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SUSTAINABLE MANAGEMENT: TOOLS FOR TOMORROW

TO4TO

TRAINING CURRICULUM

PROJECT NUMBER: 2020-1-PL01-KA203-082076

This training curriculum is an intellectual output of the project “Sustainable Management: Tools for Tomorrow” (TOO4TO), funded with the support from the European Commission in the framework of the Erasmus+ Program.

TOO4TO Training Curriculum is an open-source educational material and is free to download from the project website:

https://too4to.eu/

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ABBREVIATIONS

AI	Artificial Intelligence
CE	Circular Economy
CSER	Corporate Social and Environmental Responsibility
CSR	Corporate Social Responsibility
DMB	Dynamic Material Bank (TOO4TO Project)
ECTS	European Credit Transfer and Accumulation System
EU	European Union
KPI	Key Performance Indicator
SD	Sustainable Development
SDGs	Sustainable Development Goals
TOO4TO	Sustainable Management: Tools for Tomorrow (*Project's Abbreviation*)
UN	United Nations

INTRODUCTION

About the Project

Sustainable Management: Tools for Tomorrow (TOO4TO) is an Erasmus+ Project (project number: 2020-1-PL01-KA203-082076)[1], developed together with the European strategic partner institutions of the Gdańsk University of Technology (Poland), Turku University of Applied Sciences (Finland), the Kaunas University of Technology (Lithuania), and Global Impact Grid (Germany).

TOO4TO aims to increase the skills, competencies, and awareness of future managers and employees with available tools and methods providing sustainable management and, as a result, support sustainable development in the European Union and beyond.

To reach this objective, four intellectual outputs (to be) produced in the framework of the project are:

(1) Dynamic Material Bank (DMB)
(2) Training Curriculum
(3) E-learning Module
(4) Guide to Virtual Teams

Intellectual outputs of the project are open-access and can be reached via project website: https://too4to.eu/

Dynamic Material Bank

TOO4TO Dynamic Material Bank is a database of most recent and periodically updated literature and materials devoted to sustainability and sustainable management. The material includes open-access journal articles, EU regulations, cases, good practices project examples, as well as relevant videos. The material is classified under six themes which appeared to be most appealing for university students with whom a pre-project survey was conducted:

(1) Corporate Social and Environmental Responsibility
(2) Sustainable Resource Management
(3) Climate Change and Sustainability
(4) Sustainable Energy Solutions
(5) Circular Economy, Economic & Sustainability, Sustainable Production
(6) Artificial Intelligence & Sustainability

[1] The project is funded by the European Commission. This publication reflects the views only of the authors, and the European Commission cannot be held responsible for any use made of the information contained therein.

Training Curriculum

Various sources indicate a growing labor market demand for sustainability professionals and sustainability competencies, even in positions unrelated to sustainability. At the same time, the shifting public attitudes to the environment have shown an increasing number of Europeans thinking that large companies and industries are not doing enough to protect the environment[2].

TOO4TO Training Curriculum aims to equip students with an understanding of the barriers and pathways to sustainable development in an organizational context within the EU and beyond and to increase the learners' sustainable management competencies, such as problem solving, strategic thinking, as well as teamwork skills in a virtual environment. It presents the framework in which the material collected under the Dynamic Material Bank can be offered to students.

E-learning Module and Materials

Based on this training curriculum, consortium partners will develop an e-learning module.

The e-learning module will be offered to the students of the partner institutions during the lifetime of the TOO4TO project. Additionally, an adapted version of it will be offered as an open access module to anyone wishing to study the material asynchronously.

Guide to Virtual Teams and Its Rationale

The complexity of the sustainability problems we experience today exceed borders between countries and occupations. In many sustainability projects, engagement of international, multidisciplinary teams is needed. Additionally, during the last years, leadership has been challenged by the transformation of the work environment. Today, almost every organization operates in virtual and complex environments.

The TOO4TO project has addressed these challenges and contributes to the goal of better and more sustainable virtual leadership by integrating the development of virtual team leadership and sustainable leadership skills in the TOO4TO Training Curriculum (i.e. virtual teamwork, communication, and conflict-resolution skills). Read More: *Sustainable leadership in virtual project teams – Practices of building trust*

As a complementing output to DMB, Training Curriculum and the E-learning Module, a Guide to Virtual Teams is developed and offered on open access. The guide offers theories on the main conditions and success factors for virtual teamwork, as well as barriers and challenges related to such type of working in a multicultural and multidisciplinary context. The guide also includes practical solutions facilitating virtual teamwork, built on the experience collected during the testing of the e-learning course module.

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[2] For more information please see:

(1) Communication – European Education Area by 2025: https://ec.europa.eu/education/sites/education/files/document-library-docs/eea-communication-sept2020_en.pdf
(2) Commission Communication "European Skills Agenda for sustainable competitiveness, social fairness and resilience", COM(2020)274 final, https://ec.europa.eu/social/main.jsp?catId=1223
(3) Towards a 2030 vision on the future of universities in Europe. https://op.europa.eu/en/publication-detail/-/publication/a3cde934-12a0-11eb-9a54-01aa75ed71a1/

TOO4TO TRAINING CURRICULUM

Target Groups

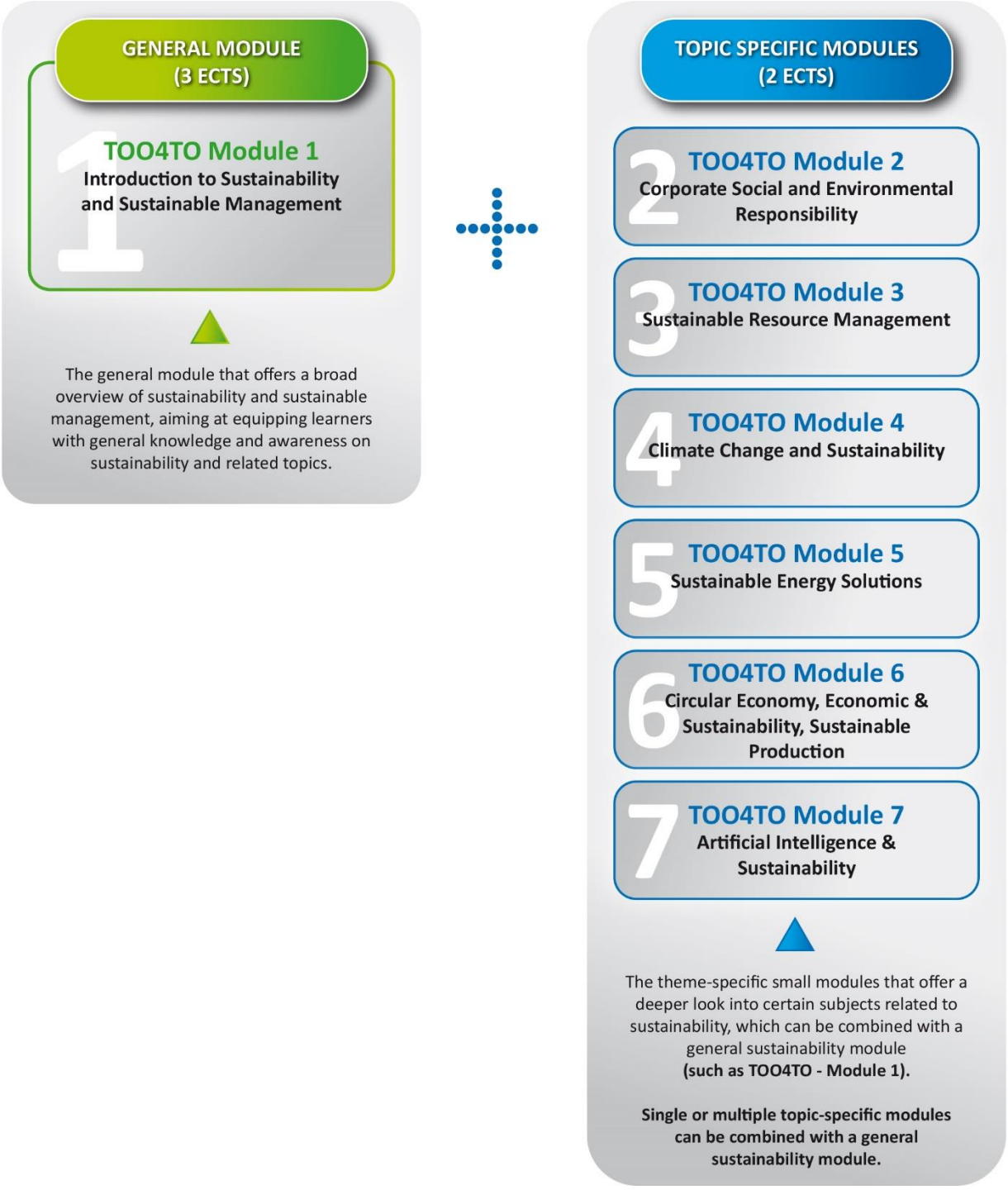
TOO4TO Training Curriculum, in connection with the Dynamic Material Bank, targets university students and teachers, as well as non-academic trainers and practitioners. It provides a training framework for sustainability and sustainable management and offers ways to learn up-to-date knowledge and trends in the field.

While management and engineering are the primarily targeted study fields by this Training Curriculum, students of other disciplines, such as humanities and social sciences, can also benefit from the courses created based on this curriculum. Teachers at academic and tertiary levels of education can transfer the training curriculum to their use as a whole or integrate parts of it into their existing study programs of various disciplines. In that way, modules can be designed for master-level (EQF level 7) students or for practitioners in life-long learning.

Modular Structure

TOO4TO Training Curriculum comprises an introductory module "Introduction to Sustainability and Sustainable Management" (3 ECTS / 90 hours) and six topic-specific modules (2 ECTS / 60 hours each) covering one of the DMB themes.

The curriculum has been designed in such a modular form to provide the learners with an opportunity and flexibility to focus on skills and knowledge, which are best suited to support their success in future work and life. The modular structure also helps teachers to integrate the training curriculum into their teachings in the best-fitting way.


GENERAL MODULE
(3 ECTS)
1
TOO4TO Module 1
Introduction to Sustainability and Sustainable Management
The general module that offers a broad overview of sustainability and sustainable management, aiming at equipping learners with general knowledge and awareness on sustainability and related topics.
TOPIC SPECIFIC MODULES
(2 ECTS)
2
TOO4TO Module 2
Corporate Social and Environmental Responsibility
3
TOO4TO Module 3
Sustainable Resource Management
4
TOO4TO Module 4
Climate Change and Sustainability
5
TOO4TO Module 5
Sustainable Energy Solutions
6
TOO4TO Module 6
Circular Economy, Economic & Sustainability, Sustainable Production
7
TOO4TO Module 7
Artificial Intelligence & Sustainability
The theme-specific small modules that offer a deeper look into certain subjects related to sustainability, which can be combined with a general sustainability module
(such as TOO4TO - Module 1).
Single or multiple topic-specific modules can be combined with a general sustainability module.

Pedagogical Approach

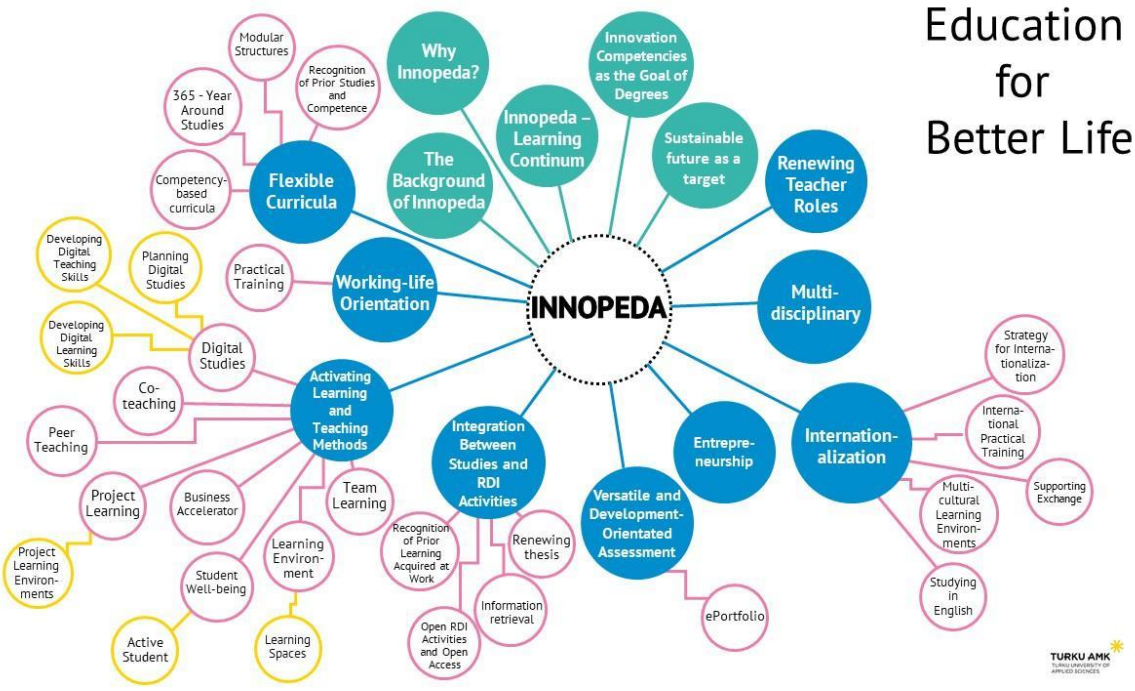
As an innovative approach to teaching, the requirements of Innovation Pedagogy (INNOPEDA®) have been taken into account while developing this Training Curriculum. The Innopeda cornerstones are intended to facilitate the students' learning process and develop the learners' innovation competencies, as well as to provide students with the opportunity to work on real-life sustainability assignments.

INNOPEDA Cornerstones

Working-life orientation, flexible curricula, and multidisciplinary learning environments are essential requirements for Innovation pedagogy to succeed. Students need good study skills to take an active and responsible role in their learning. The methods used in delivering education must be activating and versatile. Giving students opportunities to work on an assignment resembling a real-life situation is essential when aiming to improve their innovation. The assessments are development-oriented, i.e., students can assess their own and their peers' competencies and know-how to develop them. Internationalization should be embedded in studies in versatile ways.

Innovation competencies focus on dimensions of creativity, critical thinking, initiative, teamwork and networking.

Innovation Pedagogy allows developing the learners' innovation competencies in an online environment, supporting virtual teamwork, communication and problem-solving skills, and adaptability to new situations. The online environment also enables the opportunity to conduct teamwork, which can span beyond institutions and even national borders. Ideally, students can work on international group assignments virtually with students from the partnering higher education institutions.



Development of the Training Curriculum

TOO4TO Training Curriculum has been completed in a five-month period and all project partners have contributed to its design and development. In order to ensure inclusion of target groups' opinions in the training curriculum, online focus group sessions were organized with students, teachers and practitioners separately. Based on the feedback given, partners reviewed the training curriculum and added further clarifications and specifications to the content.

One of the common issues raised in each focus group session was that "there should be emphasis on gaining practical knowledge and skills that can be applied in working life". The teaching and assessment methods suggested in this Training Curriculum are, among many other qualities, practice oriented, as suggested by Innopeda.

How to Use the Training Curriculum: Notes for the Teachers

The training curriculum stands as a framework for teachers who aim at including sustainability-related topics in their modules and/or boost the content of their own sustainability-related modules. Teachers can make use of the modular structure in various forms: For instance,

- they can integrate the TOO4TO Module 1 to their *General Management* course
- they can bundle TOO4TO Module 1 with one of the following six topic-specific TOO4TO modules and offer as a single-standing course in *Sustainability* in their institution
- they can integrate one of the six topic-specific TOO4TO modules into their already-existing *Sustainability* course.

It should be emphasized that the training curriculum stands as a reference point for teachers and does not present ready-made lecturing material or impose one specific assessment tool. Instead, teachers are encouraged to develop such content by themselves, based on the outlines, learning objectives and outcomes, and other suggestions presented in this training curriculum and tailored to the needs of their own students. Teachers are also encouraged to make use of the material that will be created by the consortium for the next project output, the e-learning material, which will cover a selection of the modules developed in this training curriculum.

Similarly, the hour-allocation of the ECTS credit points[3] in each module is presented as a reference point: Teachers can amend the allocation of hours among the module units based on their institution's requirements and/or students' needs. In the case of bundling one or more of the modules of this training curriculum, teachers should ensure that there is no doubling of the content; or, if there is, it is compensated by extra workload to match the given study hours (i.e. ECTS).

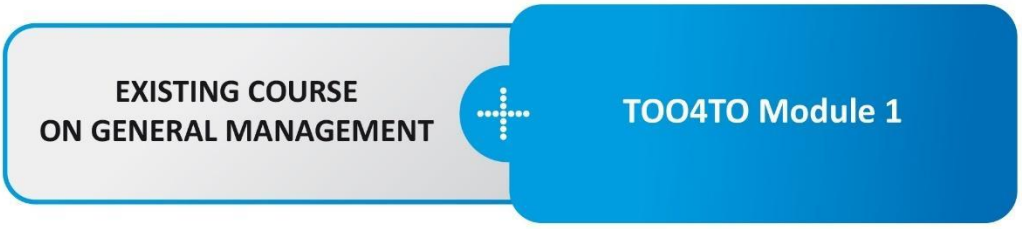
It should be also noted that the training curriculum has the flexibility to be offered in a physical or virtual environment and/or in synchronous or asynchronous ways. Where more applicable, online teaching and discussion tools should be utilized. If not provided by the institution, the teachers can look into the following sample online study platforms and tools: Moodle, Padlet, Socrative, NowComment.

[3] According to the European Credit Transfer and Accumulation System (ECTS), 1 ECTS credit point is approximately equivalent to 25-30 study hours.

Use Case 1

1

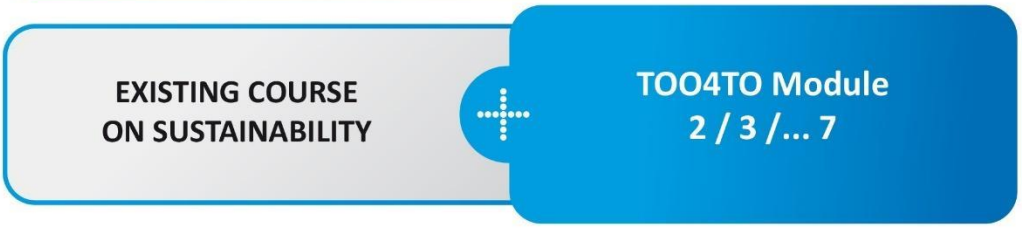
You are conducting a course on General Management and want to include Sustainability as a sub-topic in your course.
You can integrate TOO4TO - Module 1 to your course completely or partially, based on the workload you want to add.



Use Case 2

2

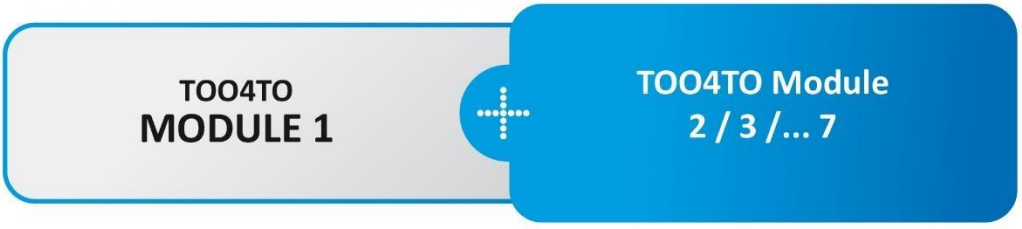
You are already conducting a course on Sustainability and want to have additional content on specific sustainability-related subject(s).
You can integrate a single or multiple topic-specific TOO4TO Modules in your own sustainability course completely or partially, based on the workload you want to add.



Use Case 3

3

You want to offer a new Sustainability course.
You can bundle TOO4TO Module 1 with a single or multiple topic-specific TOO4TO Modules according to the focus and workload you want to have.



IMPLEMENTATION OF THE TRAINING CURRICULUM: GOOD PRACTICE EXAMPLE

Based on this training curriculum, TOO4TO consortium partners have developed four e-learning modules in the beginning of 2022:

- Module 1: Introduction to Sustainability and Sustainable Management
- Module 2: Corporate Social and Environmental Responsibility (CSER)
- Module 5: Sustainable Resource Management
- Module 6: Circular Economy, Economics & Sustainability, Sustainable Production

According to the course content and learning objectives described in the training curriculum, presentation slides have been prepared for each module, which included a list of further study materials, as well as reflection questions.

After the completion of the e-learning modules, Module 6 was piloted as an online joint module in spring 2022. Students from partner institutions [Turku University of Applied Sciences (Finland), Kaunas University of Technology (Lithuania) and Gdansk University of Technology (Poland)] participated in the module and formed multidisciplinary, international, virtual teams.

Teachers / coaches from the partner institutions followed the structure of the Module 6 as described in the training curriculum, but also made alterations to certain elements where needed.

Below table shows how 3 units of module 6 were implemented and, based on the post-module feedback collected from students and coaches, gives certain tips to teachers who are to use this training curriculum.

Unit 1: Introduction to Virtual Teamwork	As the module included students from three different universities who will need to work in virtual teams, they were first asked to watch the video on virtual multidisciplinary and multicultural teamwork in TOO4TO Virtual Guide (**individual activity / pre-task 1**). They were also asked to provide a brief presentation of themselves on Padlet (**collaborative group activity / pre-task 2**). Students were divided into groups of 4-5 members and each group was assigned with a group coach from one of the partner institutions. Once the students started to study the module content and work in their groups, they were given the task of building group culture by agreeing on rules, communication methods and roles (**collaborative group activity / task**). **Tip for Teachers:** It is important to explain to the students why virtual teamwork is included as an element in a course focusing on a sustainability topic. Please see the "Guide to Virtual Teams and Its Rationale" in the training curriculum for reference.

Unit 2: Self-Study and Group Coaching	The self-study materials (i.e. presentation slides and further reading and/or video materials) have been divided into 3 topics. Each topic was complemented with a **section quiz** and **group coaching session**. Students were asked to study each topic in a given timeframe and complete the respective quiz prior to the group coaching session. **Tip for Teachers:** In the pilot, TOO4TO partners chose to dedicate group coaching sessions to present and discuss issues relevant to the course content; instead of going through the materials students have studied and initiating a discussion around them. This did not fully fulfill the students' expectations. It is important to use group coaching sessions as a means to fortify the knowledge and skills students gain through the study materials. Or, in case the coach decides to delve into another relevant subject, this should be communicated to the students in advance, with the rationale. It is also important that the communication and exchange among the group members are facilitated, in case the coach notices a lack of interactivity. In order to assess the students' learning, they were asked to submit an **individual learning diary**. **Tip for Teachers:** In the pilot, some of the students worked with a learning diary for the first time and some of them struggled to understand what exactly is to be documented. If the students are not familiar with an assessment method, it would be helpful to provide them with a sample or good practice example.
Unit 3: Group Assignment	As part of the group assignment, students were given the task to address a real or fictional development need that could be solved using the circular economy principles within their group. They were asked to prepare a poster (+ a handout) and hold a poster presentation. **Tip for Teachers:** While the group assignment itself did not receive critical feedback in the pilot, the combination of several assessment methods throughout the module's units (i.e. reflection tasks, quizzes, learning diary and group assignment) was regarded as overwhelming by some students. It is important to alter the assessment methods suggested in the training curriculum according to students' level and/or and other factors that may add to complexity. In the case that optional TOO4TO modules are offered in combination with other modules, it is also important that the workload of the course content and assignments are altered and balanced accordingly.

MODULE 1: INTRODUCTION TO SUSTAINABILITY AND SUSTAINABLE MANAGEMENT

Module Description

Field of Study	Management / Engineering
Education Level	Master
Prerequisite	-
Background	Sustainability is not a new concept, but the gravity of global challenges that is experienced today has made sustainability become at the core agenda of all kinds of institutions around the world. Climate crisis, depletion of essential resources, global poverty and rising inequalities require systemic transformation in how economies, organizations, as well as everyday life are approached and managed. While there has been intensified research and discussions on sustainable economic theories and sustainable management models and tools in academia; several international initiatives and movements have emerged on a practical level, calling for collaborative action for sustainability. In this context, it is not anymore a choice, but a must for organizations to integrate sustainability and sustainable management at the core of their everyday functions, not only for their own success in the long-term, but also for the survival of the planet.
Module Content	This module offers a broad overview of sustainability and sustainable management, without delving deep into specific topics of sustainability ranging from resource efficiency to digital transformation. The purpose of this introductory module is to make students gain general knowledge and awareness on sustainability and related topics, and thereby, help them become not only responsible individuals themselves, but also change agents in their workplaces for sustainability. The module also aims at helping students develop a solid basis, upon which they can further build their knowledge and skills during the topic-specific sustainability modules that they might participate in.

Learning Objectives	• Students will gain essential knowledge on the global challenges that have led to the development of and intensified discussions on the concepts of sustainability and sustainable management. They will also learn about the main international institutions and initiatives addressing sustainability issues, such as UN Global Compact and UN SDGs. • Students will develop a general understanding of the main theories and approaches on economic and management systems for transformation towards sustainability, such as the alternative 'economic growth' theories. • Students will learn about the role of organizations in sustainable development, as well as primary models and tools applied in organizations for sustainable management (such as for sustainable stakeholder management, sustainability reporting, etc.)
Learning Outcomes	• Students will be able to respond to sustainability-related issues in their environment and act as change agents in spreading and mainstreaming sustainability knowledge in their workplace and everyday life. • Students will be able to critically evaluate the current economic and management systems from the sustainability perspective and offer (new) approaches within the sustainability framework. • Students will be able to critically assess the activities and functions of their workplaces in terms of sustainable management and suggest (new) models and tools that can transform their organizations towards sustainability.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Teacher-Supported Course Participation: Students have teacher-supported course participation: the module content is delivered, and classroom discussion is facilitated by the teacher (physically or virtually). Unit 2: Self-Study: This unit is based on self-based learning: students study the module material within the given timeframe by the teacher. Unit 3: Module Evaluation (Individual Work): Students' learning process and outcomes are to be evaluated with individual work completed by each student. The individual work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented evaluation methods are suggested.

Evaluation Methods	The module is designed to have 3 main units, each of which uses several evaluation methods which include ● pop-up classroom questions ● self-study questions ● individual assignment (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions).
Workload / ECTS	Overall Module: 90 hours / 3 ECTS Unit 1: Teacher-Supported Course Participation: 10 hours Unit 2: Self-Study: 40 hours Unit 3: Individual Work: 40 hours

MODULE 1: INTRO. TO SUSTAINABILITY AND SUSTAINABLE MANAGEMENT

LEARNING OBJECTIVES

- to gain essential knowledge on the global challenges that have led to the development of and intensified discussions on the concepts of sustainability and sustainable management.
- to develop a general understanding of the main theories and approaches on economic and management systems for transformation towards sustainability.
- to learn about the role of organizations in sustainable development.

UNIT 1
Teacher Supported Course Participation

Direct Instruction

Teacher supported interactive class discussion

Outline

- Background and History of Sustainability
- Economic Systems and Sustainability
- Sustainability in Organizational Context

Class Discussions

Pop-up questions asked by the teacher during the class discussions

UNIT 2
Self-Study

Studying TOO4TO DMB Material on Module 1

UNIT 3
Individual Work

Further Research

Practice Oriented Individual Assignment

LEARNING OUTCOMES

- ability to respond to sustainability-related issues in their environment and act as change agents in spreading and mainstreaming sustainability knowledge in their workplace and everyday life.
- ability to critically evaluate the current economic and management systems from the sustainability perspective and offer (new) approaches within the sustainability framework.
- ability to critically assess the activities and functions of their workplaces in terms of sustainable management and suggest (new) models and tools that can transform their organizations towards sustainability.

Module Structure

Module 1 / Unit 1: Teacher-Supported Course Participation

Description	Students have teacher-supported course participation: the module content is delivered, and classroom discussion is facilitated by the teacher. The hours can be broken into several sessions, which can take place physically in the classroom or virtually on a webinar platform. The course topics are presented in direct instruction form by the teacher, which is complemented by teacher-supported discussions among the students. If the module is to be delivered completely as an e-learning module; the direct instruction part can be pre-recorded by the teacher and given to the students as an asynchronous e-learning source, which would then be complemented by synchronous discussion sessions (Alternatively, the discussions can be organized in an asynchronous way). Suggested outline for the teacher: ● Step 1: Background and history of the concept of sustainability. Main global challenges and societal movements that have led to the development of the concept. ● Step 2: Analysis of the current economic system in the framework of sustainability issues. Looking into various economic theories / concepts that have emerged as a response to sustainability challenges, such as the 'degrowth movement'. ● Step 3: Analysis of sustainability in organizational context. What sustainability means for organizations and how they can contribute to sustainable development.
Unit-Specific Learning / Teaching Method	● direct synchronous instruction by the teacher or asynchronous e-learning source pre-recorded by the teacher. ● teacher-supported discussions among the students.
Unit-Specific Assessment Method	● pop-up questions asked by the teacher during the teacher-supported discussions and evaluation of students' active participation (Alternatively, if the discussions take place in an asynchronous way, contribution of students to online discussion tools / forums can be monitored online). Sample questions for the teacher: ● Can you name some of the global challenges and social developments that have led sustainability to become such an important topic today?

	• We need a systemic and collaborative approach to tackle the climate crisis. Why? • What do you think are the roles of governments and companies in sustainability? • If you consider the economic growth models which aim at infinite economic growth, what is the problem in the framework of sustainability issues? • What do you think is your biggest negative impact on the environment? What do you / can you do to minimize that impact?
Unit Workload	10 hours
List of Suggested Material	Suggested books for content creation for teachers, as an addition to Module 1 self-study material: • Blewit, J. (2008) Understanding Sustainable Development. Earthscan Publications Ltd. • Elliott, J. (2006) An Introduction to Sustainable Development. Routledge. • Jackson, T. (2017) Prosperity without Growth: Foundations for the Economy of Tomorrow. Routledge. • Laasch, O., & Conaway, R. N. (2014) Principles of Responsible Management: Global Sustainability, Responsibility, and Ethics. Cengage Learning. • Mintzberg, H. (2015) Rebalancing Society: Radical Renewal Beyond Left, Right, and Center. Berrett-Koehler Publishers, Inc. (https://mintzberg.org/books/rebalancing-society) • Raworth, K. (2017) Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist. Random House Business Books. • Reid, D. G. (2021) A New World-System: From Chaos to Sustainability (Routledge Studies in Sustainable Development). Routledge. • Sachs, J. D. (2015) The Age of Sustainable Development. Columbia University Press. • Savitz, A., & Weber, K. (2014) The Triple Bottom Line: How Today's Best-Run Companies Are Achieving Economic, Social and Environmental Success - and How You Can Too. Wiley • Weybrecht, G. (2014) The Sustainable MBA. Wiley.

Module 1 / Unit 2: Self-Study

Description	This unit is based on self-based learning: students study the module material within the given timeframe by the teacher. Peer-to-peer learning, in addition to self-paced learning, is encouraged among the participants.
Unit-Specific Learning / Teaching Method	The unit is based on self-learning by the students, without the direct involvement of the teacher. Students can contact the module teacher for their questions related to the self-study material.
Unit-Specific Assessment Method	Self-study questions are either presented to students through the institution's learning platform (e.g. Moodle) or sent to students via email. After the given timeframe of the self-learning, students' answers are evaluated by the module teacher. Sample self-study questions: ● Please define sustainability and sustainable management in an organizational context. How can various actors (governments / businesses / individuals) contribute to the achievement of sustainable development goals? ● What is a circular economy? Why is it important to shift from linear economy to circular economy for sustainable development? ● What is the European Green Deal and EU Taxonomy? How can they potentially contribute to sustainable development? ● Why should businesses have a sustainability agenda beyond compliance with law? ● What is sustainability reporting and why is it important? Please elaborate on it by referring to the following concepts / initiatives: (i) triple bottom line (ii) GRI (iii) ESG metrics (iv) sustainability balanced scorecard.
Unit Workload	40 hours
List of Suggested Material	TOO4TO DMB

Module 1 / Unit 3: Individual Work

Description	Students' learning process and outcomes are to be evaluated with individual work completed by each student. The individual work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice, practice-oriented evaluation methods are suggested. Sample assignments / questions for the individual work: ● Analyze the sustainable strategy / program of the company (…)[4]. What are the positive aspects and what could still be improved? ● Using the sustainability SWOT analysis tool, please analyze the company / business project (…). ● Analyze the impact of a government strategy, which aims to neutralize carbon-emissions by 2050, on the (…) industry.
Unit-Specific Learning / Teaching Method	● case-based learning ● project-based learning
Unit Workload	40 hours
List of Suggested Material	See Module 1 / Unit 2

[4] For the practice-oriented individual work, students are asked to choose a company / industry that they want to work on as a case. Alternatively, the course teacher can pick the case for the questions where indicated as (…).

MODULE 2: SUSTAINABILITY OPTIONAL: "CORPORATE SOCIAL AND ENVIRONMENTAL RESPONSIBILITY"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[5]
Background	Economic, social, and environmental issues related to social responsibility and sustainability are increasingly gaining significance in business. Responsible business practices have become one of the most challenging and dynamic topics corporate management face today. Corporate Social and Environmental Responsibility (CSER) is the framework on how the company takes care of its responsibility towards the community and the environment. Companies must have ways to evaluate their impact in causing, for instance, environmental problems and take systematic steps to reduce this impact and towards a more sustainable society. This module on CSER for future managers has been designed to prepare them to cope with and find solutions for such challenges.
Module Content	Module will present • CSER as part of corporate strategy • relevant concepts and standards related to CSER (e.g. ISO 26000 - Guidance on Social Responsibility), including the principles, practices and trends in CSER • implementation of CSER throughout an organization taking into account the economic, social and environmental impacts of the operations

[5] Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components that an "equivalent" module is to have.

Learning Objectives	• The students will improve their virtual team working and communication skills in virtual environments. • The students will learn what CSER means in an organizational context. • The students will be able to improve their skills in analyzing and reporting CSER related topics. • The students will learn how companies' decisions and activities may negatively impact the environment and society.
Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to participate in creating a CSER management framework and strategy for an organization. • Students will be able to critically analyze CSER reports and the impact an organization has on the environment and society using standardized KPIs and templates. • Students will be able to suggest activities for reducing the negative impact the company may have on the environment or society.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented assessment methods are suggested.

Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 2: CORPORATE SOCIAL AND ENVIRONMENTAL RESPONSIBILITY

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to learn what CSER means in an organizational context.
- to improve skills in analyzing and reporting on CSER related topics.
- to learn how companies' decisions and activities may negatively impact the environment and society.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments
- Video lecture on virtual teams
- Get to know each other

Assessment
- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 2

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work
- Individual reflections
- Collaborative reflection

Assessment
- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to participate in creating a CSER management framework and strategy for an organization.
- ability to critically analyze CSER reports and the impact an organization has on the environment and society.
- ability to suggest activities for reducing the negative impact the company may have on the environment or society.

Module Structure

Module 2 / Unit 1: Introduction to Virtual Teamwork*

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

*** This unit repeats in all TOO4TO topic-specific modules (Module 2, Module 3, …, Module 7).**

Module 2 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Corporate Social and Environmental Responsibility presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related to CSER, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on CSER, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • Why is CSER important for businesses? • Name 5 CSER examples you consider to be successful and give arguments. • What are the trends in CSER?

Unit-Specific Assessment Method	Assessment method will be in the form of “approved/ rejected”: The student will get evaluation “approved” for this unit after ● documenting the knowledge that they have gained through self-study* ● participating in group coaching sessions (min. 80% attendance) ● bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: ● answers submitted for the self-study questions ● quizzes prior to the group coaching sessions ● a multiple-choice test completed at the end of the unit ● a learning diary submitted at the end of the unit (i.e., self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation “approved” will proceed to Unit 3, group assignment.
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB

Module 2 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on CSER. Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions: Reflect your learning on CSER • What went well? • What could be improved? • What did you learn? • What are you going to exploit in practice? Reflect your teamwork during the last few weeks: • How was the trust and safe atmosphere built in your team? • Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? • Share the most positive and challenging issues for communication within your multicultural team. • Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. • Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to CSER topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: • Please analyze the CSR strategy of the company (…)[6]. • Please study the sustainability report of the company (…) and reflect on the company's environmental impact communicated. What are the main challenges and how does the company deal with them? • Please analyze the stakeholder communication strategy of the company (…).
Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit • the list of academic and/or non-academic materials collected as part of the initial background research • an individual reflection summary (in text or video format) on the group work • a collaborative reflection recording on the group work • written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) • visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)

[6] For the practice-oriented group assignment, the company and/or industry to be worked on as a case, which is indicated with "(…)" below, can be decided by the teacher. Alternatively, groups can be given the option to decide on the company and/or industry on their own.

Unit Workload	25 hours

List of Suggested Material	TOO4TO DMB and
	● ISO 26000 Social responsibility standard
	● ISO 14000 standard series for Environmental management
	● Selected Journal articles, e.g. from journals:
	  ○ Social Responsibility Journal (Emerald Publishing)
	  ○ Journal of Business Ethics (Springer)
	  ○ Business and Society (Sage)
	● A Recent textbook available for students, e.g.
	  ○ 21st Century corporate citizenship: a practical guide to delivering value to society and your business / by Dave Stangis Katherine Valvoda Smith, United Kingdom: Emerald Publishing, 2017
	  ○ Dictionary of corporate social responsibility: CSR, sustainability, ethics and governance / Samuel O. Idowu, editor-in-chief ; Nicholas Capaldi, Matthias S. Fifka, Liangrong Zu, René Schmidpeter, co-editors. New York : Springer, 2015

MODULE 3: SUSTAINABILITY OPTIONAL: "CLIMATE CHANGE AND SUSTAINABILITY"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[7]
Background	Human-induced global warming may reach a 1.5°C increase around 2040[8]. Limiting the warming under this threshold is expected to reduce the probability of extreme regional weather conditions, global sea-level rise, extinction of species, and depredation of various industries. Industries should pursue sustainability in the collective battle against climate change but also need to be ready and prepare themselves for the changes that climate change poses to them in the future. This module will familiarize students with the past, present, and future of human-induced climate change and provide materials and tools that can be used to analyze climate impact and anticipate the future scenarios in this regard in the context of industries' operating environments. Students will gain knowledge in the context of climate change and its influence on business performance. They will get the necessary skills to be able to recognize the threats and opportunities related to climate change in the context of business performance.

[7] Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components that an "equivalent" module is to have.

[8] Source: https://www.ipcc.ch/sr15/faq/faq-chapter-1/

Module Content	The module will present • Background/history of human induced climate change - the genesis of the present climate change and its comparison with the previous climate changes - highlighting the human role in this present climate change. • Geographical impact - the description of particular parts of the world (continents/regions/countries) with regard to their contribution to climate change (differences in total contribution vs. contribution per capita). • present and anticipated consequences of climate change - updated outcomes of studies from different fields showing the impact of climate change on different spheres of life on Earth. • business characteristics and its impacts on climate change - the description of how particular business performance influences climate change. • climate change impacts on regions and their industries - the descriptions of how climate change affects individual geographic areas and thus countries and industries that operate in them. • international and EU-wide treaties, climate benchmarks and regulatory mechanisms, climate-related reporting (e.g. EU ETS, TCFD, CDP). • introduction to materials and future study techniques that help anticipate the possible changing operational environment due to climate change. • glocal actions counteracting climate change by various stakeholders (examples from governments, agencies, corporations and SMEs, EU-institutions).
Learning Objectives	• Students will improve their virtual team working and communication skills in virtual environments. • Students will gain knowledge on climate change and its impact: it is important to provide the arguments confirming climate change and its impact on the basis of the up-to-date research outcomes. • Students will be familiarized with materials and techniques that help them to critically analyze the present and future issues related to climate change in the context of an operational environment. • Students will develop and manifest an attitude based on a deep understanding of climate change issues in organizational context: students will understand all the aspects related to climate change necessary in the organizational context.

Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to describe climate change-related impacts on their operating environment - students will understand these impacts and will explain their importance and potential relation with an organizational situation • Students can critically analyze and anticipate the changing needs in their future organizations and operating environments from the perspective of climate change using future-studies related techniques • Students will be able to form industry/policy recommendations in relation to climate change - students will be able to propose solutions on how to manage the company in the climate change circumstances and actions that can be taken by the chosen company in order to face and prevent climate change.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented assessment methods are suggested.
Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 3: CLIMATE CHANGE AND SUSTAINABILITY

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to gain knowledge on climate change and its impact.
- to be familiarized with materials and techniques that help critical analysis of the present and future issues related to climate change in the context of an operational environment.
- to develop and manifest an attitude based on a deep understanding of climate change issues in organizational context.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments

- Video lecture on virtual teams
- Get to know each other

Assessment

- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 3

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work

- Individual reflections
- Collaborative reflection

Assessment

- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to describe climate change-related impacts on their operating environment.
- ability to critically analyze and anticipate the changing needs in their future organizations and operating environments from the perspective of climate change using future-studies related techniques.
- ability to form industry/policy recommendations in relation to climate change.

Module Structure

Module 3 / Unit 1: Introduction to Virtual Teamwork

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

Modul 3 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Climate Change and Sustainability presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related to Climate Change and Sustainability, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on Climate Change and Sustainability, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • Please name the main causes of climate change. • Please explain how climate change we are facing today is different from the previous historic climate changes. • Please give some examples of how climate change can affect businesses.
Unit-Specific Assessment Method	Evaluation method will be in the form of “approved/ rejected”: The student will get evaluation “approved” for this unit after

	• documenting the knowledge that they have gained through self-study* • participating in group coaching sessions (min. 80% attendance) • bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: • answers submitted for the self-study questions • quizzes prior to the group coaching sessions • a multiple-choice test completed at the end of the unit • a learning diary submitted at the end of the unit (i.e.,self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation “approved” will proceed to Unit 3, group assignment.
Unit Workload	25hours
List of Suggested Material	TOO4TO DMB

Modul 3 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on Climate Change and Sustainability. Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions: Reflect your learning on Climate Change and Sustainability • What went well? • What could be improved? • What did you learn? • What are you going to exploit in practice? Reflect your teamwork during the last few weeks: • How was the trust and safe atmosphere built in your team? • Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? • Share the most positive and challenging issues for communication within your multicultural team. • Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. • Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to Climate Change and Sustainability topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: • Gamification -students will take part in a game that will last the entire semester. Fixed rules, clear goals will be presented in the first classes. The game will pose interesting challenges and regular tasks to solve, which will teach students to learn systematically and often back to the topic from the lectures (even for a short time). After each task they will get feedback immediately. During the game students will get points. If they get 80% of points, they will pass the subject without an exam otherwise the exam will be held. • This exercise will be done in groups of 3-6. The group is asked to assess an industry of their choice in their chosen region and its possible role in climate change. Students are then asked to arrange a collaborative session utilizing their chosen future study methods (e.g. brainstorming, mind-mapping, star-bursting) to anticipate how the industry's operational environment will change in the coming 20 years due to climate change. They are finally asked to write a report containing the following: 1) description of the industry and assessment of its current climate impact, 2) documentation concerning the implementation of the collaborative session, 3) reporting of the predicted future scenarios 4) recommendations for the industry on how to prepare and respond to the possible changes in the operational environment, 5) references. Each group will also peer-assess another group's report. Team members are also requested to assess their team's performance. The final grade is based on written feedback from the teacher, peer-assessment of other groups and evaluation of the team members and using the scale (1-5).

	• Student journals - each group is supposed to prepare a journal issue on a selected aspect of climate change in the context of a certain company - they need to plan its content and write the articles for the issue on the basis of DMB and other resources they collect. The group needs to inform about the potential impact of climate change in a given company and offer some countermeasures to minimize this impact.
Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit • the list of academic and/or non-academic materials collected as part of the initial background research • an individual reflection summary (in text or video format) on the group work • a collaborative reflection recording on the group work • written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) • visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB and • IPCC reports: https://www.ipcc.ch/ • There's a Future Vision's for a Better World: https://www.bbvaopenmind.com/wp-content/uploads/2013/01/BBVA-OpenMind-Book-There-is-a-Future_Visions-for-a-Better-World-1.pdf • Glossary of Future Studies: https://www.researchgate.net/publication/283324310_A_Glossary_of_Terms_commonly_used_in_Futures_Studies • World Economic Forum, https://www.weforum.org/ • EU ETS: https://ec.europa.eu/clima/policies/ets_en • Global CDP reports and data: https://www.cdp.net/en • TCFD recommendations report: https://www.fsb-tcfd.org/recommendations/#:~:text=for%20effective%20disclosure-,Overview,included%20in%20mainstream%20financial%20filings.

MODULE 4: SUSTAINABILITY OPTIONAL: "SUSTAINABLE ENERGY SOLUTIONS"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[9]
Background	The current global energy system is to a large extent based on fossil fuels. Energy production (burning the fossil fuels) causes the majority of the greenhouse gas emissions that cause climate change. Replacing fossil fuels with sustainable energy sources will reduce the environmental damage. Sustainable energy is energy that meets the needs of the present generations without compromising the ability of future generations to meet their own needs. Sustainable energy is about finding clean and renewable sources of energy from sources that can never be depleted. Sustainable energy solutions include innovations for improved energy efficiency and storing energy.
Module Content	The basics of the main sustainable energy solutions, based on e.g. hydro energy, wind and solar energy, bioenergy, as well as geothermal energy, will be introduced. The feasibility and environmental impact of using sustainable energy solutions will be discussed. The importance of energy decisions and energy efficiency for climate change will be highlighted. Energy market and regulation.
Learning Objectives	• Students will improve their virtual team working and communication skills in virtual environments. • Students will learn the basics of various sustainable energy solutions. • Students will learn to contrast and compare different sustainable energy solutions from climate change perspective • Students will learn about the feasibility and environmental impact of main sustainable energy solutions.

[9] Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components that an "equivalent" module is to have.

Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to use their knowledge about sustainable energy solutions in decision making. • Students will understand how the energy decisions impact the environment and climate change. • Students will be able to compare and explain the environmental impact of the sustainable energy solutions to the fossil fuel-based energy solutions.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented evaluation methods are suggested.
Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 4: SUSTAINABILE ENERGY SOLUTIONS

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to learn the basics of various sustainable energy solutions.
- to learn to contrast and compare different sustainable energy solutions from climate change perspective.
- to learn about the feasibility and environmental impact of main sustainable energy solutions.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments
- Video lecture on virtual teams
- Get to know each other

Assessment
- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 4

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work
- Individual reflections
- Collaborative reflection

Assessment
- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to use their knowledge about sustainable energy solutions in decision making.
- ability to understand how the energy decisions impact the environment and climate change.
- ability to compare and explain the environmental impact of the sustainable energy solutions to the fossil fuel-based energy solutions.

Module Structure

Module 4 / Unit 1: Introduction to Virtual Teamwork

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

Module 4 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Sustainable Energy Solutions presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related to Sustainable Energy Solutions, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on Sustainable Energy Solutions, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • Name 1-2 examples of recent innovations in sustainable energy solutions. • What political decisions or actions have been recently made in your country and on the European level towards increasing the share of sustainable energy sources in energy production? • What are the main challenges related to increasing rapidly the use of sustainable energy solutions and how those challenges could be solved?
Unit-Specific	Evaluation method will be in the form of “approved/ rejected”: The student

Assessment Method	will get evaluation “approved” for this unit after • documenting the knowledge that they have gained through self-study* • participating in group coaching sessions (min. 80% attendance) • bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: • answers submitted for the self-study questions • quizzes prior to the group coaching sessions • a multiple-choice test completed at the end of the unit • a learning diary submitted at the end of the unit (i.e.,self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation “approved” will proceed to Unit 3, group assignment.
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB

Module 4 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on Sustainable Energy Solutions. Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions: Reflect your learning on Sustainable Energy Solutions • What went well? • What could be improved? • What did you learn? • What are you going to exploit in practice? Reflect your teamwork during the last few weeks: • How was the trust and safe atmosphere built in your team? • Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? • Share the most positive and challenging issues for communication within your multicultural team. • Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. • Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to Sustainable Energy Solutions topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: • Introduce and analyze the feasibility of a recent (or under development) innovation related to Sustainable Energy Solutions (including energy storage solutions). • Study the change in the sources of energy production in 2 or 3 countries in a 20-years timeframe and analyze the impact of the change. • Compare two sustainable energy sources and the feasibility of those.
Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit • the list of academic and/or non-academic materials collected as part of the initial background research • an individual reflection summary (in text or video format) on the group work • a collaborative reflection recording on the group work • written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) • visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)
Unit Workload	25 hours

List of Suggested Material	TOO4TO DMB and • Renewable energy | Energy (europa.eu) • Shedding light on energy in the EU – A guided tour of energy statistics (europa.eu) • The Future European Energy System - Renewable Energy, Flexibility Options and Technological Progress. Editors: Möst, D., Schreiber, S., Herbst, A., Jakob, M., Martino, A., Poganietz, W.-R. 2021. Open access.

MODULE 5: SUSTAINABILITY OPTIONAL: "SUSTAINABLE RESOURCE MANAGEMENT"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[10]
Background	Sustainable resource management is crucial when dealing with the global challenges (population growth, climate crisis, resource overconsumption) and having orientation towards the strategic changes (Agenda2030; EU Green Deal; digitalization and 4th Industrial revolution). Therefore, the broad understanding of those issues could help to develop innovation oriented to sustainable resource management taking into account long term (strategic) perspective. The course provides knowledge needed to understand the interdependence between natural resources (state and limits in availability) and human activities (economic growth, technologies used, social issues). The basics of anthropogenic metabolism, European Union strategic initiatives development (Roadmap to a Resource Efficient Europe, The Raw Materials Initiative, An EU Action Plan for the Circular Economic, and other), indicators and methodologies to analyze resource use are taught. Competences to assess and plan the use of natural resources are developed. Introduction to material flow analysis methodology will help to gain competences, which could be applied in different scales managing natural resources: global, regional or company level.

[10] Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components that an "equivalent" module is to have.

Module Content	Module will present • natural resources and socio-industrial metabolism • analyses of resource use: Indicators of metabolic performance of economies and regions; Material Flow analysis; Ecological footprint. • strategies and visions for a sustainable resource use • resource use trends and examples
Learning Objectives	• Students will improve their virtual team working and communication skills in virtual environments. • Students will gain professional knowledge on natural resources in the context of sustainability. • Students will be equipped with understanding of impact and of opportunities for technology development due to the limitation and state of natural resources, and due to strategic initiatives of the European Union. • Students will acquire indicators and methodologies for analyzing the use of natural resources, to be able to carry out material flow analysis at the enterprise or regional level, and to apply it to identifying and solving the problems.
Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to evaluate and plan use of natural resources, taking into account resource quality and limits of their availability, development of technologies, and strategic resource related targets (such as development of circular economy and other). • Students will be able to analyze material flow systems at the level of enterprise or region. • Students will be able to identify problems specific to the analyzed flow (resource) and offer engineering, technological, and management solutions to increase resource efficiency.

Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented evaluation methods are suggested.
Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions and, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 5: SUSTAINABILE RESOURCE MANAGEMENT

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to gain professional knowledge on natural resources in the context of sustainability.
- to be equipped with understanding of impact and of opportunities for technology development due to the limitation and state of natural resources, and due to strategic initiatives of the European Union.
- to acquire indicators and methodologies for analyzing the use of natural resources.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments
- Video lecture on virtual teams
- Get to know each other

Assessment
- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 5

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work
- Individual reflections
- Collaborative reflection

Assessment
- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to evaluate and plan use of natural resources.
- ability to analyze material flow systems at the level of enterprise or region.
- ability to identify problems specific to the analyzed flow (resource) and offer engineering, technological, and management solutions to increase resource efficiency.

Module Structure

Module 5 / Unit 1: Introduction to Virtual Teamwork

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

Module 5 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Sustainable Resource Management presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related to Sustainable Resource Management, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on Sustainable Resource Management, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • How would you describe the challenge of resource depletion? What are the main problems and opportunities? • Name 3 EU policy issues dealing to sustainable resource management. • What information sources are useful for analysis of global, regional, national or company level material flows. Name two sources per each.
Unit-Specific	Evaluation method will be in the form of “approved/ rejected”: The student

Assessment Method	will get evaluation “approved” for this unit after ● documenting the knowledge that they have gained through self-study* ● participating in group coaching sessions (min. 80% attendance) ● bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: ● answers submitted for the self-study questions ● quizzes prior to the group coaching sessions ● a multiple-choice test completed at the end of the unit ● a learning diary submitted at the end of the unit (i.e.,self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation “approved” will be proceed to Unit 3, group assignment.
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB

Module 5 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on Sustainable Resource Management. Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions Reflect your learning on Sustainable Resource ● What went well? ● What could be improved? ● What did you learn? ● What are you going to exploit in practice? Reflect your teamwork during the last few weeks: ● How was the trust and safe atmosphere built in your team? ● Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? ● Share the most positive and challenging issues for communication within your multicultural team. ● Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. ● Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to Sustainable Resource Management topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: • What are the key messages of the EU Critical Raw Material list? What are the main trends identified in the resource management field - EU and Global or national perspective? What is the risk for green and traditional technologies, concerning critical raw materials? • What is the existent situation and gap in sustainable resource management? Please answer the question based on the statistical (Eurostat) data (using tables of Waste management and natural resource management). • How material flow analysis could be used for measuring and management of resource related circular economy challenges (company, city or global scale). How mass balance principle and relevant EU policies related to resource management could be utilized, in order to make research-based decisions?

Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit ● the list of academic and/or non-academic materials collected as part of the initial background research ● an individual reflection summary (in text or video format) on the group work ● a collaborative reflection recording on the group work ● written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) ● visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB and ● One of the links relevant for the understanding of challenge-based learning process: https://www.challengebasedlearning.org/

MODULE 6: SUSTAINABILITY OPTIONAL: "CIRCULAR ECONOMY, ECONOMICS & SUSTAINABILITY, SUSTAINABLE PRODUCTION"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[11]
Background	Nowadays, the global economy is undergoing transformation into a sustainable direction. Resources depletion and climate change force people to look for more sustainable, environmentally friendly practices. It is necessary to create new business models which will reduce social and environmental impacts and switch to circularity with all of its related aspects e.g. renewable energy sources. This module will familiarize students with the new business models and strategies in the context of circular economy, economy and sustainability as well as sustainable production. They will be provided with the materials and tools that can be used to design, implement and successfully manage the actions taken in the companies, cities and regions to become more sustainable. Students will get the knowledge in the context of circularity and sustainability. They will understand the needs, benefits, opportunities and challenges related to a circular and sustainable economy.

[11] (Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components an "equivalent" module is to have.

Module Content	Module will present • Introduction to the neighboring concepts of the circular economy, such as the Triple Bottom Line (TBL) and the Planetary Boundaries, and the ways companies and economies address them. • Familiarization with two types of economies: linear and circular; Presenting differences between the two and explaining the profits of circular economy implementation for the company and the environment. • Introduction to the key concepts and practices based on the 3-R approach: reduce (use the necessary minimum amount of raw material); reuse (maximum reuse of the products and components needed); recycle (reuse of waste material to create a new product). • Systems thinking – how one element influences the other; presentation on how important the action of one person or element is; what influence it can have on the entire value chain. • Presentation of examples of how companies can successfully assess and implement circular economy using various means like material flow analysis, eco-design, life cycle analysis and circular canvas. • Sustainable Global Supply Chain – understanding the structures and actors involved in the global supply chain. • How shared resources and cooperation can be used in the pursuit of circularity. • How public policy and instruments such as extended producer responsibility influence the transformation into a more sustainable and circular society. • Types of renewable energy sources and their challenges and opportunities in the circular economy.
Learning Objectives	• Students will improve their virtual team working and communication skills in virtual environments. • Students will gain knowledge of the circular economy and its neighboring concepts. • Students will be familiarized with materials and techniques on how companies can assess and implement circular economy. • Students will understand the role of cooperation and shared resources in the circular economy. • Students will be able to critically analyze and assess business actions in terms of sustainability and circularity.

Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to describe and differentiate concepts of linear and circular economies and all aspects related to them. They will understand the benefits of transitioning from a linear to a circular economy. • Students will be able to critically analyze, design, implement and successfully manage the actions taken in the company, for it to become more circular. • Students will be able to form industry/policy recommendations in relation to sustainability and circularity relevant for different types of businesses, countries/regions or cities.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented evaluation methods are suggested.
Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 6: CE, ECONOMICS & SUSTAINABILITY, SUSTAINABILE PRODUCTION

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to gain knowledge of the circular economy and its neighboring concepts.
- to be familiarized with materials and techniques on how companies can assess and implement circular economy
- to understand the role of cooperation and shared resources in the circular economy.
- to be able to critically analyze and assess business actions in terms of sustainability and circularity.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments
- Video lecture on virtual teams
- Get to know each other

Assessment
- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 6

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work
- Individual reflections
- Collaborative reflection

Assessment
- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to describe and differentiate concepts of linear and circular economies and all aspects related to them.
- ability to critically analyze, design, implement and manage the actions taken in the company to be more sustainable.
- ability to form industry/policy recommendations in relation to sustainability and circularity relevant for different types of businesses, countries/regions or cities.

Module Structure

Module 6 / Unit 1: Introduction to Virtual Teamwork

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

Module 6 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Circular Economy, Economics & Sustainability, Sustainable Production presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related Circular Economy, Economics & Sustainability, Sustainable Production, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on Circular Economy, Economics & Sustainability, Sustainable Production, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • Please provide the benefits of moving from the linear to the circular economy from the business and environment perspective. • Please provide examples of policy instruments that help transition companies into a more sustainable and circular economy. • Please provide examples of how various energy sources can be used in the circular economy: What are their current challenges and opportunities?

Unit-Specific Assessment Method	Evaluation method will be in the form of "approved/ rejected": The student will get evaluation "approved" for this unit after • documenting the knowledge that they have gained through self-study* • participating in group coaching sessions (min. 80% attendance) • bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: • answers submitted for the self-study questions • quizzes prior to the group coaching sessions • a multiple-choice test completed at the end of the unit • a learning diary submitted at the end of the unit (i.e., self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation "approved" will proceed to Unit 3, group assignment.
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB and • Chapter 1 in OECD (2016) provides a good overview of Extended Producer Responsibility: https://read.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264256385-en#page21 • Pages 13-14 and 21-25 from World Bank (2021) "International Framework for Eco-Industrial Parks" provides good overview of the concept: https://read.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264256385-en#page5 • European Environment Agency (2021) provides a quick read on opportunities and challenges of the clean-energy transition from a circular economy perspective: https://www.eea.europa.eu/publications/emerging-waste-streams-opportunities-and

	• Circle Economy. (2019). The Circularity Gap Report 2019
	• EU Action: 2030 climate & energy framework
	• Materials on planetary boundaries:
	  ○ https://www.sanudurabilitas.ch/app/download/6234868266/201126_SD_kn1_booklet_A5_ENG_SMALL.pdf?t=1606472016
	  ○ https://www.stockholmresilience.org/research/planetary-boundaries/the-nine-planetary-boundaries.html
	• Materials on systems thinking:
	  ○ https://thesystemsthinker.com/systems-thinking-what-why-when-where-and-how/
	  ○ https://www.youtube.com/watch?v=Miy9uQcwo3U
	  ○ https://learningforsustainability.net/systems-thinking/

Module 6 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on Circular Economy, Economics & Sustainability, Sustainable Production Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions Reflect your learning on Circular Economy, Economics & Sustainability, Sustainable Production ● What went well? ● What could be improved? ● What did you learn? ● What are you going to exploit in practice? Reflect your teamwork during the last few weeks: ● How was the trust and safe atmosphere built in your team? ● Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? ● Share the most positive and challenging issues for communication within your multicultural team. ● Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. ● Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to Circular Economy, Economics & Sustainability, Sustainable Production topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: • A case report based on a regional company that is on its way to circularity or activities taken in the city to be more sustainable and reduce carbon footprint. Students in the group of 3-6 will need to choose one company from their surroundings and propose the solution of how to improve the company's/ city actions in terms of sustainability. How to improve the production process/ service etc. to meet the criteria of circular economy. Present the benefits of circularity as well as show the cost the company/city has to carry and the profits the company/city can gain. • Students will be divided into the group of 3-6 and they will be asked to choose one item of casual usage and think how it was created, what natural resource was used to create this thing, how much energy was consumed and how it can be recycled when used, how its components can be reused for the new thing. • Student Journal: Students are asked to create a 'fake' journal on a specific topic, where they write articles on the basis of scientific resources (e.g. TOO4TO DMB), interviews with experts, etc. The issue of the journal can be 2-3 pages.

Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit ● the list of academic and/or non-academic materials collected as part of the initial background research ● an individual reflection summary (in text or video format) on the group work ● a collaborative reflection recording on the group work ● written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) ● visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB

MODULE 7: SUSTAINABILITY OPTIONAL: "ARTIFICIAL INTELLIGENCE AND SUSTAINABILITY"

Module Description

Field of Study	Management / Engineering
Education Level	Master
Pre-requisite	Module 1 or equivalent[12]
Background	The emergence of artificial intelligence (AI) and its progressively wider impact on many sectors requires an assessment of its effect on the achievement of the Sustainable Development Goals. Sustainable governance and innovation in sustainable production are increasingly linked to digitization and data analytics at the level of EU strategy papers, science and practice. The EU's Industrial Strategy (2020) states about a twofold industrial transformation: green and digital. It is emphasized that digitization is the engine of green economic transformation, allowing to optimize production processes and focus on a life-cycle approach to reduce environmental impact and ensure the competitiveness of companies and the region. The European Competences (Skills) Agenda, the European Digitization Strategy and the application of the principles of the Circular Economy in industry require new competencies, interdisciplinary professionals to address the complex challenges of sustainability and the industrial transition to a circular economy through digital analytical decision-making tools (decision support analytics). The need to manage businesses and region risks and make decisions based on research (data analysis): Artificial Intelligence, Data Analytics and advanced technologies, methods. As environmental sustainability becomes more important, there is a need for much more information about the impact the company is having. The need to track and report on what is happening inside the company as it relates to environmental sustainability. AI has the potential to produce significant and impactful solutions to decrease carbon emissions. AI also has the potential to offset or reduce those carbon emissions. This course will be an introductory one for the specialists of different disciplines wishing to understand and integrate AI in sustainability analysis,

[12] Please see TOO4TO Module 1 learning objectives and learning outcomes to see the components an "equivalent" module is to have.

	planning and risk management activities.
Module Content	The main aim of the module – to integrate digitization and decision-making-based data analytics approaches to strengthen the cross cutting competencies of the sustainability professionals simultaneously responding to the latest EU green and digital transformation trends. The course is oriented for the development of expansive competences, oriented to the broad understanding about AI and its impact on sustainability. Analysis of different applicability of AI when solving SD challenges, integration of AI in decision making, management and engineering activities as integral parts, with the intention to foster positive changes towards sustainability, climate neutrality, resource efficiency, while ensuring economic benefit and social justice. The main topics of the module: ● The concept of artificial intelligence ● Complexity and interlinkages between AI and Sustainable Development ● AI impact on SD (positive and/or negative): social, environmental and economic ● SD impact on AI (positive and/or negative) ● AI methods and tools ● Practical applicability of artificial intelligence for different SDGs ● Future predictions, consequences and development of AI in SD analytical and decision support field
Learning Objectives	● Students will improve their virtual team working and communication skills in virtual environments. ● Students will become familiar with the concept, definition and classification of AI. ● Students will analyze the impact of AI for the different aspects of SD (social, environmental, economic) and will have the ability to read official information published online (GIS, statistics, etc.). ● Students will plan research, integrate AI methods into decision-making systems for real-world data analysis, present reasonable conclusions and forecasts, to prepare reports.

Learning Outcomes	• Students will be able to communicate and work in virtual teams. • Students will be able to define the basic elements of artificial intelligence and the application possibilities of artificial intelligence. • Students will be able to explain the basic statistical methods used in the application of artificial intelligence. • Students will be able to plan research, integrate AI methods into decision-making systems for real-world data analysis, as well as to analyze and interpret the results of calculations, to present reasonable conclusions and forecasts, to prepare reports.
Teaching / Learning Methods	The module is designed to have 3 main units, each of which uses several teaching / learning methods (Please see the following sections dedicated to each unit separately for detailed descriptions and sample questions). Unit 1: Introduction to Virtual Teamwork: In this unit students will gain experience and skills to work in virtual teams through asynchronous learning material and exercises. Unit 2: Self-Study and Group Coaching: This unit is based on self-based learning and group coaching sessions: students study the module material within the given timeframe and engage in group discussion / feedback sessions with the teacher. Unit 3: Group Assignment: Students' learning process and outcomes are to be assessed with group work completed by each group. The group work stands as a learning procedure in itself and to strengthen students' ability and skills to implement module content in practice; hence, practice-oriented evaluation methods are suggested.
Assessment Methods	The module is designed to have 3 main units, each of which suggests several assessment methods. Please see the following sections dedicated to each unit separately for detailed descriptions, suggested assessment methods and sample questions.
Workload / ECTS	Overall Module: 60 hours / 2 ECTS Unit 1: Introduction to Virtual Teamwork: 10 hours Unit 2: Self-Study and Group Coaching: 25 hours Unit 3: Group Assignment: 25 hours

MODULE 7: ARTIFICIAL INTELLIGENCE AND SUSTAINABILITY

LEARNING OBJECTIVES

- to improve virtual team working and communication skills in virtual environments.
- to become familiar with the concept, definition and classification of AI.
- to analyze the impact of AI for the different aspects of SD and to read official information published online.
- to plan research, integrate AI methods into decision-making systems for real-world data analysis, present reasonable conclusions and forecasts, to prepare reports.

UNIT 1
Introduction to Virtual Teamwork

Team Building Assignment

Virtual Pre-Assignments

- Video lecture on virtual teams
- Get to know each other

Assessment

- Self-assessment
- Assessment within the team
- Teacher (coach) feedback

UNIT 2
Self-Study and Group Coaching

Studying TOO4TO DMB Material on Module 7

1st coaching | 2nd coaching | 3rd coaching | 4th coaching | 5th coaching

UNIT 3
Group Assignment

Reflections on the Group Work

- Individual reflections
- Collaborative reflection

Assessment

- Initial background research
- Written documentation of the group assignment
- Visual documentation of the group assignment

LEARNING OUTCOMES

- ability to communicate and work in virtual teams.
- ability to define the basic elements of artificial intelligence and the application possibilities of artificial intelligence
- ability to explain the basic statistical methods used in the application of artificial intelligence
- ability to plan research, integrate AI methods into decision-making systems for real-world data analysis, as well as to analyze and interpret the results of calculations, to present reasonable conclusions and forecasts, to prepare reports.

Module Structure

Module 7 / Unit 1: Introduction to Virtual Teamwork

Description	Unit 1 will present the knowledge on diversity in virtual teams and provide them with the opportunity to get to know each other asynchronously before the module starts. It will help participants build relationships within the student groups and agree on the rules, communication, and tools to be applied in Unit 3 group work. This will facilitate building trust between the group members and emphasize effective virtual communication. Content of the Unit 1 includes: • building trust in virtual teams • communication in virtual teams • choosing appropriate technology for communication processes • understanding diversity in virtual teams (language, cultures, professional background) The learning objectives will be achieved through real-life activities integrated into the group work (Unit 3). However, before the official start of the group work, there will be two different kinds of activities to support virtual teamwork. **Individual Activity** Pre-Task 1: Reading and listening to the story in TOO4TO Virtual Team Guide. The story takes the students through the 4 stages of virtual team building and focuses on the experiences of team members and the leader, where sustainable leadership plays an important role. **Collaborative Group Activity** Pre-Task 2: Icebreaker - Asynchronous informal presentation of the participants and discussion on diversity using a platform that allows interaction (e.g. Padlet). Task: Building group culture by agreeing on rules, communication, roles using team canvas and TOO4TO Virtual Team Guide.

Unit-Specific Learning / Teaching Method	• Video lecture: 13min on virtual multicultural teamwork in Virtual Guide (available also https://www.youtube.com/watch?v=QIoAkFpN8wQ) • Student-centered collaborative team culture building exercises (using *Team Canvas*) in virtual teams before the start of the Unit 3: The teams and the responsible members for this assignment are indicated on the learning platform. Each team will organize a video meeting in order to agree and record the team's rules using the Team Canvas tool. (http://theteamcanvas.com/) • Integrated student-centered collaborative reflection task within a team in the middle of Unit 3 and at the end of it. • Individual reflections included in the Unit 3 self-assessment.
Unit-Specific Assessment Method	Assessment of Unit 1 will take place in Unit 3, when students start working on group assignments as a team: • self-assessment (as part of Unit 3) • assessment within a team (As part of Unit 3: Reflections are discussions that are completed within a team using videoconferencing tools. Reflection discussions are recorded by the student groups and forwarded to the teacher as agreed). • teacher feedback on the reflection video
Unit Workload	10 hours
List of Suggested Material	• Team canvas template http://theteamcanvas.com/ • 8 tips for more effective virtual meetings: https://insights.learnlight.com/en/articles/8-tips-more-effective-virtual-meetings/ • Eisenberg, J., Glikson, E., & Lisak, A. (2021). Multicultural Virtual Team Performance: The Impact of Media Choice and Language Diversity. Small Group Research, 1046496420985614 • Hacker, J. V., Johnson, M., Saunders, C., & Thayer, A. L. (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23. • Varhelahti, M. & Turnquist, T. (2021). Diversity and Communication in Virtual Project Teams. IEEE Transactions on Professional Communication. Vol. 64 , Issue 2 DOI: 10.1109/TPC.2021.3064404 • TOO4TO Virtual Team Guide

Module 7 / Unit 2: Self Study and Group Coaching

Description	This unit is based on self-based learning of the students which is accompanied by (teacher supported) group coaching sessions. First, students study the material on Artificial Intelligence and Sustainability presented in Dynamic Material Bank to gain basic knowledge and skills related to the topic. Parallel to studying the existing material, students are requested to collect additional learning material that they have found as part of their further research on the topic. In this way, students not only learn about the key issues related to Artificial Intelligence and Sustainability, but also develop their searching and reading skills in academic work. During the self-study period, students are requested to participate in group-coaching sessions supported by the teacher. The size and frequency of the group coaching sessions, as well as the discussion methods to be used, can be decided by the teacher. It is suggested that, for a multifaceted discussion session, the groups are formed multidisciplinary and certain topic-related questions are prepared by the teacher to boost the interaction (For example, groups of 4-6 students, including minimum of two different discipline-backgrounds, can meet for 3-5 group coaching sessions with the teacher). It is also recommended that the students are given a pre-coaching task (such as reading assignments) in order to ensure the quality of discussions held during the group coaching sessions. Here, the aim is not only to improve the manifoldness of knowledge gained on Artificial Intelligence and Sustainability, but also to make students get prepared for Unit 3, group assignment.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning, supported by self-study questions* • research-based learning • peer-to-peer learning • discussion-based teaching * Sample self-study questions: • What are the main pros and cons of AI as a tool for decision making towards sustainable development in the national context? • What is the most relevant thematic (up-to-date) in the field of AI application for the SD in the (scientific literature; legal requirements; projects; social media… and any other thematic of DMB). • What are the basic tools for analyzing big data in the interdisciplinary fields (such as CE, SDGs, value chain management, etc.)?
Unit-Specific	Evaluation method will be in the form of “approved/ rejected”: The student

Assessment Method	will get evaluation “approved” for this unit after • documenting the knowledge that they have gained through self-study* • participating in group coaching sessions (min. 80% attendance) • bonus: additional study material suggested to DMB * Sample methods for documentation of self-study: • answers submitted for the self-study questions • quizzes prior to the group coaching sessions • a multiple-choice test completed at the end of the unit • a learning diary submitted at the end of the unit (i.e., self-assessment by answering following questions (i) What did I learn in this unit (ii) What do I want to learn more about the topic (iii) What can I implement / exploit in practice?) Students who get the evaluation “approved” will proceed to Unit 3, group assignment.
Unit Workload	25 hours
List of Suggested Material	TOO4TO DMB

Module 7 / Unit 3: Group Assignment

Description	In this unit, students are formed in multidisciplinary groups and given a case to work on as a group. The size of the group is to be decided by the teacher based on the characteristics of the group assignment (case) given. It is suggested that a minimum of two discipline-backgrounds are represented in the groups. First, students are asked to search for background information and relevant references to the case. As a result of this research, they are asked to collect academic and/or non-academic material related to the case (including journal articles, reports, interviews, policy frameworks, related videos, etc.) which can be added to DMB on Artificial Intelligence and Sustainability Then students are requested to work on the group assignment (case) questions in a detailed way and submit their answers in a given timeframe. It is suggested that students are asked to elaborate on their answers (i.e. submitted written work) by an additional visual presentation. While working on the case as a group, students are asked to reflect on the collaboration and work as a group. **Individual Reflection** Sample Questions: Reflect your learning on Artificial Intelligence and Sustainability • What went well? • What could be improved? • What did you learn? • What are you going to exploit in practice? Reflect your teamwork during the last few weeks: • How was the trust and safe atmosphere built in your team? • Reflect on the importance of agreed rules, tools and schedules during the virtual teamwork? • Share the most positive and challenging issues for communication within your multicultural team. • Did your educational and professional background affect the team progress (team building and productivity). Please reason your thoughts. • Reflections can be returned as text or video form into the learning platform.

	Collaborative Reflection Reflections are discussions that are completed within a team using videoconferencing tools. It is suggested that the reflection discussions are recorded by the student groups and forwarded to the teacher. Here the purpose is not only to broaden students' knowledge related to Artificial Intelligence and Sustainability topics, but also to help them develop relevant skills and experiences in the field by working on a practice-oriented case. It is also aimed in this unit that students develop their research and analysis competences, as well as (virtual) teamwork and presentation skills.
Unit-Specific Learning / Teaching Method	• self-based asynchronous learning • research-based learning • team-based learning • case- / problem-based learning* *Sample group assignment (case) questions: For the practice-oriented group assignment, the company and/or industry to be worked on as a case, which is indicated with "(…)" below, can be decided by the teacher. Alternatively, groups can be given the option to decide on the company and/or industry on their own. • Analyze one selected SDG or specific objective (problem) within SDGs – identified as relevant one by group members. Idea (mind) map – will be used to describe and specify the problem which will be analyzed. Based on the tools and methods explained in Unit 2 and additional exercises presented at Unit 3 – students will be able to analyze the selected problem and try to apply AI methods (such as GIS, "R" and blockchain, IoT concept) for analyzing it and making research (analysis) based decisions. • Students will be asked to analyse sustainability indicators in the statistical databases and companies' reports in order to make research based decisions oriented to sustainable development. • Students will analyse and compare different AI tools (from the DMB) in order to develop SWOT and to suggest new innovative AI tools (as inputand update for DMB) which they discovered in the additional desk research.

Unit-Specific Assessment Method	Working on a case as a group provides students with a multidimensional learning experience. Therefore, the learning process is to be assessed from various angles and students are asked to submit ● the list of academic and/or non-academic materials collected as part of the initial background research ● an individual reflection summary (in text or video format)on the group work ● a collaborative reflection recording on the group work ● written documentation of the group assignment (which can be done via answers sheet, report, mind map, etc.) ● visual documentation of the group assignment (which can be done via presentation, recorded videos, etc.)
Unit Workload	25 hours (TBC)
List of Suggested Material	TOO4TO DMB