

Strategy to Integrate the SDGs in the BSc and MSc Degrees. Recommendations and Guidelines

PR1.A2



JOIN-RISE



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1. Introduction

The United Nations' **2030 Agenda for Sustainable Development** is one of the most ambitious and important global agreements in recent history. In order to achieve the 17 **Sustainable Development Goals**, SDGs, it is necessary to educate smart, creative and entrepreneurial individuals that have confidence and think critically. Education, specifically STEM (science, technology, engineering, and mathematics) education, is essential for the achievement of the SDGs, but Universities have struggled to introduce SDGs into their regular courses and degrees due to the lack of awareness and resources.

The main objective of **JOIN-RISE** (Joint development of innovative blended learning in STEM curricula based on SDGs for a resilient, inclusive and sustainable education) is to foster the development of STEM students into critical thinkers fully committed to the SDGs. To achieve this, changes to current curricula should be implemented, and the SDGs should be taught in STEM degrees. Lecturers are key players to the project's main objective. Therefore, further aims are to make STEM lecturers more aware of global challenges and of the need to integrate values and ethics into their teaching; and provide them with concrete guidelines and recommendations for integrating the SDGs. JOIN-RISE will therefore create a **specific course for university lecturers** on this subject.

In addition, a **guideline** will be provided for Universities and other higher education institutions for adopting the **Certificate of Sustainable Commitment** (CSC) and adjust it into the **European Qualifications Framework** (EQF). JOIN-RISE will provide a **database of Service-Learning projects** and Bachelor's and Master's final dissertations related to SDGs in STEM which will help students to put their knowledge and social commitment into practice. In addition, the JOIN-RISE project will design an **innovative virtual** training environment on the SDGs targeted at lecturers and students. This inclusive, digital approach will help commit STEM students to the achievement of the SDGs.



The project team, with a strong international character, includes four academic institutions (University of Burgos (Spain), Technische Universiteit Delft (Netherlands), Trinity College Dublin (Ireland), University of Pécs (Hungary)) and a technology consulting company (Bjäländ Technologies (Spain)).

This document presents the **JOIN-RISE strategy** to integrate the SDGs in the Bachelor and Master's Degrees in STEM disciplines. It provides a general framework for the integration along with a compilation of recommendations and guidelines to facilitate its implementation.

In addition, the structure and learning objectives of 4 courses are provided as follows: (1) a full description of a new elective module/course, including its functioning and requirements to put it into practice, (2) a full description of a new program of 5 modules on Human Sustainable Development, its functioning and requirements to put it into practice, (3) an online course for lecturers on how to integrate SDGs in an existing module/course or Bachelor/Master Degree Projects and (4) an online course for Bachelor Degrees Coordinators on how to integrate SDGs in the curriculum. Moreover, the document provides the description of the Certificate of Sustainability Commitment and the process of implementation. This certificate is a micro-credential with ECTS recognition integrated in the academic curriculum.

The document is built upon *PR1.A1 Compilation of best practices in fostering education for sustainable development*. Here, a thorough review of the best practices at European level in fostering Education for Sustainable Development is given. It reviews the status of implementation of the SDGs in higher education (HE) institutions, existing implementation practice and the main challenges and barriers that HE institutions face when putting SDGs in place.

The commitment of HE institutions towards the implementation of SDGs is paramount to achieve a successful integration. HE institutions should actively encourage and support



SGD integration by implementing them throughout their systems. Although some institutions lag in formalising SDGs in their accreditation programs, there is a clear willingness for the integration of SDGs in the curricula. However, this requires implementing structures and deploying resources. R1.A1 shows that integration into curriculum is a challenge. There is often a big gap between the strategic vision of universities (e.g. [TUD vision on education](#)) and the development of new curricula to match this vision. This is due to administration hurdles, the tendency towards de-intensifying education (more lectures, less coaching) and existing programme frameworks.

The present work builds up on the assumption of a willingness for the incorporation of SDGs, and the availability of economic and human resources, and attends to the incorporation process.

The document is structured as follows; in Section 2, the definitions of some concepts used in this document are given. Section 3 provides the JOIN-RISE vision regarding teaching SDGs in STEM disciplines. The implementation strategy is given in Section 4 and detailed in Sections 5 to 10, where recommendations, guidelines and application cases are presented for each implementation mechanism discussed. The certification of Sustainable commitment is discussed in Section 11. Finally, some closing remarks are given in Section 12.



2. Definitions

(By alphabetical order)

Course: a complete program of study that can range from a few weeks to a year. It typically covers a specific subject area.

Competencies: broad abilities and skills that a student should possess after completing a course or program. Competencies are more comprehensive and long-term than learning objectives and typically include a mix of knowledge, skills, attitudes, and behaviours.

Compulsory course: also mandatory, core or core curriculum courses. It is a course that students are required to take in order to fulfil the requirements of a program or degree.

Elective course: a type of course in an educational program that is optional for students to take. Elective courses are not required as part of the core curriculum, but students have the choice to select and study these courses based on their personal interests or career goals. Electives can be used to broaden a student's educational experience, provide opportunities to explore new subjects or topics, or allow students to specialize in a particular area.

Entry course: a course designed for students who are new to a particular subject area or educational program. They serve as an introduction to the fundamental concepts and skills required for a specific field of study and provide a foundation for more advanced courses. Entry courses are usually lower-level courses that do not require prior knowledge or experience in the subject area and are designed to be accessible to all students, regardless of their background. Their purpose is to help students develop a basic understanding of the subject matter and to prepare them for more advanced coursework.

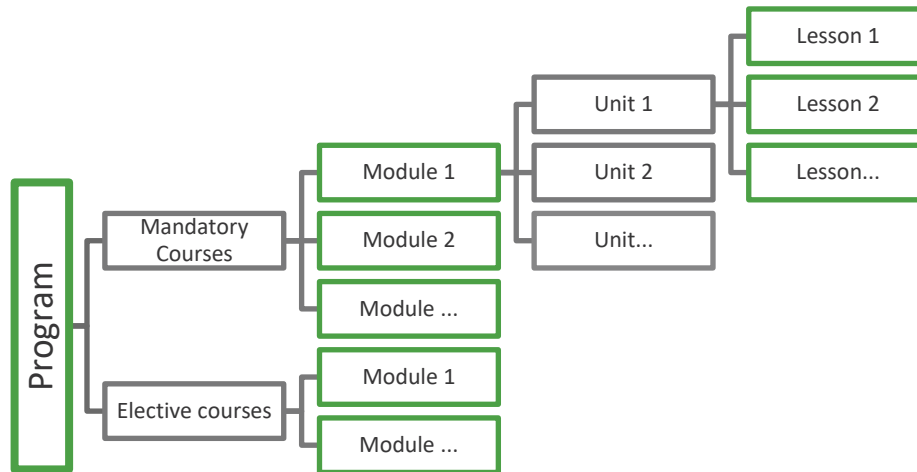


Figure 1. Levels of organization and structure within educational content

Learning objective: specific, measurable outcomes that a teacher wants their students to achieve by the end of a lesson or unit. They describe what the student should know or be able to do by the end of the learning experience.

Lesson: the smallest unit of instructional content. It is a self-contained instructional experience that focuses on a single concept or skill. Lessons can range from a few minutes to several hours and are designed to help students build understanding of a specific topic.

Module: a smaller, self-contained unit within a course. It is designed to cover a specific topic or set of topics in depth. Modules can be used to break down complex subjects into manageable pieces and provide students with the opportunity to focus on specific areas of interest.



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Program: a structured series of courses and/or modules that lead to a specific educational goal, such as a degree, certification, or professional development. Programs are usually designed to provide students with a comprehensive education in a specific field.

Unit: a subdivision of a module or course. It typically covers a single, well-defined topic within the larger subject area.



3. JOIN-RISe Vision

Education is not preparation for life; but life itself. Building on what has been discussed in PR1.1, this section discusses the expansion of traditional learning competencies and how to embed new competencies by creating space in education.

1. Moving beyond traditional competencies

Traditional competencies for students are embedded in disciplines and are built on cognitive learning skills and abilities derived from Bloom’s taxonomy, as indicated in Figure 2. Teaching the SDGs extends this cognitive learning base to socio-emotional learning of values, mindsets and attitudes. Engaging in socio-emotional learning is necessary to define the value-driven framework for measuring and understanding the world. But changing mindsets and values is insufficient without action. Behavioural learning competencies are needed to enable students to develop critical behaviour by introducing students to methods and theories for envisioning the future, experimenting, connecting things, reflecting and taking actions.

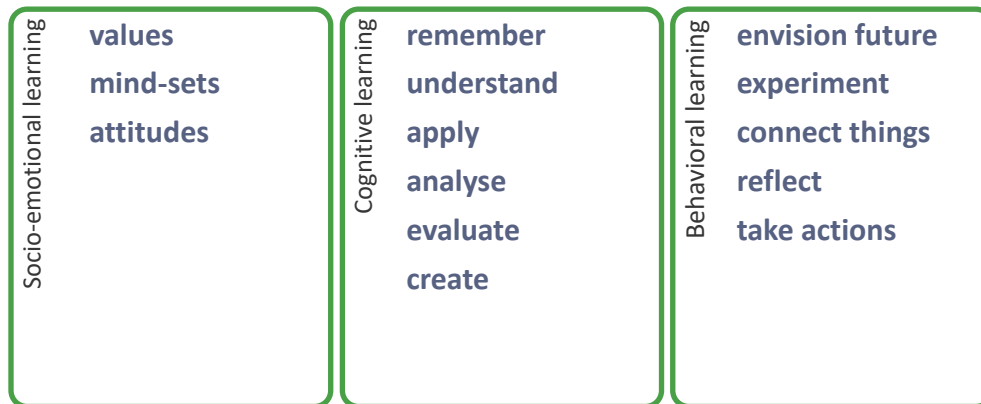


Figure 2. Classification of the competencies that students should acquire in relation of an integrated and comprehensive education of the SDGs in the Bachelor and Master’s Degrees in STEM disciplines.



2. Creating space for gaining new competencies

Gone are the days of the dichotomy between the teacher and the student and between classroom and real-world settings. Increasingly, students are expected to engage in self-led learning. Teachers are thereby challenged by students to rethink their own understandings, especially in the context of the growing societal and environmental concerns of younger generations. To create an environment for this exchange, educators should look towards the younger generations and foster creativity.

Creating space involves challenging existing knowledge and our current way of thinking. It also means tackling real-world challenges through exposure to challenges outside the classroom. However, students also need access to existing knowledge and previous successful/unsuccessful applications. Moving beyond the classroom entails moving beyond existing knowledge and traditional teaching methods for students to gain a new perspective on the world. It is important for administrators to recognize that creating space for new competencies takes time and additional resources.

3. Implementing competencies at all levels of organization and structure

Implementing the expanded competencies entails creating space for students and professors to generate new ideas, assess the feasibility of existing approaches and perspectives for creating a sustainable future, and expanding the limits of practice and knowledge to achieve a sustainable world. The implementation of this expanded educational agenda can be described in three general directions (see Figure 3).

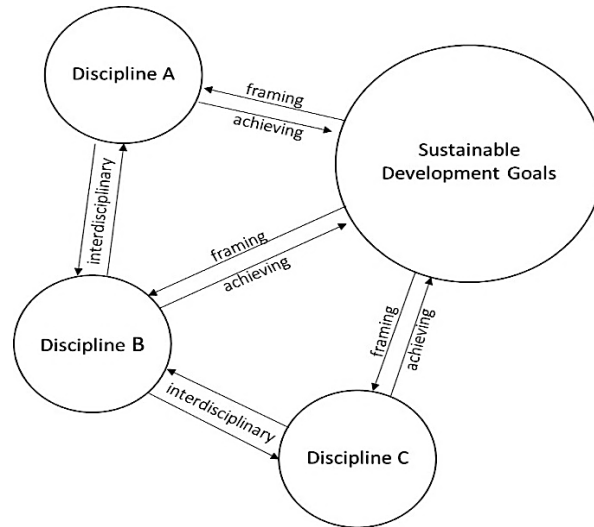


Figure 3. Three directions of integration of the SDGs in STEM education disciplines

Direction 1 pertains to the teaching of disciplinary concepts and competencies from an SDG perspective, e.g. the framing perspective. The SDGs are applied as a framing tool to set a certain mindset, attitude or values teaching a discipline thereby leading to socio-emotional learning. Direction 2 pertains to the relevance of disciplinary concepts and competencies to achieving the SDGs, e.g. achieving perspective. Providing students with a cognitive learning that will enable the behavioural learning. Direction 3 pertains to the relating of concepts and competencies across disciplines, e.g. interdisciplinary perspective. Two examples of implementation in this direction are given. First, mixed classrooms are increasingly popular settings for traditional students and professionals to learn from one another and together. Such settings expose traditional students to existing knowledge and real-world challenges while sharing with professionals the fresh perspectives of students. Here it is worth noting that we acknowledge the role of students in society as young citizens whose voices are often underrepresented in decision making. Second, in addition to their primary purpose as research and innovation spaces embedded in real-world environments, living labs offer spaces for students, researchers and professionals to



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engage in shared learning and experimentation in close to real-world settings. Since the world does not exist as silos of knowledge and experiences, shared learning and experimentation in real-world contexts also entails a relating knowledge and concepts across disciplines, which is an important aspect of interdisciplinary learning.





4. Implementation Strategy

According to PR1.A1 *Compilation of best practices in fostering education for sustainable development*, there are different possible implementation mechanisms to achieve the discussed competencies. Namely; (i) embedding the SDG-related content within other courses, that is, teaching SDGs without the need to change the structure of the existing study program (e.g., Müller (2020) and De la Torre et al (2021)); (ii) creating intensive courses (or dedicated courses) on SDG-related content, that is, separate courses with intensive training on SDGs (e.g., Braßler and Sprenger (2021) and Kirchherr and Piscicelli (2019)); (iii) creating entire programs, involving several courses (e.g., Nowotny et al, 2018); and (iv) Implementing transdisciplinary projects for the Bachelor and Master’s final dissertation (e.g., Hernández-Barco et al, 2020). These strategies are discussed in detail in Sections 5 to 10.

Each of them requires different expertise for the actors involved as indicated in Figure 4.

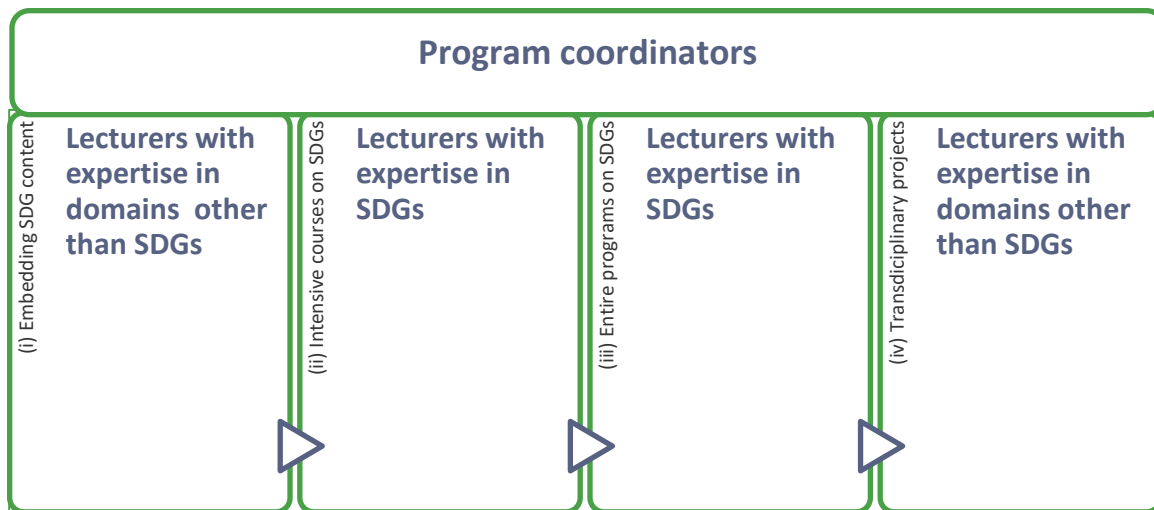


Figure 4. Actors involved and required expertise in the four identified implementation mechanisms.



A well-recognised handicap that lecturers with expertise in domains other than SDGs face is a lack of knowledge specific to SDGs. This can affect the effectiveness of mechanisms (i) and (iv). Therefore, the implementation strategy should include a course for lecturers to teach them how to integrate SDGs in their courses. This is discussed in detail in Section 9. In parallel, degree coordinators should acquire a comprehensive vision of the challenges and opportunities when designing the programs for an adequate implementation of the integration of the SDGs. Section 10 addresses this issue.



5. Introducing SDG-Related Content into other Courses. Recommendations and Guidelines

Section 5 in PR1.A1 identifies the **challenges of implementing SDGs into the curriculum**. These challenges are identified through a literature review and surveys of the teaching staff at TU DELFT and UP FEIT. Built on this information, this section provides recommendations and guidelines to support teachers to introduce SGD-related content into existing or new courses that are oriented to teach any topic in the STEM domains, such as industrial design, differential calculus and econometrics.

One main constraint identified was the lack of time that teachers have available when introducing SDG concepts into existing courses, as well as the lack of resources that are available to adapt or create new materials. On the positive side, the survey identified that many teachers already introduce concepts of SDGs into their courses, however these tend to be those SDGs which are directly related to the course which means that there several SDGs which are neglected depending on the focus of the education program. At some institutions it may be advisable to teach an introductory course that covers those SDGs which are less likely to be embedded in the core curriculum subjects. This is covered in Section 6 of this document.

The **recommendations and guidelines** can be adapted to each specific institution, programme or course. Some of these guidelines may not be suitable for all STEM programs, but using a combination of them depending on the priorities and individual nature of the teaching curriculum is likely to be the best approach. It is noted that these guidelines focus on embedding SDGs in other courses which means that the lecturer's priority will be on the material related to the subject taught rather than the SDGs.



1. Identify the relevant SDGs and targets that align with the course objectives and learning outcomes at the course development/accreditation stage. Due to the wide-ranging scope of the SDGs, it is possible to select those goals that can be embedded in a wide range of courses. These should be considered at the accreditation stage of a course rather than later. It is also important for program directors to be involved at this stage to ensure that SDGs are well represented in a program of studies but that there is not excessive repetition within the subjects.
2. Develop lesson materials which focus on raising awareness about SDGs. It is important that the beliefs and values of students are developed rather than focusing on transferring knowledge. Students should clearly be able to see how they can transfer these values and knowledge to their own work and their community upon graduating.
3. When embedding materials in courses, it is preferable that activities are restricted to the duration of one session rather than taking up multiple sessions. If material is being added to an accredited course, it is important that supplementary material remains below 30% to avoid the need for reaccreditation in many countries.
4. Ensure that faculty members are equipped with access to open educational resources. This could be a database of resources or an incentive to develop their own materials or workshops to promote the importance of using SDGs. Now, many teachers do not have easy access to materials that can be easily adapted to their courses. This is especially so if the language of instruction is not English.
5. Improve teachers' skills in the field of sustainable development through workshops, training sessions, and information dissemination. This applies to both pedagogical skills as and those dealing specifically with the SDGs. Section 9 presents an example of a course for lecturers to enable them with this knowledge. Moreover, professional development can be supported through participation in conferences and other events related to sustainable development education. Institutions need to



provide incentives for teachers to expand their teaching materials to include concepts of SDGs.

6. Develop learning activities that allow the student to understand the specific links between their studies and the SDGs. It is important that the teacher not only points out, for example, that energy efficiency is important for their studies but also important from a broader global viewpoint and how it is related to numerous SDGs.
7. Assess the learner's progress using criteria that reflect the principles and values of the SDGs.
8. Incorporate different perspectives and case studies from different regions and contexts that illustrate the challenges and opportunities of achieving the SDGs. It is important that students realise that a global perspective is needed, and that their actions can make have an impact on other communities, and vice versa.
9. Engage learners in critical thinking and problem-solving activities that foster creativity and innovation towards sustainable solutions. The 17 SDGs represent a wide-ranging and complex collection of goals that require developing interdisciplinary knowledge and skills. One effective approach to teaching the SDGs in STEM subjects is to create lessons that involve real-world problems, which allow learners to apply their knowledge and skills to practical, meaningful situations.



6. A New Course on SDGs

6.1. General considerations

6.1.1. Introductory course for first-year university students

The Sustainable Development Goals introductory course, which will be **implemented at the University of Burgos** (UBU) in Spain, aims to provide first-year bachelor students with a general and broad overview of the challenges faced in the 2030 Agenda. University students will be the professionals involved in the achievement of these goals in future. Therefore, an early introduction and training in the field of sustainable development is much needed. It is also essential to focus on the practical applications of this knowledge, to promote involvement and participation in actions to achieve the sustainable development goals.

Therefore, the **general objective** of the course is to provide students with theoretical and practical knowledge that will allow them to acquire and develop the competencies and skills necessary to work towards sustainable development. The course title will be **‘My role as a university student and future professional within the Sustainable Development Goals’**.

The training course will include an introduction focussing on the origin of the objectives, regulations and commitments that exist in this area. The second module will then explain the 17 goals, their targets, achievements attained and future challenges. The third module will focus on the approaches that should guide any intervention in the field of sustainable development. Finally, the course will end with practical applications of the acquired knowledge (module 4). Providing students with a clear vision of the actions they can take in their professional careers will result in greater student’s engagement with the SDGs.

This course will be compulsory and common to all the degrees offered by the University of Burgos. It will take place during the first months of the new undergraduate students (first



semester/year). It will be taught in four two-hour sessions, so that the total dedication will not exceed 8 hours. The first six hours will focus on general training, common to all degrees, and the last two on adaptable training for specific areas of study. At the end of the course, students will receive a diploma for the training they have completed that will give them merit to obtain the Certificate of Sustainable Commitment. They will also receive information on the further options available in the university to develop their commitment with the 2030 Agenda during their academic life.

6.1.2. Elective Course on SDGs

This elective course aims to provide students with the knowledge and skills necessary to work on architectural projects in the field of international development cooperation.

The objectives of the course are as follows

- To define the organisation of an architectural project and project management in the context of international cooperation.
- To learn about low-cost and sustainable technologies for the design, calculation and execution of architectural cooperation projects.
- To know how to combine low-cost technological solutions with industrialised solutions, seeking innovation.
- To apply circular economy criteria in the projects developed.
- To seek to raise awareness, commitment, and initiative among students in the field of cooperation.



6.2. Application case I. Mandatory entry course on SDGs for first year university students

Entry course. 'My role as a university student and future professional within the Sustainable Development Goals'

Module 1. Sustainable development goals: an introduction to sustainability
Total duration of the module: two hours Year and semester in which the subject is taught: first year, first semester.
Learning Objectives: By the end of the module, the student will be able to <ul style="list-style-type: none"> • understand the key concepts that guide actions designed to achieve DDGs. • understand the key factors and basis of social and territorial inequalities in all dimensions and at different geographical scales. • develop a global and comprehensive view of nature, approach, and objectives of development cooperation actions. • apply the values of university cooperation in its teaching and research dimensions.
Unit 1.1. Introduction: Sustainable Human Development Unit 1.2. The Cooperation for Development Unit 1.3. The actors in development cooperation Unit 1.4. Normative Framework for Cooperation
Evaluation criteria: In order to pass the module, students must achieve 60% of correct answers in the self-assessment tests.

Module 2. Goals and challenges in 2030 agenda for sustainable development
Total duration of the module: two hours Year and semester in which the subject is taught: first year, first semester.
Learning Objectives: By the end of the module, the student will be able to <ul style="list-style-type: none"> • understand the increasing complexity of cooperation in the achievement of the SDGs.



<ul style="list-style-type: none"> • promote and participate in the debate of development processes and appropriate strategies and policies for the promotion of sustainable human development.
<p>Unit 2.1. From the MDGs to the SDGs</p> <p>Unit 2.2. The 17 Sustainable Development Goals</p> <p>Unit 2.3. The 2030 Agenda: achievements and challenges</p>
<p>Evaluation criteria: In order to pass the module, students must achieve 60% of correct answers in the self-assessment tests.</p>

<p>Module 3. Cross-cutting approaches in cooperation for development</p>
<p>Total duration of the module: two hours</p> <p>Year and semester in which the subject is taught: first year, first semester.</p>
<p>Learning Objectives:</p> <p>By the end of the module, the student will be able to</p> <ul style="list-style-type: none"> • develop a global and comprehensive vision of the sectoral areas of development cooperation and the fundamentals of cross-cutting approaches in cooperation policies and actions.
<p>Unit 3.1. Women, gender and development.</p> <p>Unit 3.2. The Human Rights-Based Approach</p>
<p>Evaluation criteria: In order to pass the module, students must achieve 60% of correct answers in the self-assessment tests.</p>

<p>Module 4. Practical applications of the sdfs</p>
<p>Total duration of the module: two hours</p> <p>Year and semester in which the subject is taught: first year, first semester.</p>
<p>Learning Objectives:</p> <p>This module has four elective units. The learning objectives vary depending on the student's selection.</p> <p>By the end of the module, the student will be able to</p> <ul style="list-style-type: none"> • foster critical attitudes and encourage commitment to sustainable development goals. • reflect about environmental problems and human development.



- develop individual strategies for waste management, prevention and recovery of the natural environment.
- experiment in actions of cooperation in the field of architecture and urban planning as well as in the field of engineering.
- take actions to improve the field of educational and health cooperation actions in developing countries.
- connect expertise in critical and solidarity economy with alternative financing instruments for development, microfinance, ethical banking and fair trade.

Unit 4.1. Sustainable Living Habits and SDGs

Unit 4.2. The SDGs in your professional career (elective units):

Evaluation criteria: In order to pass the module, students must achieve 60% of correct answers in the self-assessment tests.

6.3. Application case II. Elective course on SDGs

Module 1. Projects in the area of international development cooperation

Type of course: elective

Learning load: 3 ECTS.

Learning Objectives:

By the end of the course, the student will be able to

- define the organisation of an architectural project and project management in the context of international cooperation.
- use low-cost and sustainable technologies for the design, calculation and execution of architectural cooperation projects.
- combine low-cost technological solutions with industrialised solutions, seeking innovation.
- apply circular economy criteria in the projects developed.
- developed the raise awareness, commitment and initiative among students in the field of cooperation.



Content:

- Unit 1.1. Contextualisation for social and material regeneration of the habitat
- Unit 1.2. Tools and methodologies of international cooperation
- Unit 1.3. Urban planning and infrastructures
- Unit 1.4. Unit Low-tech construction
- Unit 1.5. Technical professional in cooperation

Evaluation system

- Classroom practicals (50% of the final grade).
- Assessment exercise of the general part (40% of the final grade).
- Attendance and participation (10% of the final grade).



7. New Program

7.1. General considerations

The University, as an entity with a high social responsibility, should not limit itself to a narrow vision of education. As part of a wider cultural system, it needs to take a broad a view of higher education. Hence it must prepare professionals to be able to use their knowledge, not only in scientific contexts, but also to respond to social and environmental needs. **The whole educational process should be addressed in a holistic way addressing sustainability.** In doing so, students will learn how to make decisions and carry out actions based on sustainable criteria which will contribute to the training of global and responsible citizens.

The training of students in the principles of Sustainable Development, defined as "the development that satisfies the needs of people today without compromising the ability of future generations to satisfy their own needs" (Brundtland, 1989), is an unavoidable issue for higher education institutions.

The **new programme** on Sustainable Development aims **to offer** students the opportunity **to increase their training** in this multidisciplinary subject in all degree programmes, so that they can become responsible professionals in their respective fields.

The aim is to promote systemic and transdisciplinary approaches to the major problems of the planet. The students taking the modules in the new programme would understand the complexity of social, economic and environmental problems embedded in the SDGs, and the impact that their own daily and professional activities have on them.

Specific objectives are to critically reflect on the viability of current economic and social development models and national and international political structures; on the distribution of wealth, equity and justice as the cornerstones of human relations; on the rights and opportunities of future generations; and on what has been and should be our



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attitude towards natural resources and the environment. Learning is oriented towards training in values that place respect for people and care for life at the centre of individual behaviour. It also seeks to contribute to the acquisition of knowledge and skills necessary to access postgraduate studies and research, specialised or transdisciplinary in nature, related to sustainable human development. The new programme consists of five subjects of three ECTS each. In order to obtain the Diploma in SHD, students must take a total of 12 ECTS, distributed as follows: 3 ECTS of the course 1 “Sustainable Human Development” must be taken, and the remaining nine ECTS may be taken by choosing three out of the five courses that conform the module.





7.2. Application case: Program of 5 courses on human sustainable development

<p>Course 1. Human Sustainable Development</p>
<p>Type of course: mandatory Learning load: 3 ECTS.</p>
<p>Learning Objectives:</p> <p>By the end of the course, the student will be able to</p> <ul style="list-style-type: none"> • demonstrate that the concept of sustainability is not only related to environment, but it also linked to economic, social, political and cultural issues. • develop critical thinking and adopt general perspective when facing challenges in the professional development. • develop strategies to involve sustainable human development in their professional life.
<p>Content:</p> <p>MODULE 1. Dhs: general characterization</p> <p>Unit 1.1. Development</p> <p>Unit 1.2. Humanity</p> <p>Unit 1.3. Sustainability</p> <p>Unit 1.4. The evaluation of development: towards another index</p> <p>MODULE 2. Reality analysis from a DHS perspective</p> <p>Unit 2.1. Demographic overview, a growing population</p> <p>Unit 2.2. Economic overview, growth based on large-scale consumption.</p> <p>Unit 2.3. Political overview: Governance, Sovereignty, The States share the stage with other important social actors. Unequal power.</p> <p>Unit 2.4. Social overview</p> <p>Unit 2.5. Environmental overview, global destabilization of ecosystems and natural cycles</p> <p>MODULE 3. Proposals and Alternatives for Sustainable Human Development</p> <p>Unit 3.1. Development and everyday sustainability</p> <p>Unit 3.2. Growth vs. de-growth: utopian or realistic alternative?</p>



Evaluation system

- Classroom practical (60% of the final mark).
- Assessment exercise of the general part (30% of the final mark).
- Attendance and participation (10% of the final mark).

Course 2. Education for a Human and Sustainable World

Type of course: elective

Learning load: 3 ECTS.

Learning Objectives:

By the end of the course, the student will be able to

- analyse and compare the education in the countries of the North and the South, both from a quantitative and qualitative point of view.
- identify the existing differences between the neoliberal educational model and the popular or critical one.
- describe the main elements of Development Education and promote solidarity with the most vulnerable sectors of society by analysing different didactic proposals.
- work on the culture of peace.
- develop proposals at different levels, in order to achieve a fairer and more united world.

Contents:

MODULE 1. Neo-liberal and critical education.

Unit 1.1. Neo-liberal and critical education.

Unit 1.2. The education in the North and in the South.

Unit 1.3. Analysis of the characteristics of neoliberal education.

Unit 1.4. Popular and critical education: characteristics, origin and development.

Unit 1.5. Chrematistics vs. "Good living". A reflexion about the concept of development



MODULE 2. *Development and Global Citizenship Education*

Unit 2.1. Development and Global Citizenship Education.

Unit 2.2. Education for Development: an analysis of its dimensions and characteristics.

Unit 2.3. Sustainable Development begins with education. Didactic proposals in Education for Development for formal and non-formal contexts.

MODULE 3. *Education for a culture of peace and democracy*

Unit 3.1. Education for Peace and Human Rights.

Unit 3.2. Education for Peace and Children's Rights.

Unit 3.3. The Sustainable Development Goals and the Culture of Peace.

Evaluation system

- Coursework 40%
- Readings and practical exercises 20%
- Final assessment test 40%



Course 3. Economy for Human Sustainable Development
Type of course: elective Learning load: 3 ECTs.
Learning Objectives: By the end of the course, the student will be able to <ul style="list-style-type: none"> • understand the key elements and stages of the development economy. • identify, obtain and understand the main indexes to measure development. • to question contemporary economic goals and behaviours, as well as to reflect on possible alternatives for action. • appreciate the importance of business decisions for the achievement of sustainable development. • To use tools for the evaluation of the business contribution to sustainable development
Contents: MODULE 1. <i>Economy for Sustainable Human Development</i> Unit 1.1. Economy for development. Introduction. Unit 1.2. Reviewing current economic goals and behaviours. Alternatives. Unit 1.3. Organisations and sustainable development. Unit 1.4. Leadership for corporate sustainability.
Evaluation system <ul style="list-style-type: none"> • Active participation • Evaluation tests



Course 4. Citizenship and Democratic Governance in a Global World
Type of course: elective Learning load: 3 ECTS.
<p>Learning Objectives:</p> <p>By the end of the course, the student will be able to</p> <ul style="list-style-type: none"> • analyse the influence of contemporary socio-cultural, political and economic factors on the sovereignty of the nation-state. • identify the difference between generations of rights and their contents. • identify about the different forms of citizenship proposed from different areas. • propose alternative forms of governance that include social participation. • contribute to the development of a critical and active citizenship.
<p>Contents:</p> <p>MODULE 1. <i>The sociological dimension of governance</i></p> <p>Unit 1.1. Introduction and concepts</p> <p>Unit 1.2. Actors Involved</p> <p>Unit 1.3. Alternative to formal citizenship</p> <p>Unit 1.4. The sociological dimension of transnational mobility</p> <p>MODULE 2. <i>The legal dimension of governance</i></p> <p>Unit 2.1. Introduction and concepts</p> <p>Unit 2.2. Actors involved</p> <p>Unit 2.3. Legal framework for foreigners in Spain</p> <p>Unit 2.4. Legal dimension of transnational mobility</p>
<p>Evaluation system</p> <ul style="list-style-type: none"> • Active participation in class • Presentation in the classroom context • Class discussions • Final research paper on one of the topics of the course the subject



Course 5. Inequalities in the current world
Type of course: elective Learning load: 3 ECTS.
<p>Learning Objectives:</p> <p>By the end of the course, the student will be able to</p> <ul style="list-style-type: none"> • address global and interdependent approaches to the major problems of the moment. • analyse the inequalities of today's world from multiple socio-economic, gender and migratory movement perspectives. • develop a critical attitude in the analysis of the causes and consequences of an unequal world, as well as the alternative proposals in order to reduce inequalities. • debate on inequalities and development.
<p>Contents:</p> <p><i>MODULE 1. The complexity of the global space: economic inequality and social injustice on a global scale</i></p> <p>Unit 1.1. Inequalities: characteristics, origins and indicators Unit 1.2. Globalisation and inequality Unit 1.3. Strategies to correct inequalities</p> <p><i>MODULE 2. Inequalities from a gender perspective</i></p> <p>Unit 2.1. The sexual differences and gender inequality Unit 2.2. Socialization and gender identity Unit 2.3. Violence and exclusion as a result of an unequal world Unit 2.4. Reclaiming equality in the 21st century</p> <p><i>MODULE 3. Migratory flows in an unequal world</i></p> <p>Unit 3.1. International migrations. Unit 3.2. Immigration and Migratory Policies: Law on Foreigners, Asylum, Refuge and International Protection. Unit 3.3. Immigration and cultural diversity Unit 3.4. Immigration: Socio-cultural attitudes and the mass media.</p>



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Evaluation system

- Active participation: 20%
- Classroom presentations 20 %
- Classroom debates: 20%
- Final research paper about one of the topics of the subject 40%



8. Guidelines to Include SDGs in Multidisciplinary Bachelor and Master Projects

Humanhood is capable of dealing with immediate problems but less apt at dealing with complex problems where the long-term impacts of their actions are not immediately apparent. This can lead to consequences that may harm the social and ecological systems that we depend on. An overall vision of sustainability would enable students to tackle, more complex problems, more widely.

Currently, most courses in an HEI program are orientated towards mastering techniques and gaining knowledge in the specific field of study, however, most graduates upon leaving university will interact with other fields such as sociology, law and economics. By applying the concepts of SDGs to transdisciplinary projects, students can learn how to collaborate across different disciplines and with different stakeholders to address complex problems that require multiple perspectives and a broader knowledge. Moreover, they can explore opportunities for innovation and design solutions that are more resilient and adaptive to future change.

Introducing SDGs into transdisciplinary projects is perhaps the ideal way for students to explore the complexity and interdependence of the challenges that the SDGs aim to address. Some design tasks in group projects focus on SDGs in addition to solving a specific engineering challenge (for example, the Engineers without Borders Design Challenge).

The **following guidelines** address the implementation challenges identified in PR1A1, Sections 5.1 and 5.2.



1. Where possible use “real-world” problems, and get students to employ critical thinking where they reflect on their role as global citizens. Students are more likely to engage in a project if they can see that their actions have consequences in the real world. Real-life problems are also more likely to demonstrate the multifaceted approach needed to solve challenges – where numerous factors including the culture of the people involved and their specific situation cannot easily be replicated in the classroom. If students can interact with the environment and relevant stakeholders, they can understand that their actions and decisions have real consequences in the non-academic world
2. Invite guest lecturers when possible. Some external lecturers may have specialised knowledge different from the host institution, and valuable real-world experience of field challenges. If SDGs are introduced throughout a university, experts from different departments can also provide valuable guidance or teaching in their field of expertise related to SDGs. Furthermore, students can take courses addressing an aspect of sustainability which is not offered in their own faculty/school. This can promote interdisciplinary cooperation throughout an institution at levels other than sustainability.
3. Establish partnerships with institutions and community organisations. HEI have a vital role in creating an environment that promotes the concepts of the SDGs in the wider community but for this to be successful they need to create partnerships with organisations in the community and other institutions. This also relates to the previous two guidelines, where interaction between students and the community is beneficial for both parties. Students come face to face with the problems facing the communities around them and that community has an insight into SDGs and HEI and how they can make a difference in their lives. There are many NGOs that are dealing with different aspects of SDGs and they can provide different insights that may not be initially apparent to the outsider. Existing partnerships of HEI should be strengthened and developed to include aspects of the SDGs in education and research activities.
4. Establish partnerships with international institutions. Sustainability is a global issue and online communication now allows universities to engage with other communities around



the world. Students from high-income countries can learn about the context and issues facing those in low-income countries, and those in low-income countries can see how a more developed country might attempt to solve a challenge facing them. A huge advantage of having multidisciplinary groups with students from a variety of cultural and educational backgrounds is the diversity of ideas that this can produce. In cases of collaboration with international organisations, HEI institutions must be prepared to share their knowledge with those who might benefit from low-income countries.

5. Promote student and staff mobility. For teachers, this can provide numerous opportunities for professional development through exposure to different teaching methods and cultures and can result in building strong networks with colleagues from different institutions and countries helping participants build a more global perspective. Mobility can help with networking and building long-lasting collaborations, which can lead to new research collaborations and opportunities for academic and institutional development. For students, it can also promote a more global perspective and cross-cultural exchange, which can encourage a more sustainable mindset in their future work.

6. Introduce final project topics and research activities that contribute to the SDGs. Due to the wide-ranging scope of the 17 SDGs, it can be relatively easy to introduce those SDGs which are relevant to the research carried out. By integrating concepts of SDGs into research, students can gain a greater understanding of the complex and integrated nature of these issues and contribute to finding sustainable solutions that are aligned with the principles of sustainable development. Students will develop a broader perspective on the challenges facing the world and the role they can play in addressing them. The relevance of the SDGs in research also aligns with the needs and priorities of communities and means that there is a greater potential for the results to be implemented by the stakeholders.

7. Assess Bachelor's and Master's final projects using criteria that reflect the principles and values of the SDGs.



8. At both the undergraduate level and post-graduate level, in courses that take into consideration the complex and wide-ranging issues of the SDGs, the teacher should act as a facilitator of further knowledge and critical thinking rather than the more traditional role of one-way communication as a lecturer in a subject. Students are then encouraged to explore their own ideas, conduct critical thinking on how their research relates to the project that needs to be completed as well as take into account the SDGs.



9. New Online Course for Lecturers on the Integration of SDGs in Existing Module/Courses Bachelor and Master Degree Projects

9.1. General considerations

Join-Rise tends to make higher education STEM students develop into citizens that are critical thinkers and are fully committed to the SDGs. In order to achieve this, it is crucial to make changes into the current curricula including the SDGs in the teaching processes. Evidently, lecturers are key players in meeting the project's main objective. Therefore, the aim of this new online course is to make STEM lecturers more aware of global challenges and the need to integrate values and ethics into their teaching to help students develop a sustainable mindset and to use science to do good in society. The course will be titled 'How to integrate SDGs in the current subject content and in the final dissertation'

9.2. Application case: "The 2030 Agenda and the Sustainable Development Goals: How to integrate SDGs in the current subject content and in the final dissertation"

The course is designed to (a) contribute to raising the knowledge of the Sustainable Development Goals (SDGs) among research staff, (b) promote staff's critical attitude in order to understand the current global challenges and to be able to contribute to the implementation of sustainable solutions, and (c) provide University lecturers with the theoretical and practical resources needed to implement the SDGs in their educational activities.

By the end of the course, the lecturer will be able to

- understand the 2030 Agenda and the Sustainable Development Goals (SDGs).
- effectively integrate the SDGs into the current subject content.



- develop teaching strategies that foster student awareness and understanding of the SDGs.
- use real-world examples to illustrate the importance of sustainable development in academic and professional settings.
- critically evaluate and integrate sustainable development perspectives into the existing curriculum.
- facilitate discussions and activities that encourage students to think about the SDGs and their role in achieving a sustainable future.

Evaluation method:

- Attendance at a minimum of 80% of classes
- Presentation of the final coursework

Module 1. The 2030 agenda and university commitment
Total duration of the module: 4 hours
<p>Learning Objectives:</p> <p>By the end of the module, the lecturer will be able to</p> <ul style="list-style-type: none"> • provide an overview of the 2030 Agenda, including its origins, principles, and importance. • explain the relationship between the university and global challenges, and analyse the current state of play in social, economic, and environmental sustainability. • critically examine ethical considerations in public contracting, responsible purchasing, and the organization of sustainable events.
<p>Content:</p> <p>UNIT 1.1. Introduction to the 2030 Agenda and university commitment.</p> <p>UNIT 1.2. The relation between the University and global challenges.</p> <p>UNIT 1.3. Economic, social and environmental sustainability.</p> <p>UNIT 1.4. Ethics in public contracting, responsible purchasing and organization of sustainable events.</p>



Module 2. Integration of the sdgs in the actions of university lecturers

Total duration of the module: 4 hours

Learning Objectives:

By the end of the module, the lecturer will be able to

- identify regulations for the implementation of the SDGs in university environments and understand methodologies for integrating the SDGs into university teaching.
- follow the steps necessary for formalizing the integration of SDG-related content and methodologies into university teaching.
- evaluate the contribution of research projects to the SDGs and identify SDG-related content in STEM disciplines.

Content:

UNIT 2.1. Sustainability Education and Research.

UNIT 2.2. Looking for content for our disciplines (STEM).

Module 3. Practical workshop

Total duration of the module: 4 hours

Learning Objectives:

By the end of the module, the lecturer will be able to provide participants with practical tools and strategies for effectively integrating the SDGs into their academic work.

Content:

Brainstorming to incorporate the SDGs into participants' research projects, subjects and final projects for bachelor and master degrees and PhD thesis.



10. New Online Course for Bachelor Degrees Coordinators About on the Integration of SDGs in the Curriculum

10.1. General considerations

Bachelor's and Master's Degree need guidance on how to introduce SDGs efficiently in the curriculum. This project will fulfil this need by offering them courses, tools and case of studies to satisfactorily integrate sustainability into the different degrees. Therefore, the aim of this new online course is to support the implementation of the 2030 Agenda and the Sustainable Development Goals (SDGs) by providing coordinators of bachelor degrees with the knowledge, skills, and strategies necessary to integrate the SDGs into their curricula. The ultimate goal is to ensure that the next generation of graduates has a comprehensive understanding of the SDGs and the role they play in shaping a sustainable future. The course will be titled 'Bachelor Degree Coordination for a Sustainable Future'

10.2. Application case: "Bachelor Degree Coordination for a Sustainable Future"

The course is designed to (a) raise awareness and understanding of the 2030 Agenda and the Sustainable Development Goals (SDGs) among coordinators of bachelor degrees, (b) to provide coordinators with the skills and knowledge necessary to integrate the SDGs into the bachelor degree curriculum, and (c) support the advancement of sustainable development through education by ensuring that the next generation of graduates has a comprehensive understanding of the SDGs and the role they play in shaping a sustainable future.

By the end of the course, the coordinator will be able to understand the 2030 Agenda and the Sustainable Development Goals (SDGs).



- critically analyse and evaluate the current curriculum with regards to the integration of the SDGs.
- develop a strategic plan for integrating the SDGs into the bachelor degree curriculum.
- identify and address challenges and barriers to the integration of the SDGs into the curriculum.
- effectively communicate the importance and benefits of integrating the SDGs into the bachelor degree curriculum to stakeholders such as faculty, students, and administrators.

Evaluation method:

- Attendance at a minimum of 80% of classes
- Presentation of the final coursework



Module 1. The 2030 agenda and SDGs

Total duration of the module: 2 hours

Learning Objectives:

By the end of the module, the coordinator will be able to

- describe the origins, principles, and importance of the 2030 Agenda and the SDGs.
- identify and understand the 17 SDGs and their interconnections.
- evaluate the current state of progress in achieving the SDGs and identify areas for improvement.

Content:

- UNIT 1.1. Introduction to the 2030 Agenda: origins, principles, and importance.
- UNIT 1.2. Overview of the SDGs and their interconnections.
- UNIT 1.3. Assessment of the current state of progress in achieving the SDGs.
- UNIT 1.4. Implications of the 2030 Agenda and the SDGs for higher education and bachelor degree coordination.

Module 2. Integrating the SDGs into bachelor degree curricula

Total duration of the module: 6 hours

Learning Objectives:

By the end of the module, the coordinator will be able to

- analyse the current curriculum with regards to the integration of the SDGs and identify areas for improvement.
- develop a strategic plan for integrating the SDGs into the bachelor degree curriculum, considering the specific needs and challenges of their institution.
- implement effective strategies for incorporating the SDGs into the curriculum, including the use of innovative teaching methods and assessment techniques.

Content:

- UNIT 2.1. Analysis of the current curriculum with regards to the integration of the SDGs.



UNIT 2.2. Development of a strategic plan for integrating the SDGs into the bachelor degree curriculum.

UNIT 2.3. Implementation of effective strategies for incorporating the SDGs into the curriculum, including innovative teaching methods and assessment techniques.

UNIT 2.4. Evaluation of the effectiveness of the integration of the SDGs into the bachelor degree curriculum and identification of areas for improvement.

Module 3. Practical workshop

Total duration of the module: 4 hours

Learning Objectives:

By the end of the module, the coordinator will be able to integrate the SDGs into real-world curricular design, and leave the session with a concrete plan and the confidence to implement it in their own educational context.

Content:

The online practical session for the course will allow participants to apply the strategies and techniques for integrating the SDGs into bachelor degree curricula in a virtual setting. During this session, participants will work in small virtual groups to review and analyze a specific bachelor degree program, identify areas for improvement, and develop a plan for integrating the SDGs into the curriculum. Participants will have access to online resources and tools to assist in their planning and development process. The virtual groups will present their plans to the larger group through online video conferencing, and receive feedback and suggestions from their peers and instructors. This online practical session will provide participants with the opportunity to apply their knowledge and skills in a flexible and convenient setting.



11. Certificate of Sustainable Commitment (CSC)

The **Certification of Sustainable Commitment (CSC)** is a micro-credential with ECTS recognition which will be integrated in the academic curriculum of bachelor and master's degrees. It will recognise the knowledge and skills acquired by Higher Education (HE) students regarding the SDGs through the results of the Join-Rise programme.

For its development, each university will agree on the workload involved in the CSC which will be integrated within the SDG's VLP.

The CSC will be presented to the relevant higher education institutions for approval. Administrative staff will be informed on the procedures for integration such as the creation of an online system to generate the CSC, and lecturers and students will be advised of its existence.

The **University of Burgos (Spain)** will undertake a **pilot CSC** and will create a **guideline** for other HE institutions to implement the Certificate. This guideline will provide a comprehensive tool to encourage the rapid adaptation of the CSC in each university. As the certificate will follow the micro credential criteria, the adaptation to European HE institutions would find less obstacles.

An **online system** will be created to generate the Certificate of Sustainability Commitment. It will be integrated in the SDGs-VLP and will include the newest certification technologies such as digital print, blockchain and others enabling the courses to be verified and delivered to the students when successfully finishing the courses. The CSC will be supervised by the International and Cooperation Vice Chancellor

UBU will follow the **steps below to guarantee** an adequate **integration** of the certificate in all degrees:



- Project Manager informs the UBU Cooperation Commission, the Deans and the Degrees Coordinators about the Project and the CSC.
- The International and Cooperation Vice Chancellor informs the UBU Government Board about the CSC and asks for its approval.
- Once the CSC is approved, the Project Manager applies for the IT department support to create the CSC portfolio in the UBU website. This portfolio allows UBU students to generate their own certificates completion of the CSC requirements.
- Project Manager organises a meeting for administrative staff to inform them about the new certificate.
- The new certificate is included in the general information of all UBU Bachelor Degrees.



12. Final Remarks

The knowledge and application of the Sustainable Development Goals -SDGs- is key for humanity to achieve a sustainable future. Many of the future administrators and executives of issues affecting the SDGs are STEM (science, technology, engineering, and mathematics) students. Therefore, the implementation of the SDGs into STEM teachings is essential for a sustainable future.

In this document, some guidelines and tools are provided that would facilitate the transfer of the SDG's essence and knowledge into the STEMs curriculum, at different levels of organization and structure. Guidelines are provided for lecturers, degree coordinators and project supervisors to incorporate SDGs into their subjects.

In addition, the structure and learning objectives of four courses are provided including:

- a new elective module/course,
- a new program of 5 modules on human sustainable development,
- an online course for lecturers on how to integrate SDGs in an existing modules or projects,
- an online course for bachelor degree coordinators on how to integrate SDGs in the curriculum.

Finally, the development and establishment of a micro-credential with ECTS recognition (the Certificate of Sustainability Commitment) to be integrated in the academic curriculum is proposed.



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The logo for JOIN-RISE features a stylized 'J' on the left, composed of a vertical line and a curved line in shades of blue, green, and red. To its right, the text 'JOIN-RISE' is written in a bold, sans-serif font, with each letter in a different color: J (blue), O (orange), I (green), N (red), - (black), R (blue), I (green), S (red), E (purple).

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Joint development of innovative blended learning in STEM curricula based on
SDGs for a resilient, inclusive and sustainable education



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