective decisions aligned with Industry 5.0 values.

9.2 Outcomes

9.2.1 Knowledge

Upon completion of this module, learners will: 1) understand the fundamentals of smart decision-making and how AI can augment human judgment; 2) gain insights into AI methodologies such as predictive analytics, prescriptive analytics, and decision support systems; 3) recognize the ethical and social considerations involved in AI-assisted decision-making.

9.2.2 Skills

- 1) Develop the ability to understand and adopt AI-assisted decision-making models and tools tailored to specific organizational needs.



- 2) Acquire practical skills in interpreting AI-generated insights and translating them into strategic actions.
- 3) Build competencies in evaluating the ethical and social implications of AI-driven decisions to ensure transparency, accountability, and inclusiveness.
- 4) Learn to use AI platforms and tools (such as business intelligence software and predictive analytics systems) for real-time decision support and continuous improvement.

9.3 Course Outline

The module begins with an introduction to the concept of smart decision-making and the evolution of decision-support technologies. It then explores the role of AI algorithms in improving decision quality, speed, and objectivity. Learners will engage with real-world case studies highlighting successful AI-driven decision processes across industries. Practical workshops will guide participants in building and testing their own AI-based decision support systems. The module concludes with discussions on ethical governance of AI decisions, potential risks, and the future of human-AI collaboration in strategic management.

9.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

10. Industrial Application Development with AI Copilot Support

10.1 Objectives

The module aims to prepare learners with the necessary knowledge, skills and tools to integrate new AI-based solutions into their industrial application development workflows. This will cover the programming of automated logic, human machine interface and industrial communication in turnkey projects using



existing software frameworks from reputable vendors and Industry 5.0 best practices. Emphasis will be put on industrial-grade requirements for performance, scalability, robustness and security of generative AI models as compared to personal and business-oriented applications.

10.2 Outcomes

10.2.1 Knowledge

- Fundamentals and evolution of generative AI models and integration aspects of AI Copilots
- Presentation of the generative AI landscape for human-centric and sustainable Industry 5.0 application development
- Future development perspectives and adoption of AI Copilot in mission critical industry solutions from various industry verticals, including regulatory compliance

10.2.2 Skills

- Use of Industrial AI Copilots from various suppliers in daily industrial automation workflows for increased productivity
- Customization of AI Copilots in industrial automation development using open-source components and tools

10.3 Course Outline

The course will present first the recent timeline evolution of large language models for multimedia content generation and their integration in the form of industry-grade software frameworks. Examples and hands-on assignments will be provided in conjunction with real industrial projects for process control and discrete manufacturing automation using tools from Siemens (Industrial Copilot) and Beckhoff (TwinCAT CoAgent). Regulatory and workforce impact will also be discussed in what regards Industry 5.0 challenges and the automation of repetitive development tasks at high levels of code quality and replicability.

10.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1



11. Skills Development for using AI

11.1 Objectives

This chapter aims to help future entrepreneurs understand how to use Artificial Intelligence (AI) to improve and transform their businesses. The approach is focused on using AI in accessible ways, without requiring advanced technical knowledge, and with an emphasis on applicability in entrepreneurship.

11.2 Outcomes

11.2.1 Knowledge

Upon completing this course module, participants will understand:

- What Artificial Intelligence (AI) is and how it can support entrepreneurship.
- How Artificial Intelligence (AI) can improve customer relationships and increase sales.
- How to use Artificial Intelligence (AI) to streamline internal processes within their business.
- How to use Artificial Intelligence (AI) to develop innovative products and services.

11.2.2 Skills

Learners will:

- Acquire skills in using AI for personalizing customer experience, through intelligent recommendations, chatbots, and predictive analytics, which will help increase customer satisfaction and loyalty and stimulate sales.
- Learn to use AI to automate administrative tasks and operational processes, saving time and resources, and improving business efficiency.
- Learn how to use AI to identify market needs, develop new and innovative products, and quickly respond to changes in consumer preferences, thus offering competitive solutions.



11.3 Course Outline

The module begins with an overview of what Artificial Intelligence (AI) is and how it can support entrepreneurial development. The discussion will cover how AI can improve customer relationships and stimulate sales growth, as well as its application in optimizing internal business processes. Additionally, the course will explore the use of AI in creating innovative products and services. By the end of the module, participants will gain practical insights into how AI can address challenges and leverage opportunities in business, thereby contributing to innovation and increased competitiveness.

11.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1

12. Implementation examples of Industry 5.0

12.1 Objectives

This module aims to present learners with real-world examples of how Industry 5.0 is being implemented across various industrial sectors. It focuses on the integration of human-centric approaches, advanced AI, IoT, and other enabling technologies such as blockchain and collaborative robots. Emphasis is placed on how these technologies enhance resilience, sustainability, and mass personalization, while creating social value and fostering innovation.

12.2 Outcomes

12.2.1 Knowledge

By the end of this module, learners will:

- Understand the enablers and technological foundations that support Industry 5.0 implementations, such as human–robot collaboration, mass personalization, and ethical AI.



- Be able to recognize barriers and critical success factors related to the deployment of Industry 5.0 solutions.
- Gain insight into sector-specific use cases in areas such as manufacturing, logistics, supply chain management, and healthcare.

12.2.2 Skills

Learners will:

- Be able to analyze and evaluate practical implementations of Industry 5.0 technologies.
- Learn to identify suitable technologies (e.g., digital twins, blockchain, IIoT, 6G) and assess their readiness for deployment in different industrial contexts.
- Acquire competencies in designing and presenting Industry 5.0 transformation roadmaps using best-practice cases.

12.3 Course Outline

The module begins with an overview of the core technologies and socio-technical enablers of Industry 5.0. Learners will study exemplary implementations from various domains, including:

- Smart manufacturing plants leveraging collaborative robots for mass personalization and increased human-machine synergy.
- Cybersecurity in IIoT environments, showcasing AI-driven risk mitigation strategies aligned with Industry 5.0 resilience goals.
- Blockchain-based trust and data governance in cross-domain supply chains.
- Healthcare and education cases demonstrating how AI (e.g., ChatGPT) supports human-centric services and improves access and inclusion.
- Barriers to adoption and mitigation strategies in emerging economies, with a focus on skills gaps, digital maturity, and cost structures.
- Sustainability-focused frameworks, such as circular economy and bioeconomy, applied to Industry 5.0 contexts.

The module concludes with a collaborative workshop where learners will design their own Industry 5.0 implementation scenarios based on a selected case study, applying lessons learned throughout the course.



12.4 Course duration and ECTS

Estimated time: 10 h (teaching) + 15 h (individual study)

ECTS: 1