PLANET

Co-funded by the Erasmus+ Programme of the European Union

PLANET – PLan for Agriculture reNewable Energy Training

D4.4 - Complete and optimised version of the e-learning platform	
Document description:	The document briefly describes the Moodle platform that contains the courses developed in the PLANET project: course on ICT, and specific modules on renewable energy in agriculture: solar photovoltaic, solar thermal, solid biomass and biogas. The course is accessible online at https://www.erasmus-planet.eu/course/
Partner responsible:	CONFAGRI, CCS, UNITO
Date of approval by the QC:	17 December 2020
Work package title:	Development of the learning platform
Task title:	Task 4.4: Test of the e-learning platform by the Consortium Task 4.5: Optimisation of the e-learning platform Task 4.6: Integration of other languages modules
Status (F: final; D: draft; RD: revised draft):	F

Agreement Number 2017-3177/001-001

Table of Contents

1 Hosting platform description

As described in Deliverable 4.1, the hosting platform chosen is Moodle, a learning platform designed to provide educators, administrators, and students with a single, robust, secure, and integrated system for creating personalized learning environments.

Powering tens of thousands of learning environments around the world, Moodle is trusted by institutions and organizations large and small, including Shell, London School of Economics, State University of New York, Microsoft and Open University. More than 90 million users use Moodle worldwide, both academically and enterprise-wide, making it the most widely used open source learning platform in the world.

Because it is open-source, Moodle can be customized in any way and tailored to individual needs. Its modular conFiguretion and interoperable design allow developers to create plug-ins and integrate external applications to achieve specific functionality.

1.1 Licensing, data security and user privacy

Moodle is provided free of charge as Open Source software, under the GNU General Public License. Anyone can adapt, extend or modify Moodle for both commercial and non-commercial projects without license fees and benefit from the cost efficiency, flexibility and other advantages of using Moodle. The PLANET Consortium has therefore decided to use Moodle and adapt it to its training needs.

Regarding data security and user privacy, security controls are constantly being updated and implemented in Moodle's development processes and software to protect against unauthorized access, data loss, and misuse. UNITO, which is in charge of creating the platform, will update the core of Moodle and its plugins monthly to always have the latest security updates. Finally, the communication between the server and client applications is encrypted using the HTTP-Secure protocol, which ensures data confidentiality during connections.

1.2 User Access

There is one section in the PLANET platform, and the PLANET consortium will control the access to the material with two roles:

Registration for trainers: the PLANET consortium will grant access to the trainers that want to teach a class on renewable energy in agriculture, using the moodle platform, consequently the PLANET platform administrator (in the person of Remigio Berruto, UNITO) can grant access to a list of potential trainers and their email addresses.

Registration for trainees: It will be used the same procedure described in the registration for trainers, but the registration process will be managed from the PLANET consortium training centres under the supervision of the PLANET platform administrator (in the person of Remigio Berruto, UNITO).

Upon request, we can duplicate the material in the same portal for another training centre that wants to use the training courses. in this way we can maintain the privacy of trainers and trainees of a specific course hold by another training centre that does not belong to the partners of the project.

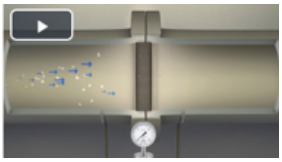
1.3 Sections available and navigation

With over 10 years of development guided by social constructionist pedagogy, Moodle offers a powerful set of learner-centered tools and collaborative learning environments that enhance both teaching and learning.

As for navigation, a simple interface, drag-and-drop functionality, and well-documented resources make this Moodle platform easy to learn and use. Moreover, Moodle provides the most flexible toolset to support both blended learning and 100% online courses. For this reason, the PLANET consortium through the full range of integrated features of Moodle, including external collaboration tools such as forums has built the e-learning portal using Moodle.

Another important aspect to consider is that Moodle can be scaled to support the needs of both small classrooms and large organizations. Because of its flexibility and scalability, Moodle has been adapted for use in educational, corporate, nonprofit, government, and community settings. In addition, it is perfect for the multilingual and multinational training that will be developed for PLANET. Finally, the platform is web-based and is therefore accessible from anywhere in the world. With a default mobile-friendly interface and cross-browser compatibility, the content on the Moodle platform is easily accessible and consistent across different web browsers and devices.

In terms of the D4.1 specification, there are easily perceived icons that help users visualize the information what it represents and what the user should expect. In general, as you can see throughout the images in Chapter 3 of this document, to simplify the user experience, we have made large icons that once clicked lead to the material they want to see. This applies to videos, documents, presentations with notes, and external links. Below are the icons:

video preview 

icon documents 

documents with notes 

external link icon 

In the same platform there are, for each day the contents with all the material. The single days of the course are characterized by a placement test and a set of activities. Depending on the days, the online course is scheduled on some days, while on others the course is scheduled with in-person activities. Initially, two different platforms were planned, one for trainees and one for trainers:

Trainees section, containing all materials for the trainee learning modules: online content.

Planet trainers toolkit section, containing all the material for the trainers, including the material for the days to be conducted in the classroom, with some guides for working based periods and usage of the platform.

All modules have been designed for single day access as well, with verification of learning before and after completion of the materials for the indicated day. In this way both the professional user and the student, who takes the course for a certification, can use the platform developed.

Subsequent to the arrival of the COVID pandemic, all activities initially scheduled in the classroom are upoladed in the online portal. Trainers made the online material visible to students, while for days when an in-class activity was scheduled, they blacked out the affected days to provide the material in class and discuss it with students. This mode allowed maximum flexibility in the use of the material by trainers and students, and is the one that can be used by the trainer to have a different split of in-class and online days.

1.4 How to use the material

The material is usable in two modes:

1) Access to a dedicated Moodle platform. At the request of a training center, it is possible to duplicate an instance of the platform to allow the registration of individual students and trainers, which will be managed separately from the others on the site. In this way, other training centers, in addition to those collaborating in the PLANET project, can use the material and offer it in their training programs.
2) Access to the material for uploading on their own platform. Those who are interested in taking advantage of some lessons for their training courses, can request and download some days of training to be used later in online mode or in class, going to take only the days of their interest from the modules provided.

1.5 Languages available

Moodle's multilingual capabilities ensure that there are no language limitations to online learning. The Moodle community has begun translating Moodle into more than 120 languages so that users can easily localize their Moodle site, along with many resources, support, and community discussions available in various languages.

Thanks to these features it was possible to develop the multilingual aspect of the platform, available in the following 5 languages:

English: https://www.erasmus-planet.eu/course/

Italian: https://www.erasmus-planet.eu/course/it/

Dutch: https://www.erasmus-planet.eu/course/nl/

French: https://www.erasmus-planet.eu/course/fr/

German: https://www.erasmus-planet.eu/course/de/

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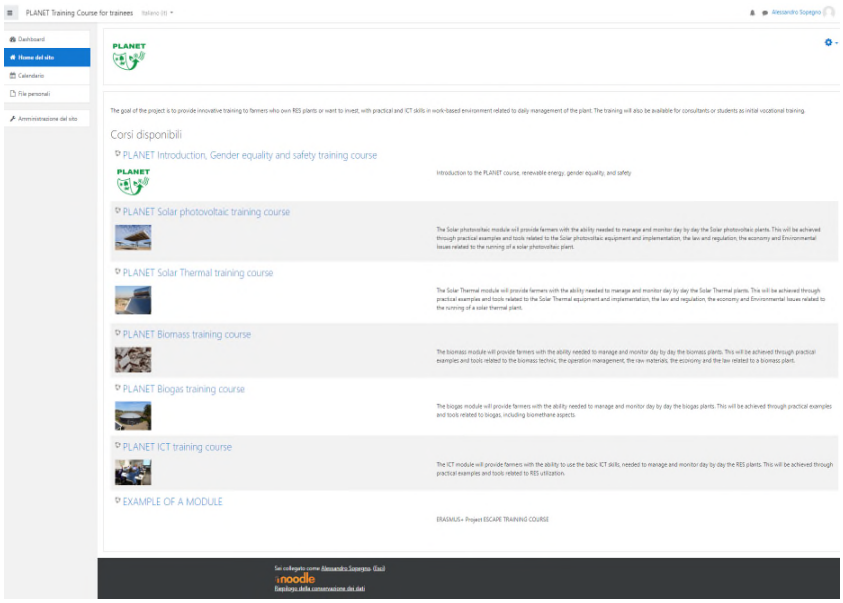
2 Results: Online platform overview

1. Below is the main page of the e-learning platform created for the PLANET project, where you can see the list of all the available courses of the PLANET training course.
2. The entire course is available at the following link: **https://www.erasmus-planet.eu/course**
3. As you can see in Figure 1 (English content), there are 6 modules:
4. Introduction, gender equity and safety training course (not included in the proposal but required for course certification)
   . Solar PV
5. . Solar Thermal
6. . Biomass
7. . Biogas
8. . ICT



~~Figura~~ Figure 1- first screen in EN language of the training platform, accessible at https://www.erasmus-planet.eu/course

Through the first screen, users can enter individual modules to view training content. These modules are also available for the trainers sections. The difference for the two (students, trainers) is that with the trainer's permission, the page can be edited by the trainer, who could add documents, assignments, and

assessments.
In order to show the complete and optimized version of all national platforms, in this deliverable the structure of one module in detail (solar PV training course) is presented as an example, while the other modules are available on the online platform and presented here in summary form.

~~In order to show the complete and optimised version of all the national platforms, the structure of a module, captured through screenshots, is shown below. Then, since the structure is repeated the same in each module, the links of each platform are shown here, with credentials (username and password) valid for all platforms, so that all platforms can be consulted at first hand.~~

~~English platform: https://www.erasmus-planet.eu/course/~~

~~Italian platform: https://www.erasmus-planet.eu/course/it/~~

~~French platform: https://www.erasmus-planet.eu/course/fr/~~

~~German platform: https://www.erasmus-planet.eu/course/de/~~

~~Datch platform: https://www.erasmus-planet.eu/course/nl/~~

~~2.1 USRNAME deliverable~~

~~2.2 PASSWORD D4.42020~~

Formattato: Tipo di carattere: (Predefinito) Calibri, 14 pt, Evidenziato

3 PLANET Solar photovoltaic training course

The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The solar PV training course consists of 6 days of training, in class, online, and in the field (with a site visit to an operating solar power plant). The module begins with an introductory chapter that should give students an understanding of solar energy applications and the roles of all stakeholders involved in a solar power plant project. The module continues with an introduction to the technical equipment of a power plant and the influence of local law and regulations on applications. Students will then learn the basic rules of designing a solar power plant. The fourth day consists of a site visit where students will discover a plant in operation and how the information learned in the previous days is applied in the field. Students will also learn about health and safety regulations and operation and maintenance steps. Day 5 presents the method for evaluating the economic benefits of a solar power plant, and finally, day 6 is a presentation of how to operate a power plant through the steps of troubleshooting, maintenance, and recycling. With the knowledge of the course, the student gains the ability to revise the design of a solar power plant under the current framework to allow for sustainable economic operation of the plant.

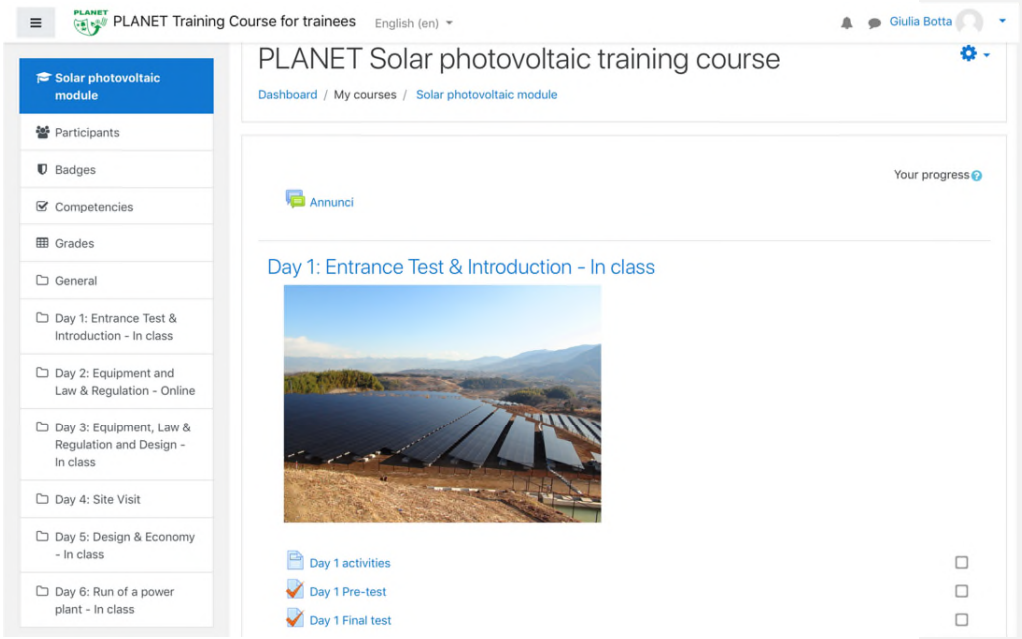


Figure 1 First day of the solar photovoltaic course

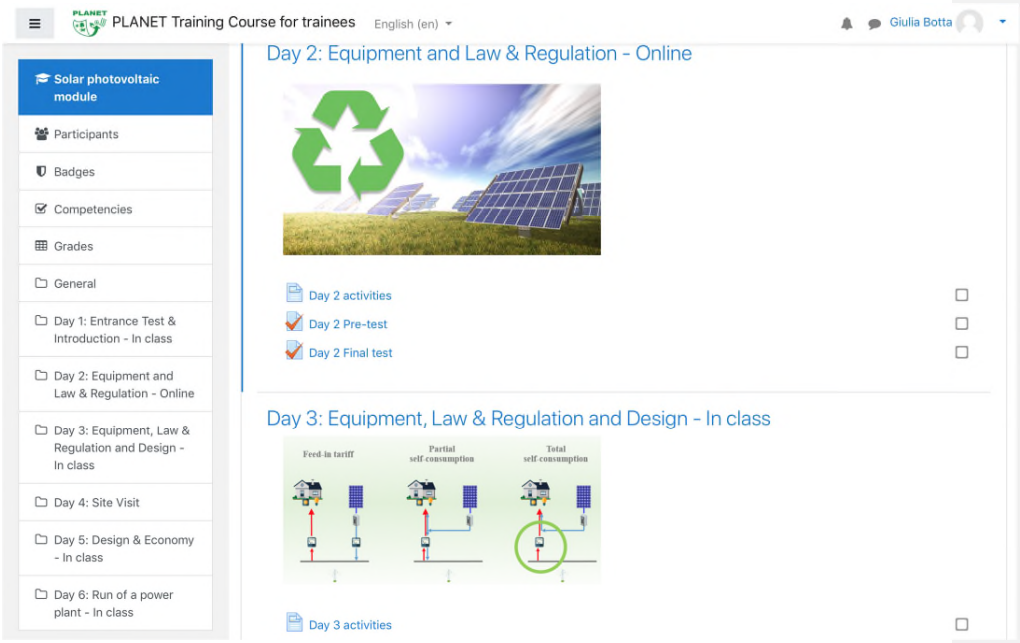


Figure 2 Second day of the solar PV module

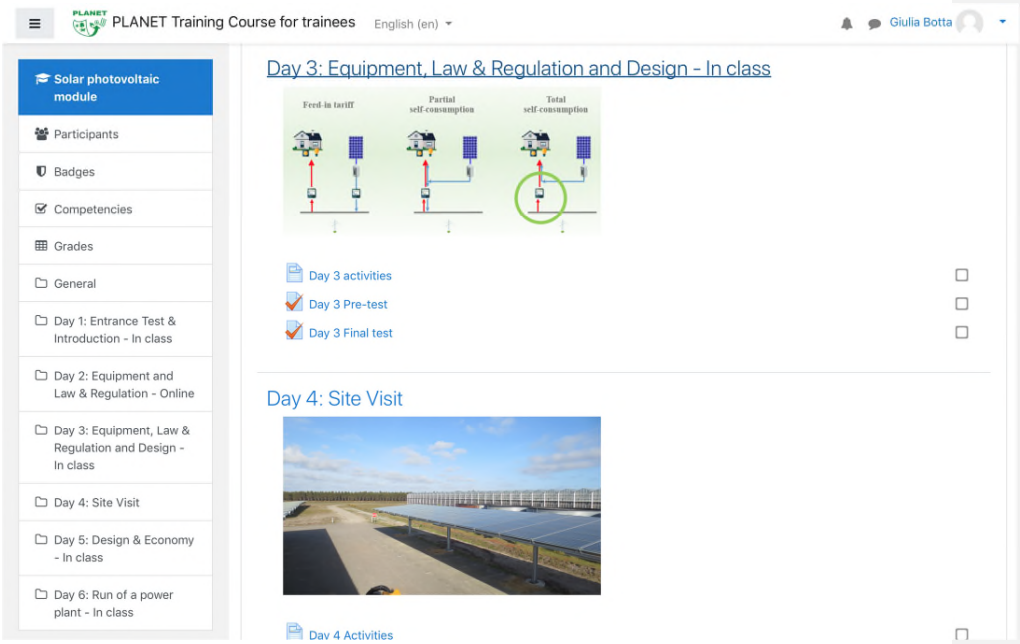


Figure 3 Third and fourth day of the solar PV module

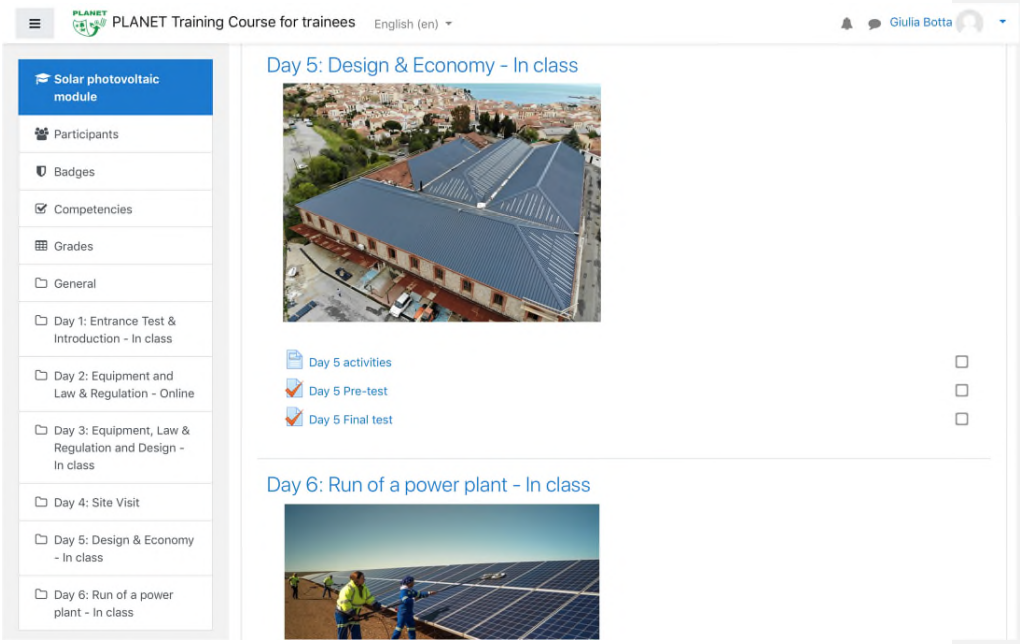


Figure 4 Fifth day of the solar PV module

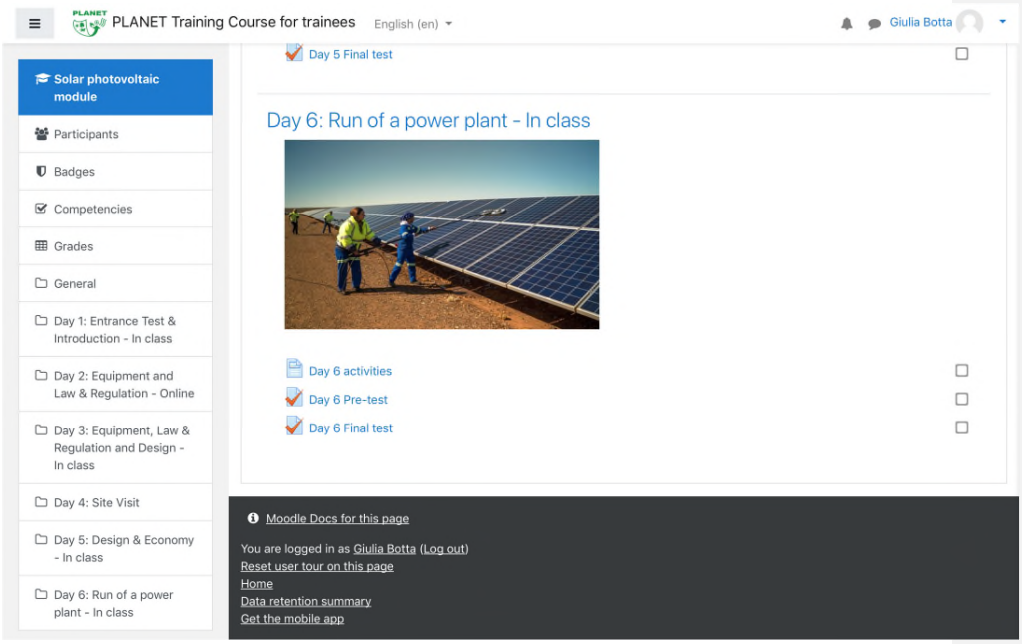


Figure 5 -Sixth day of the solar PV module

4 Structure of solar photovoltaic course days

4.1 Day one:

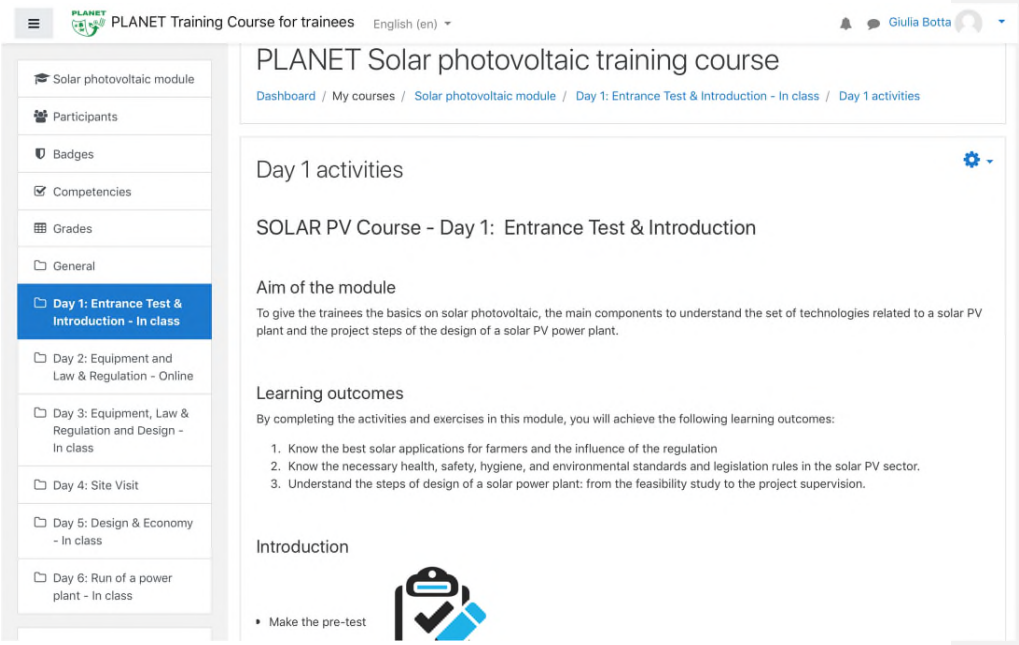


Figure 6 Structure of the day 1, previously shown

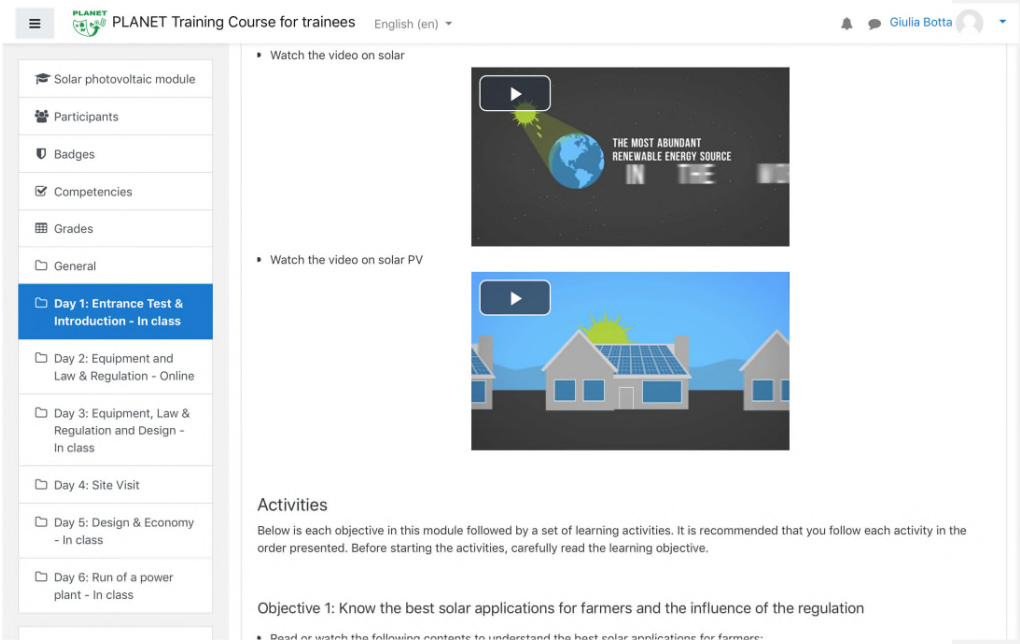
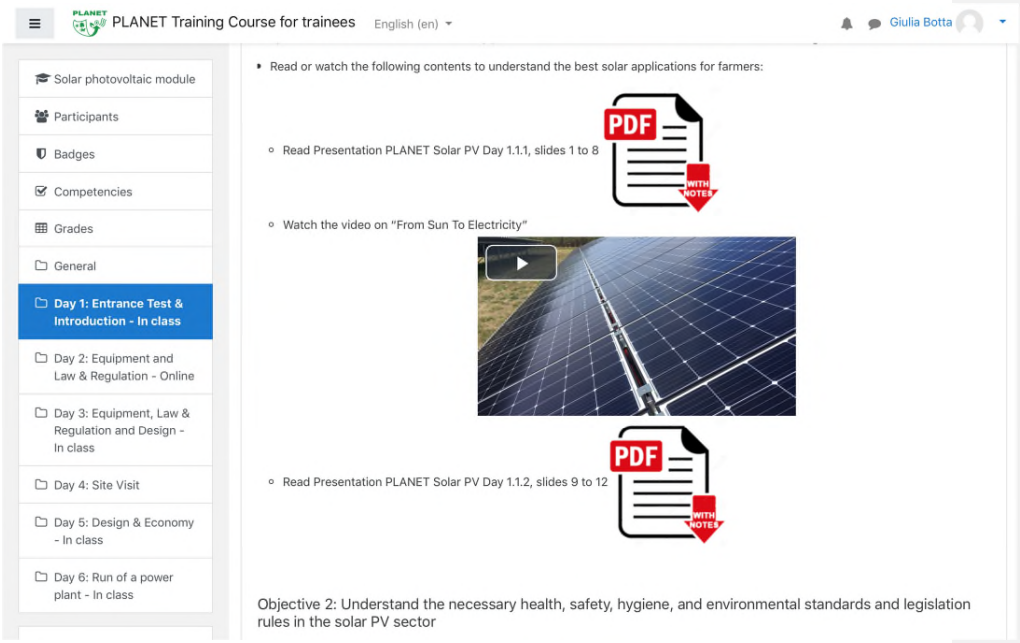


Figure 7 Detail of the structure of day 1, previously shown



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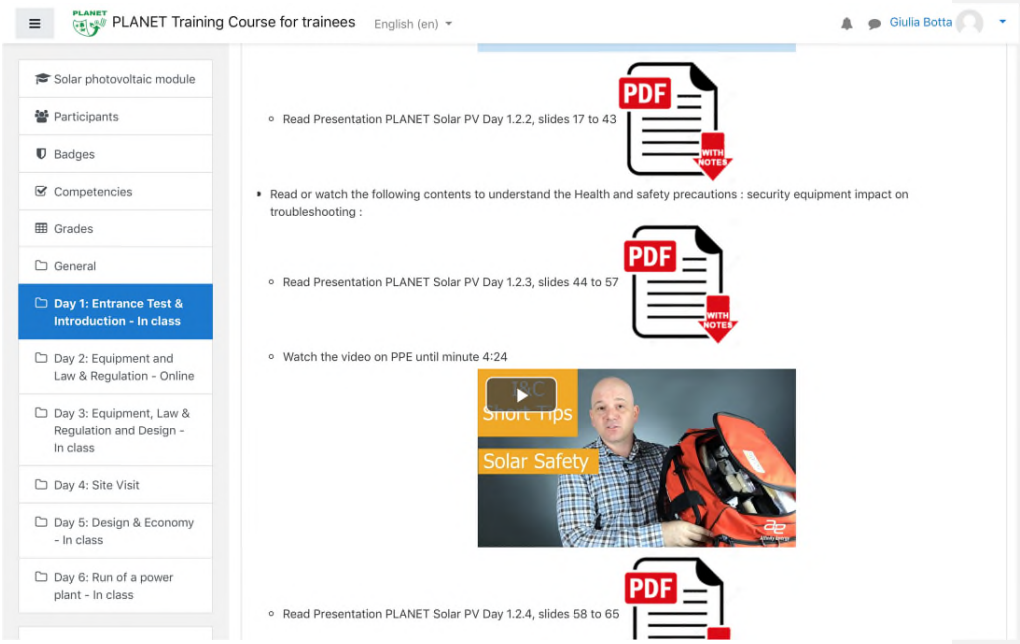

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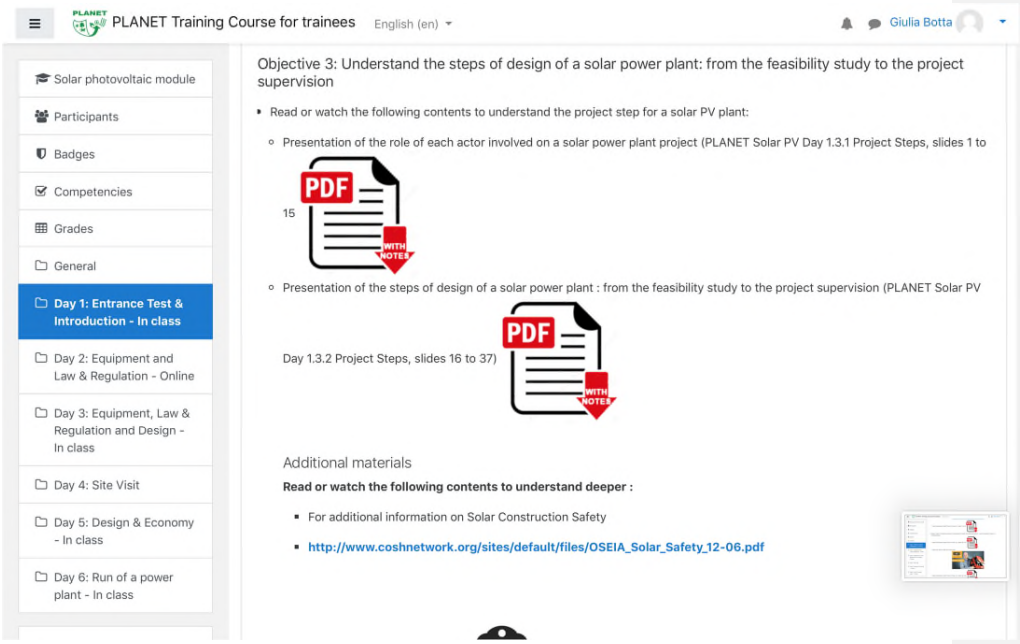

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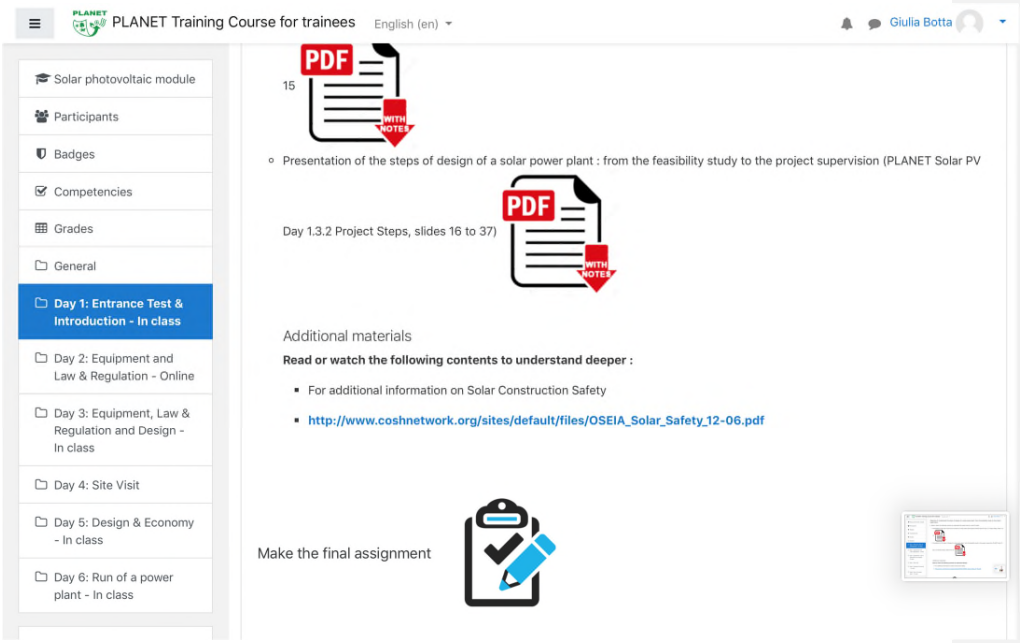

Figure 11- details of the structure of the day 1 structure of the day 1, previously shown

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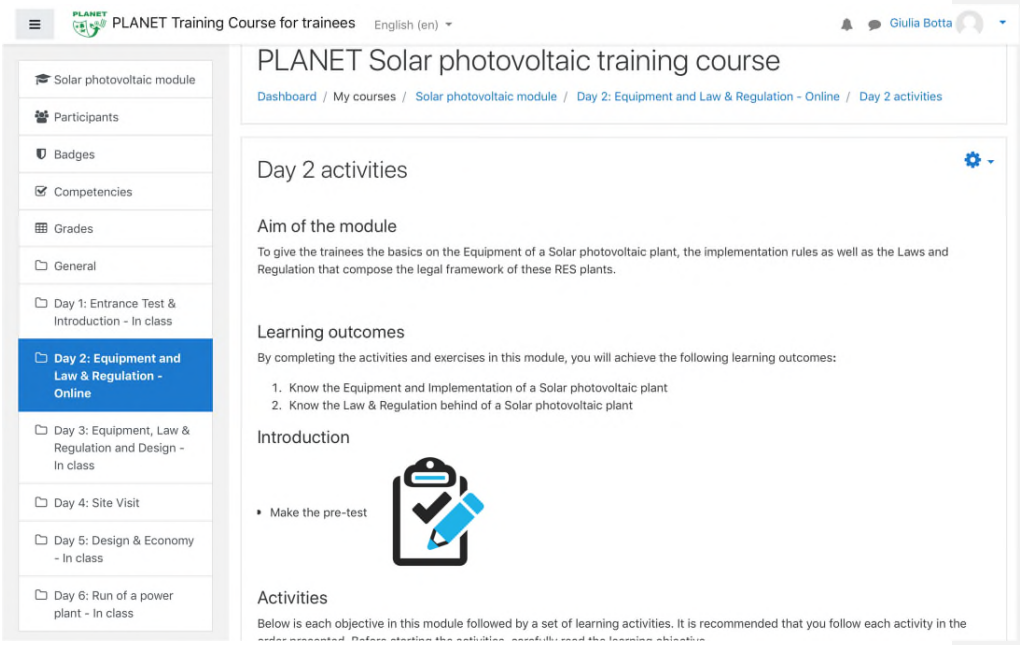

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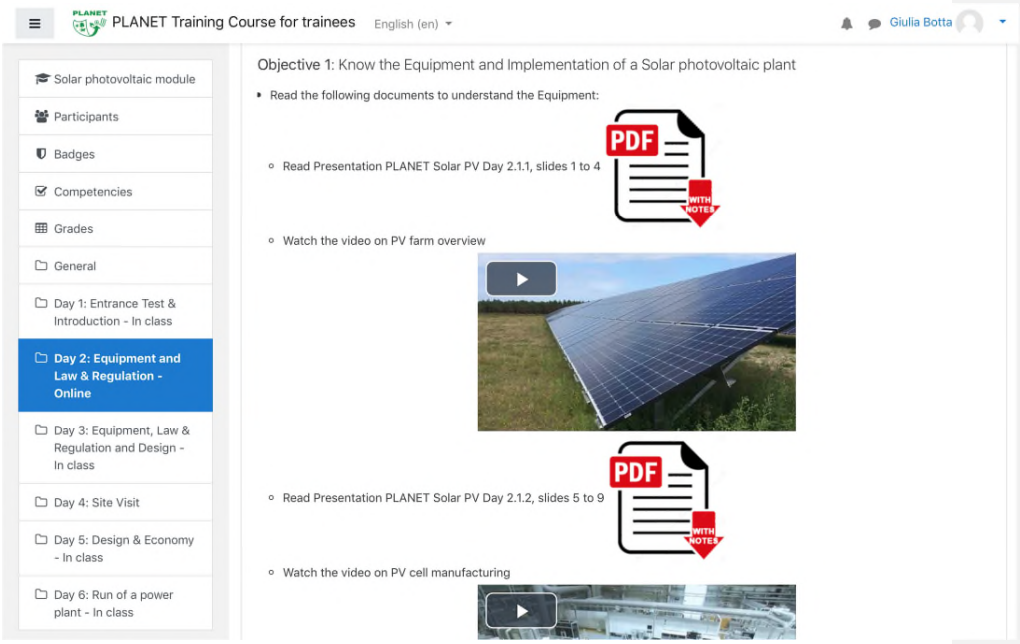

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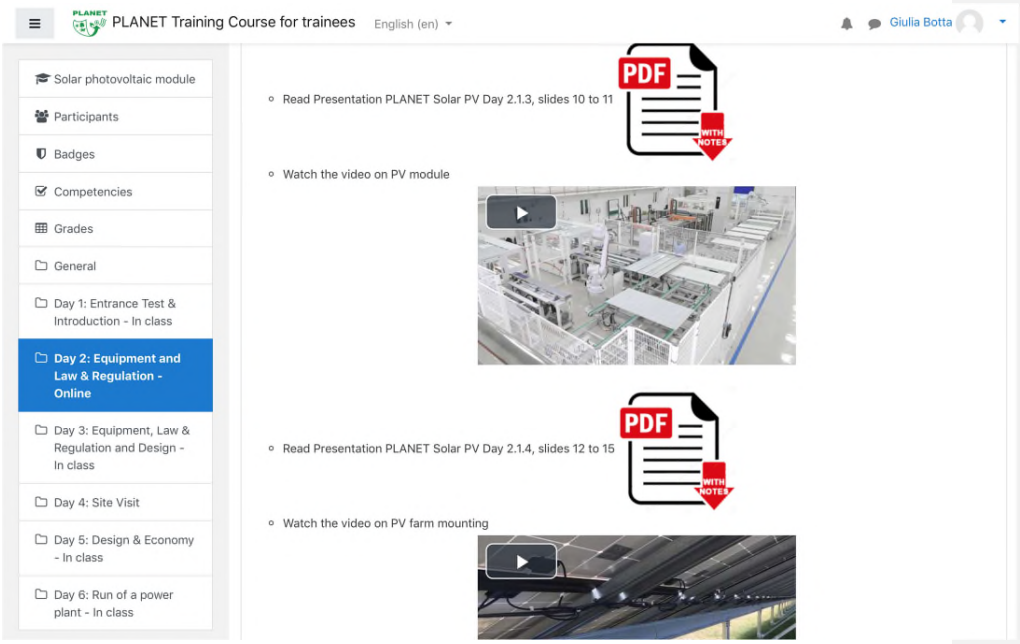

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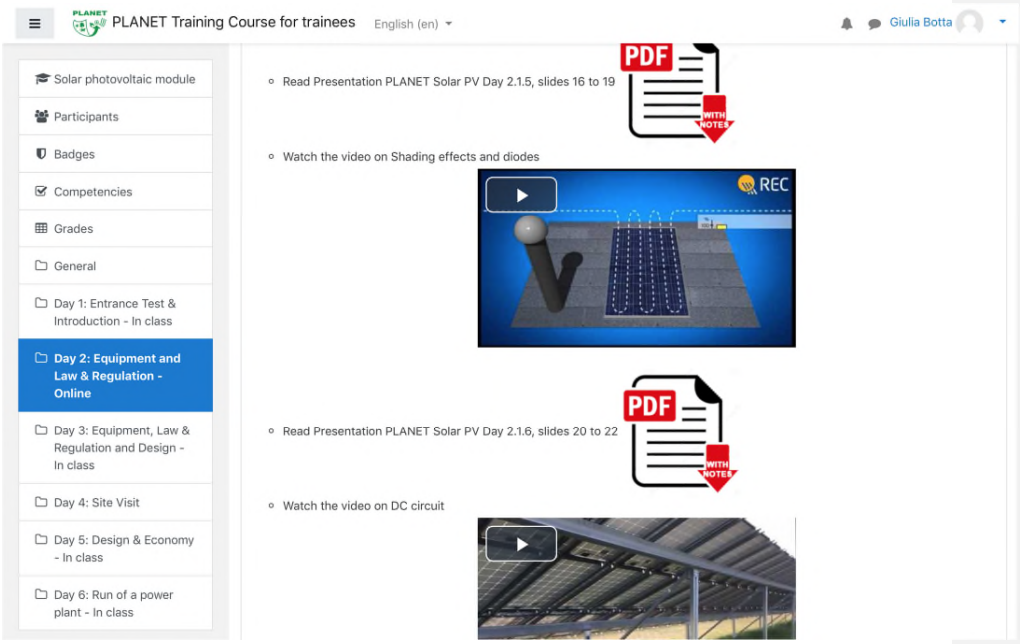

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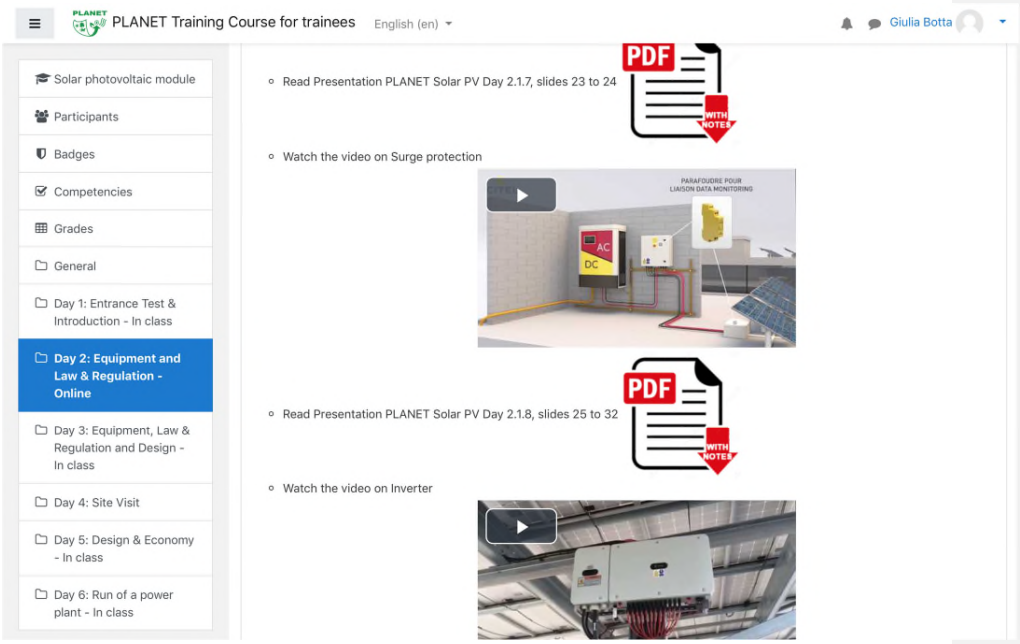

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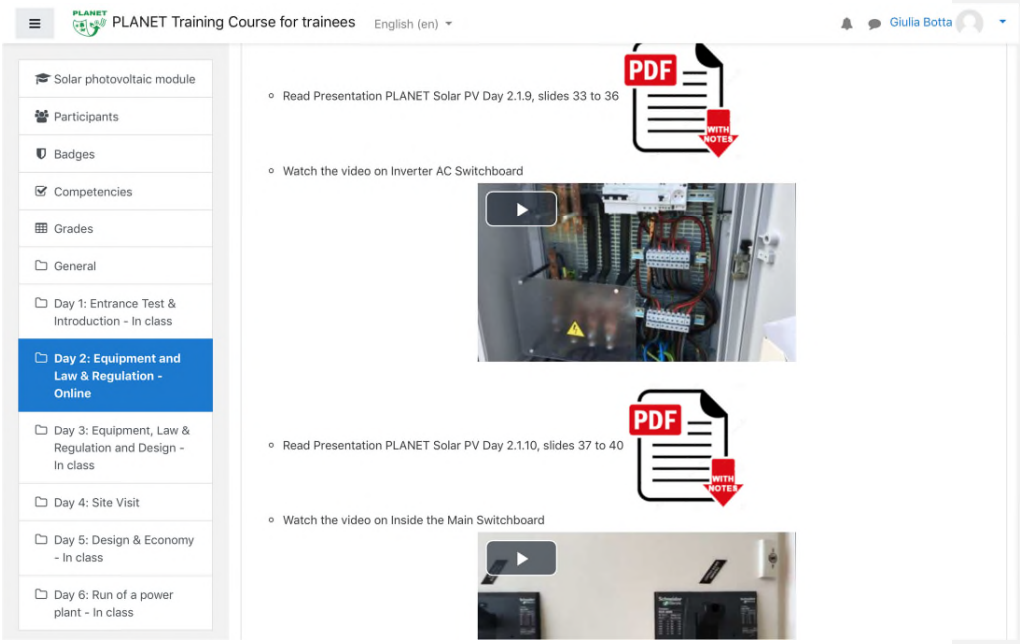

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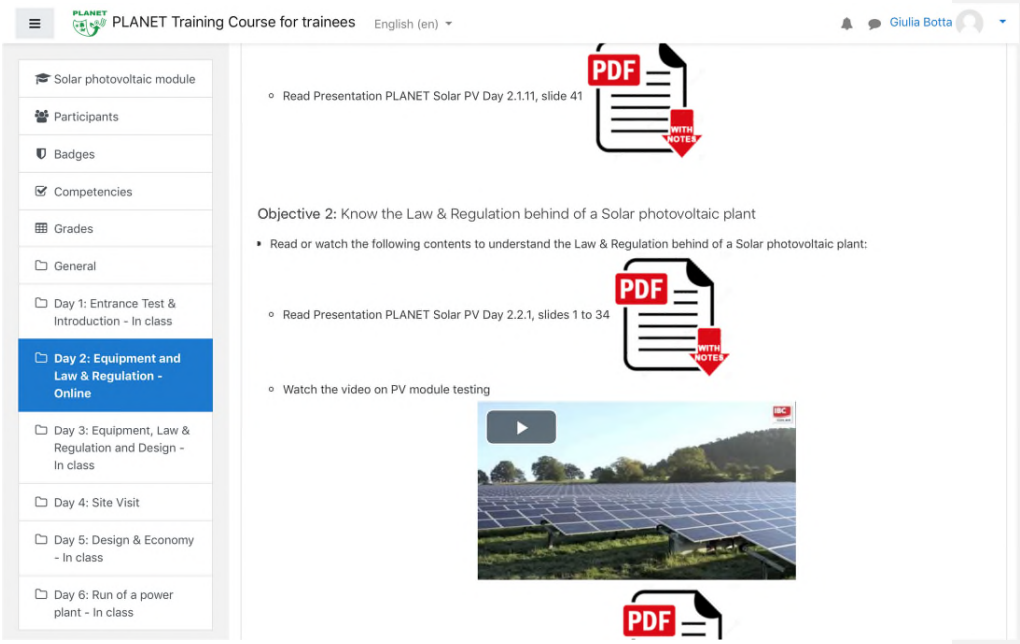

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Figure 19 details of the structure of the day 2, previously shown

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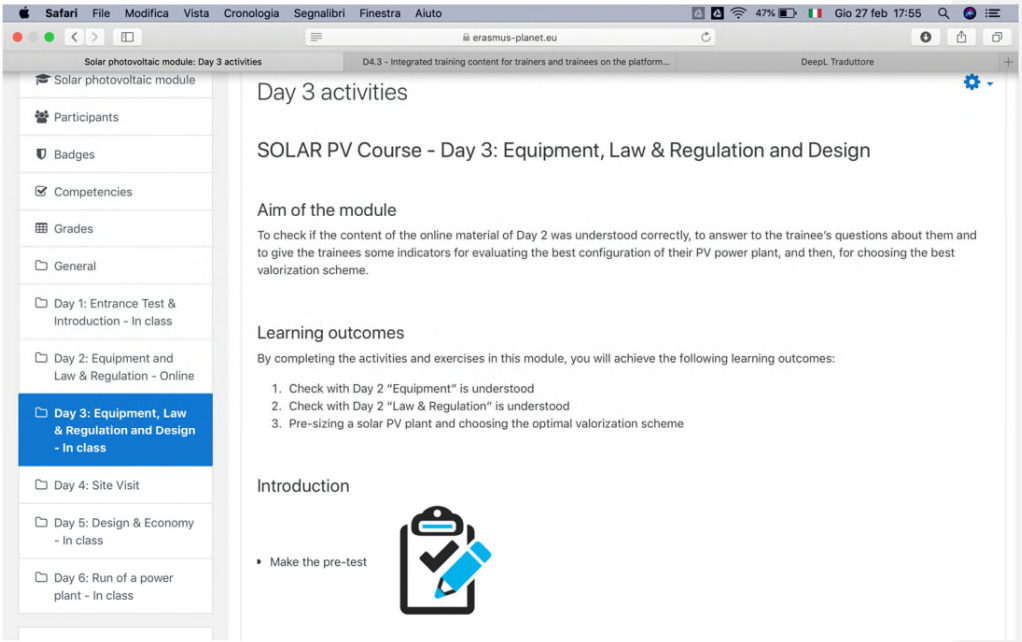

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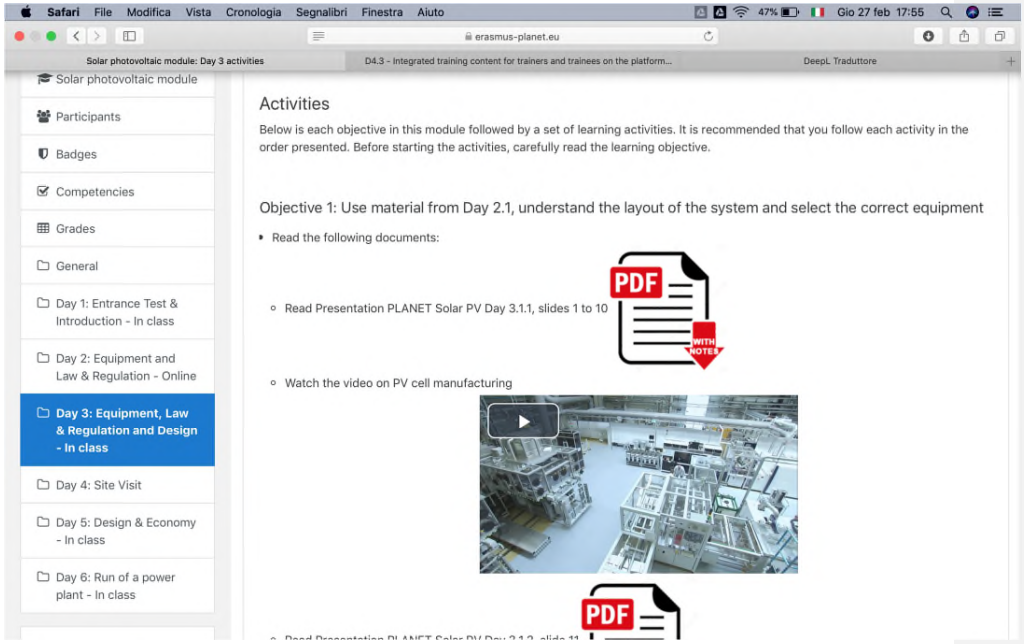

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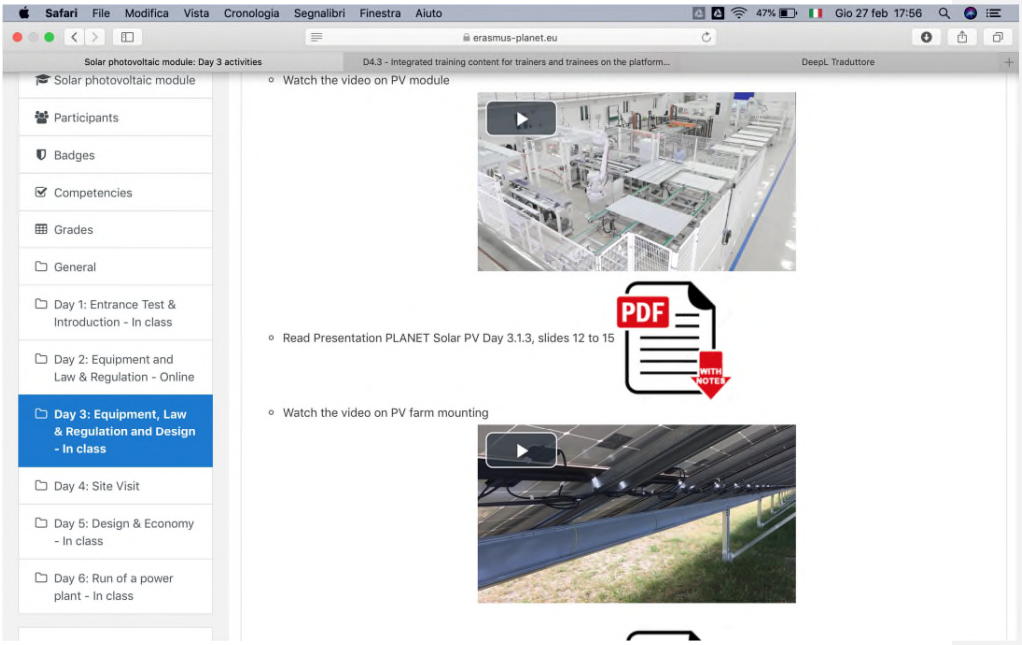

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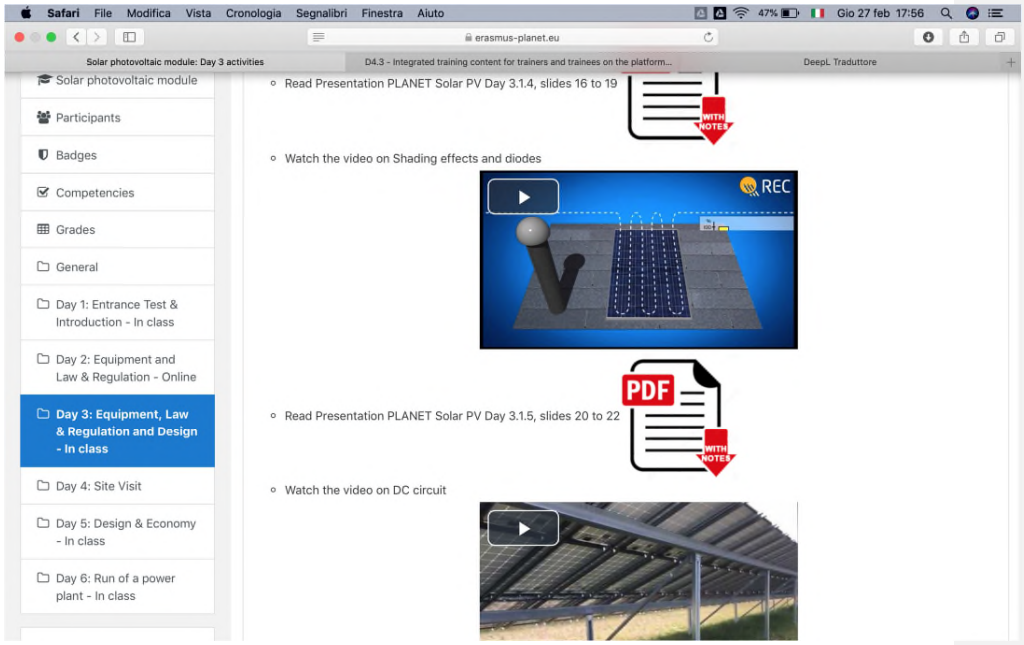

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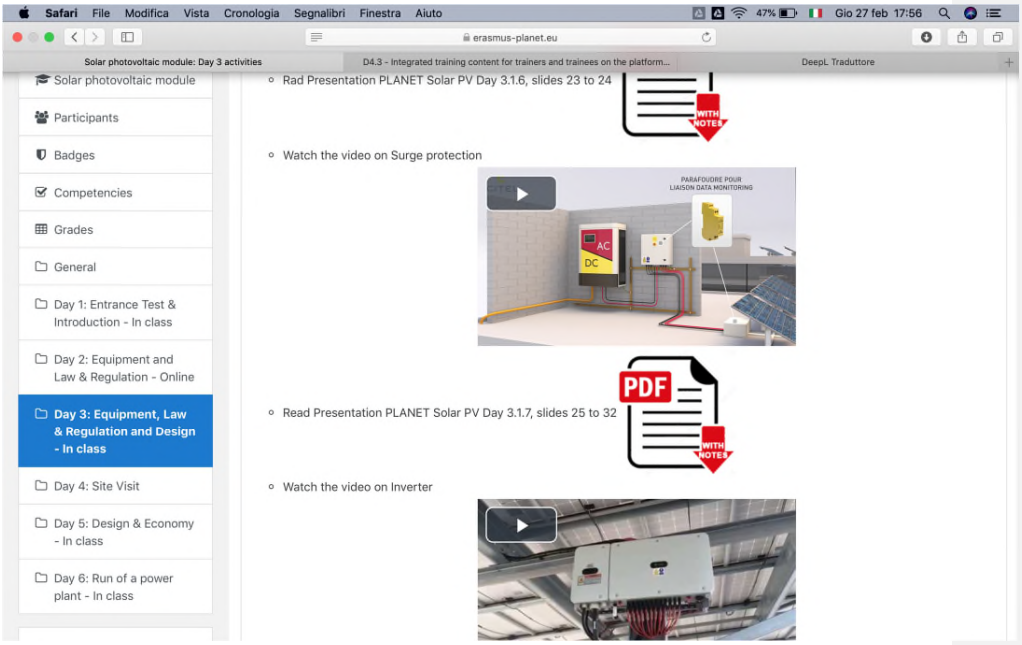

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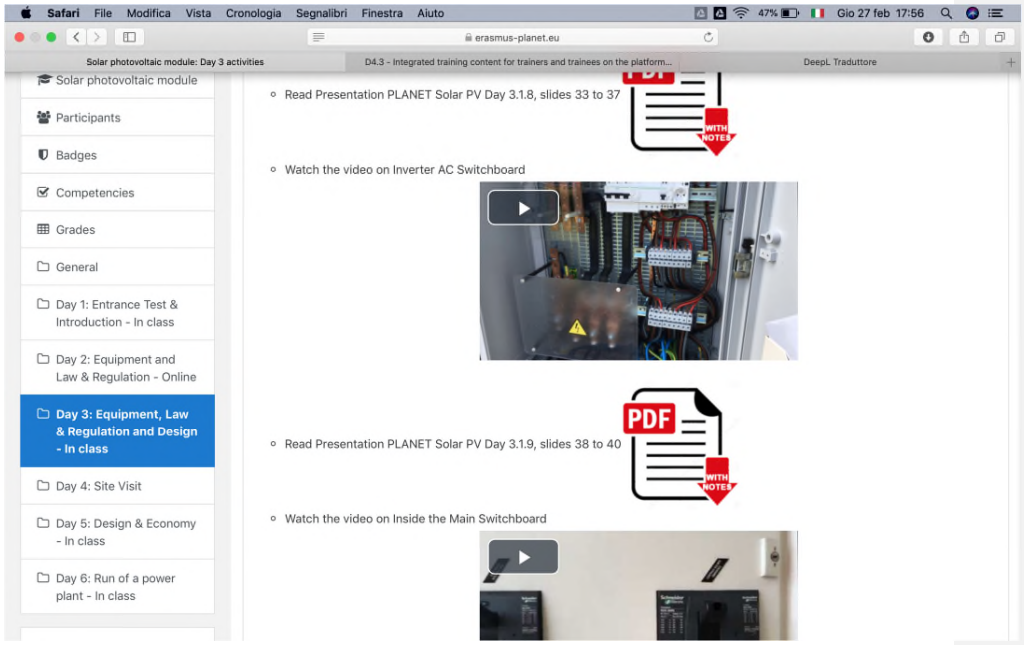

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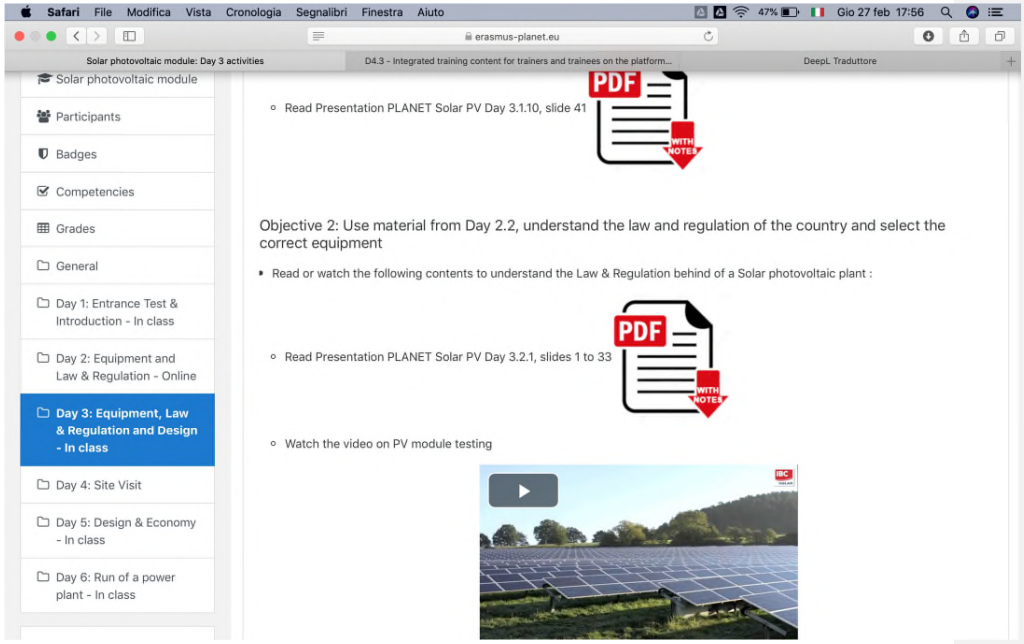

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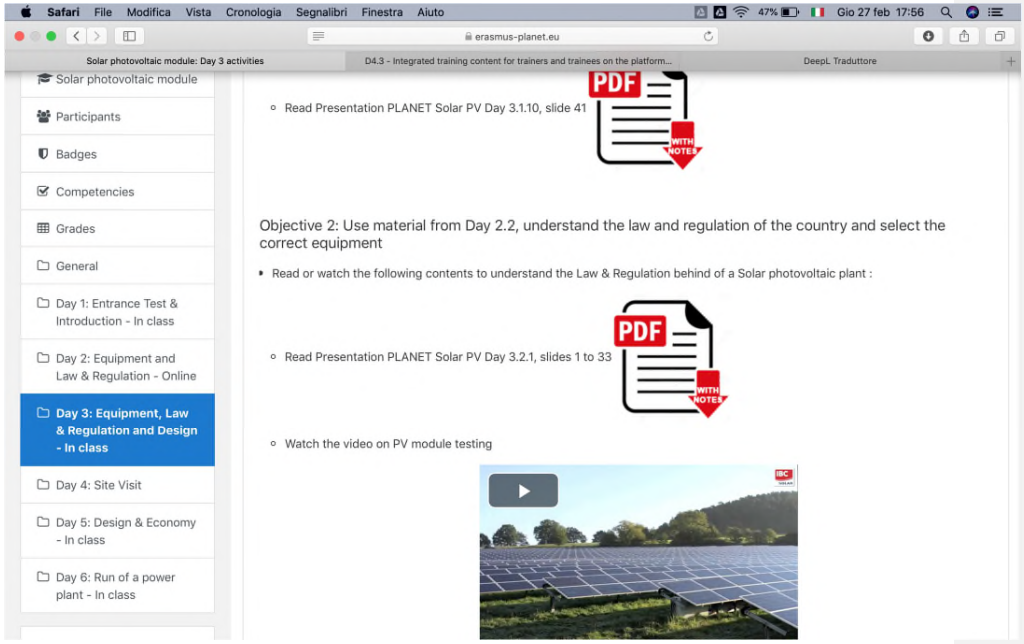

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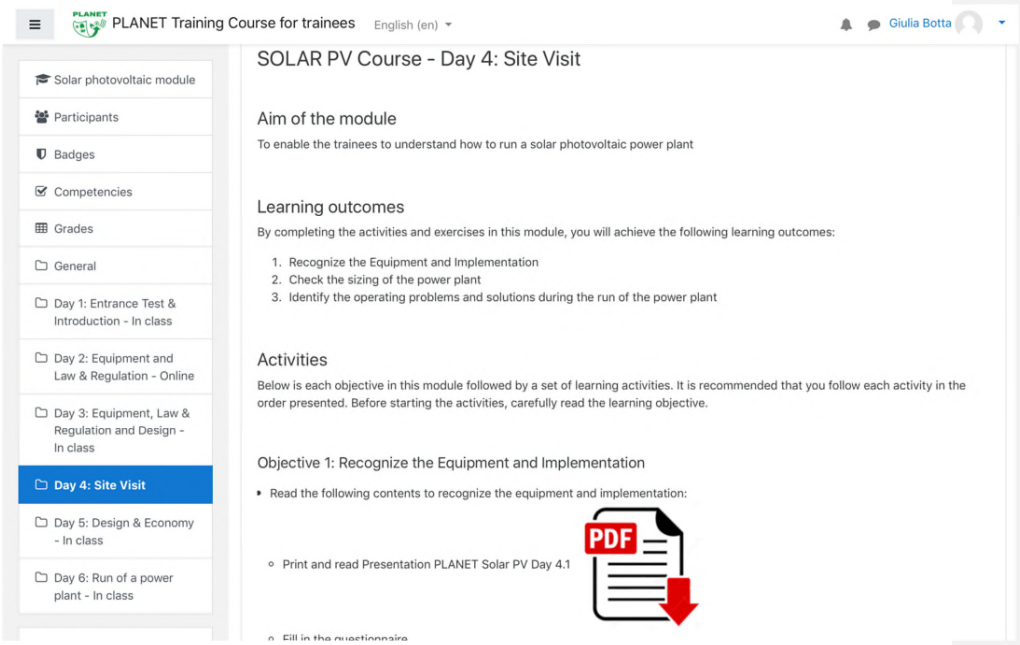

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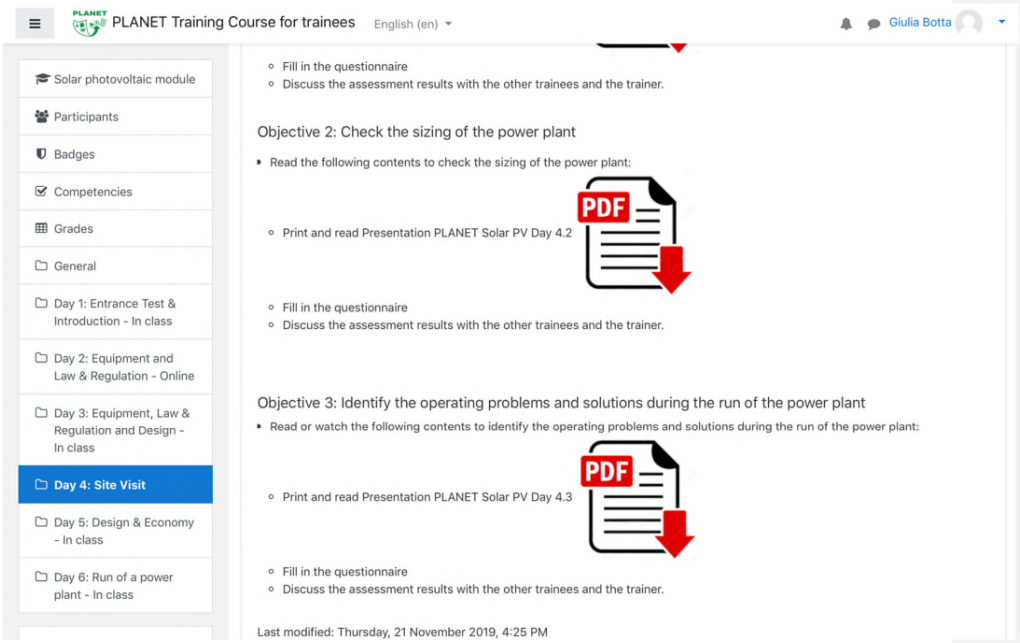

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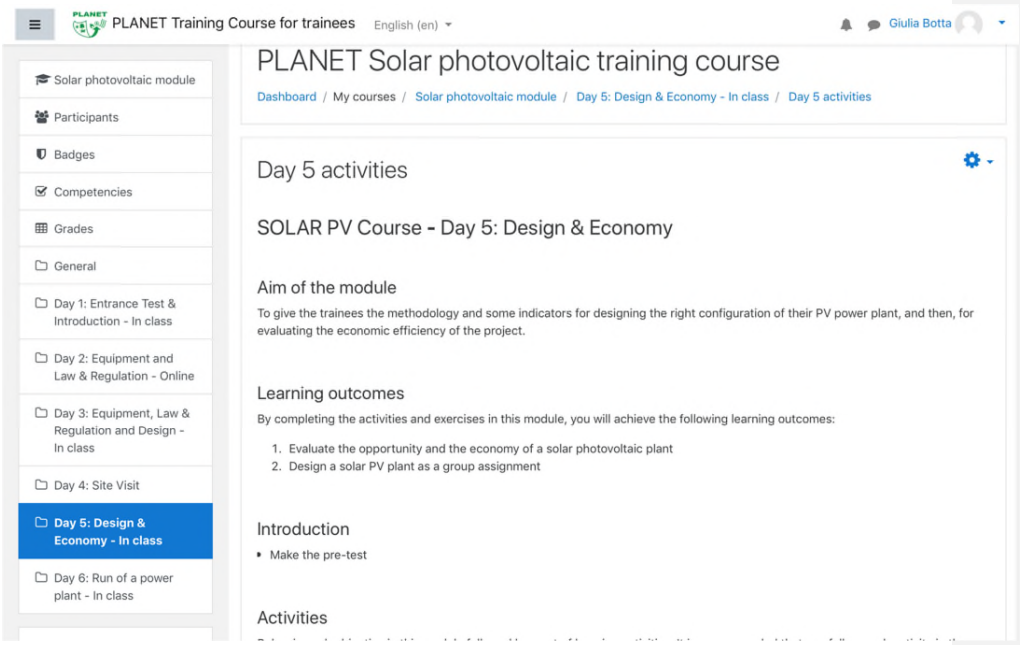

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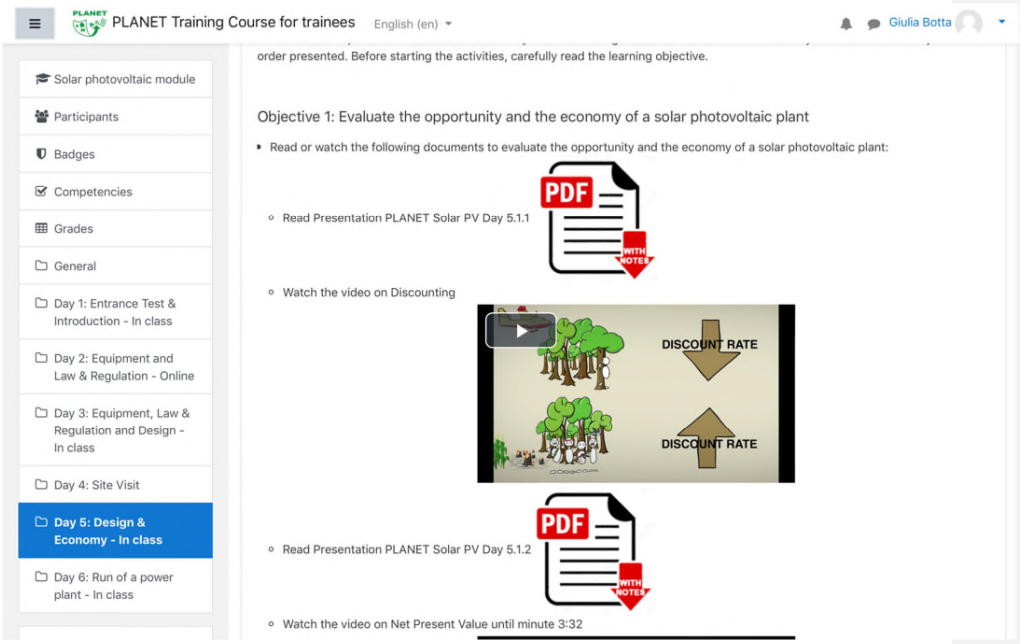

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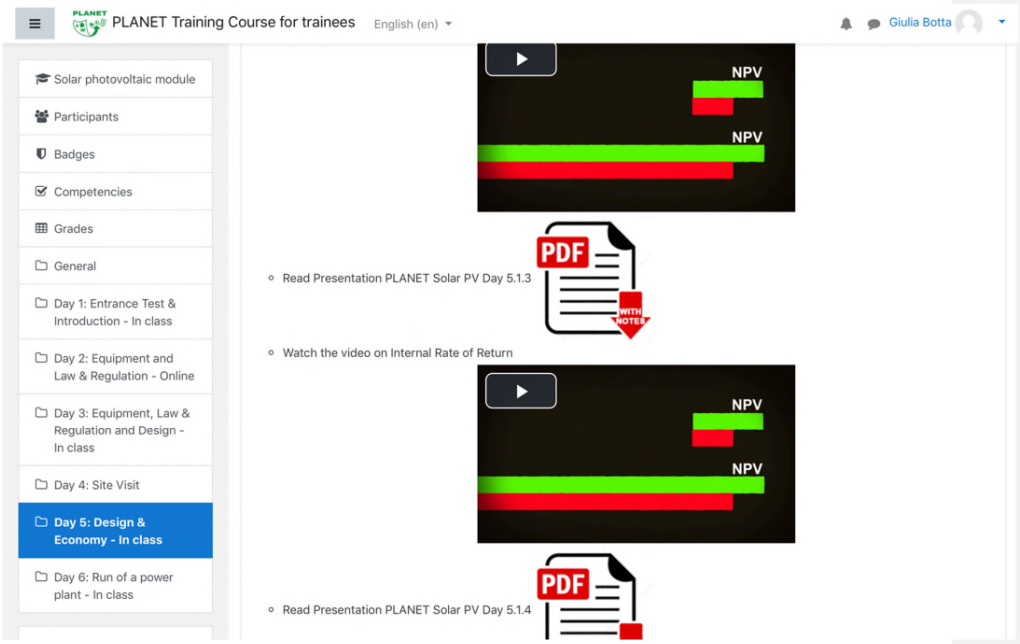

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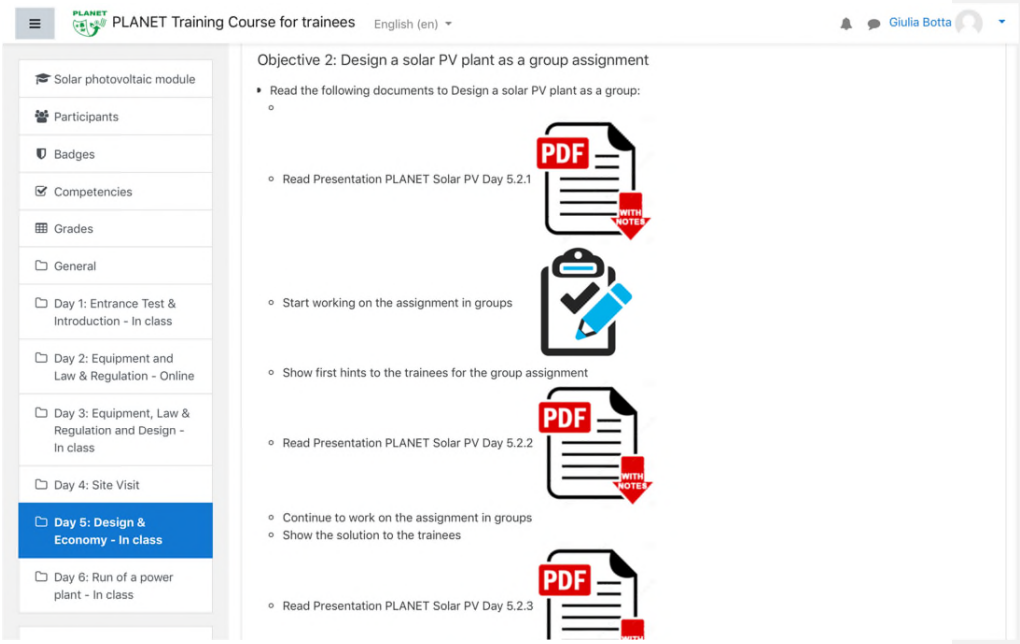

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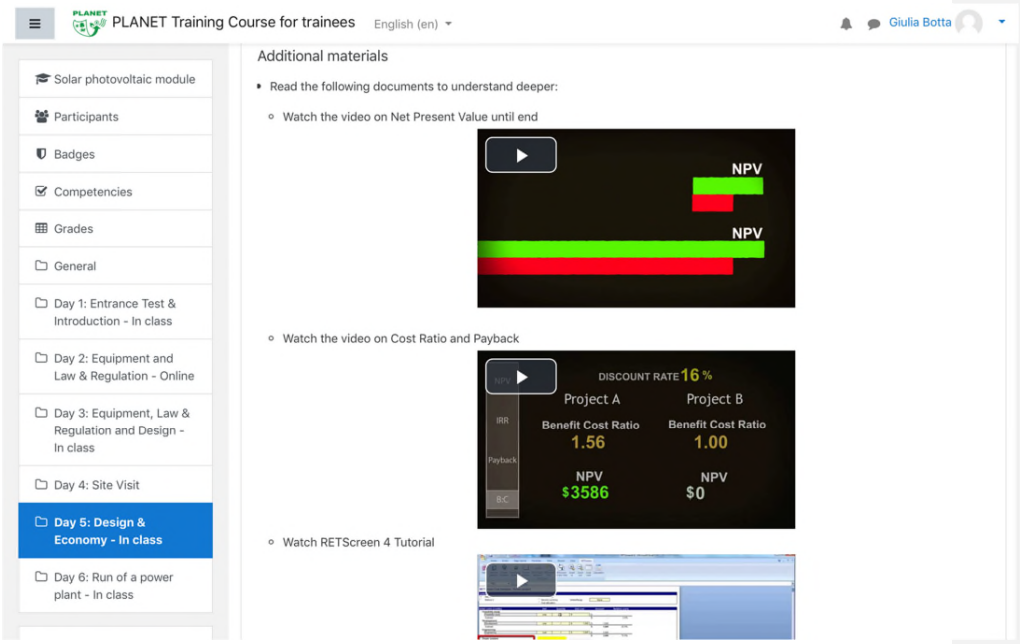

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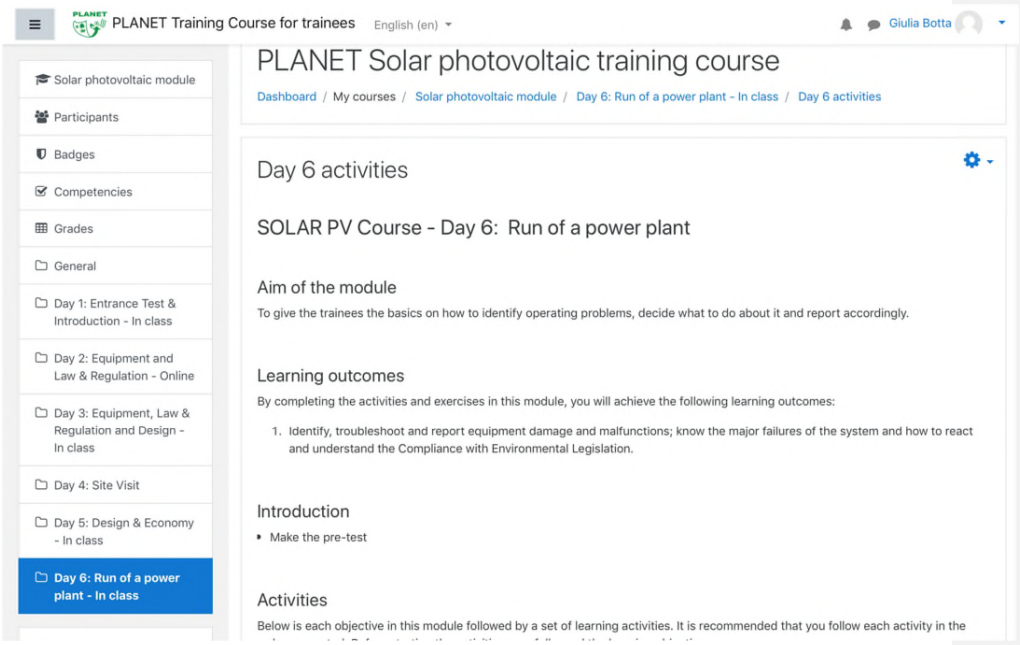
4.5 Day Six:



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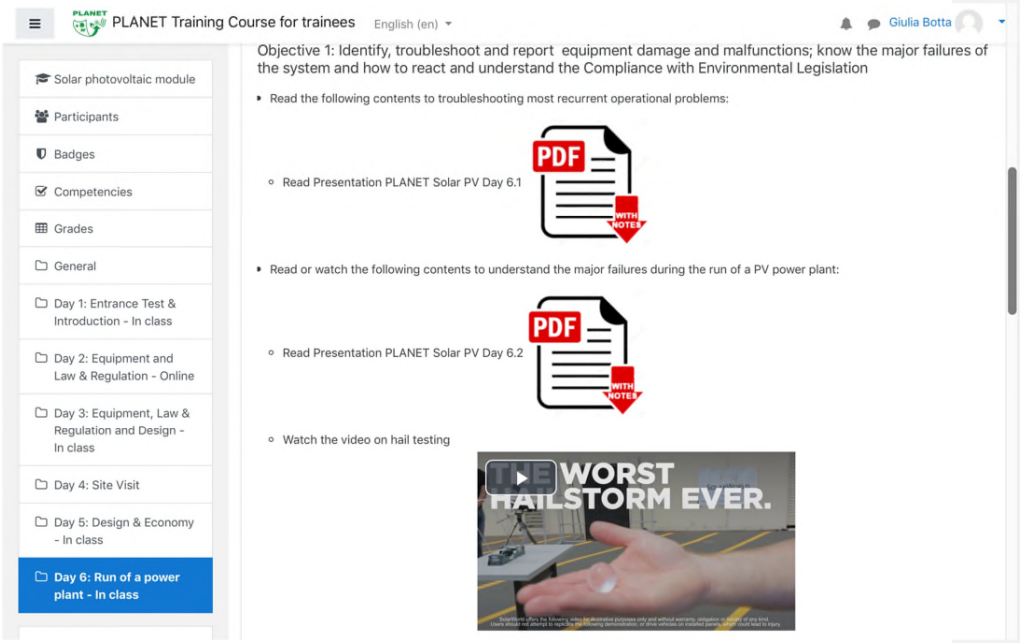


Figure 36 details of the structure of the day 6, previously shown

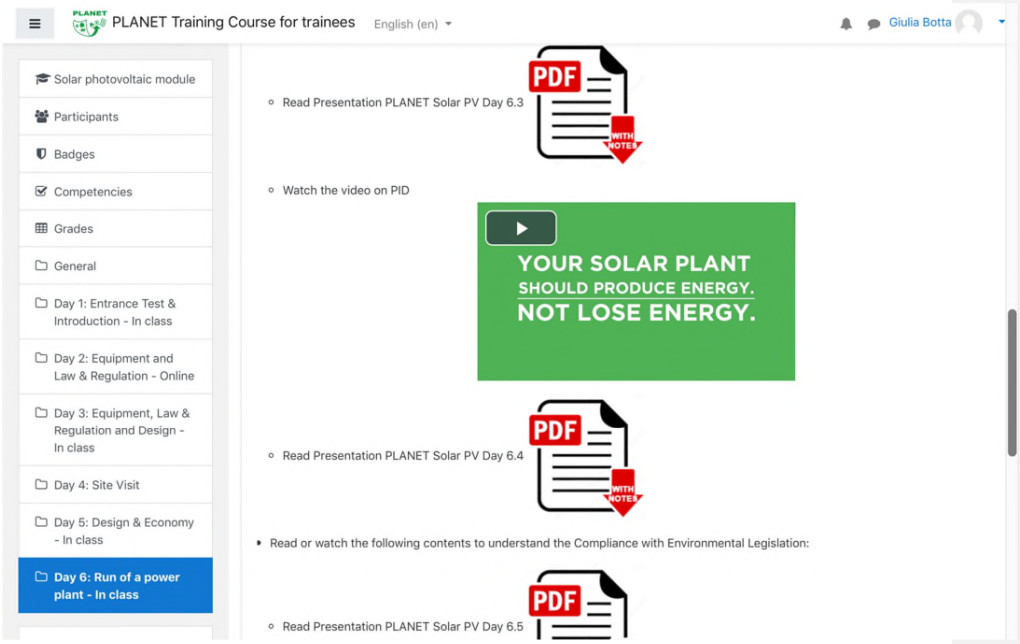


Figure 37 details of the structure of the day 6, previously shown

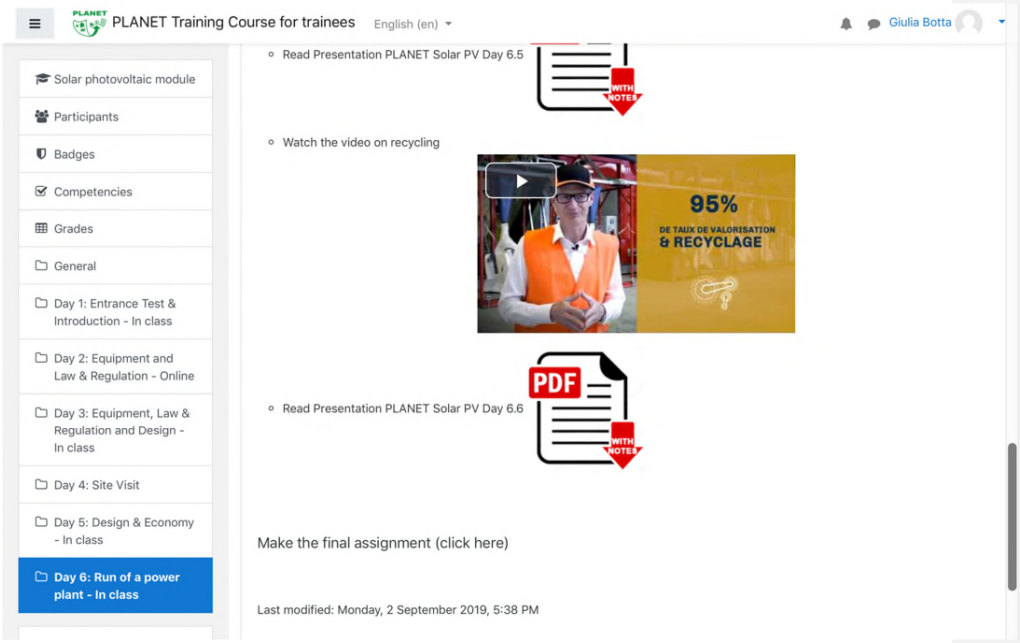


Figure 38 details of the structure of the day 6, previously shown

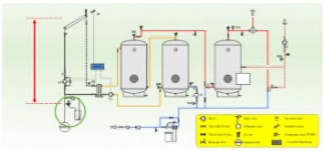
5 PLANET Solar thermal training course

The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The solar thermal training course consists of 6 days of training, in class, online and in the field (with a site visit to a working solar plant). The module begins with an introductory chapter that should allow students to understand the applications of solar energy and the roles of all stakeholders involved in a solar plant project. The module continues with a presentation of the technical equipment of a solar power system and the influence of local law and regulations on the system. Students will then learn the basic rules of designing a solar thermal system. The fourth day consists of a site visit where students will discover a plant in operation and how the information learned in the previous days is applied in the field. Students will also learn about health and safety regulations and operation and maintenance steps. Day 5 presents the method for evaluating economic benefits, and finally, day 6 is a presentation of how to operate a solar thermal system through the troubleshooting, maintenance, and recovery phases. Through the study of this module, the student will learn notions to enable sustainable economic operation of the system.

Day 1: Entrance Test & Introduction - In class

Day 1 activities
Day 1 Pre-test
Day 1 Final test

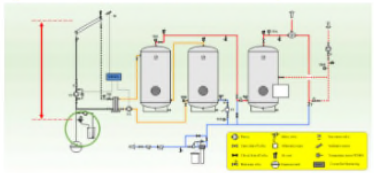
Day 2 Equipment & Law and Regulation - Online



Day 2 activities
Day 2 Pre-test
Day 2 Final test

Figure 39 first and second day of solar thermal course

Day 3: Equipment, Law & Regulation and Design - In class



Day 3 Activities

Day 3 Pre-test

Day 3 Final test

Day 4: Site visit

Day 4 Activities

Figure 40 third and fourth day of solar thermal course

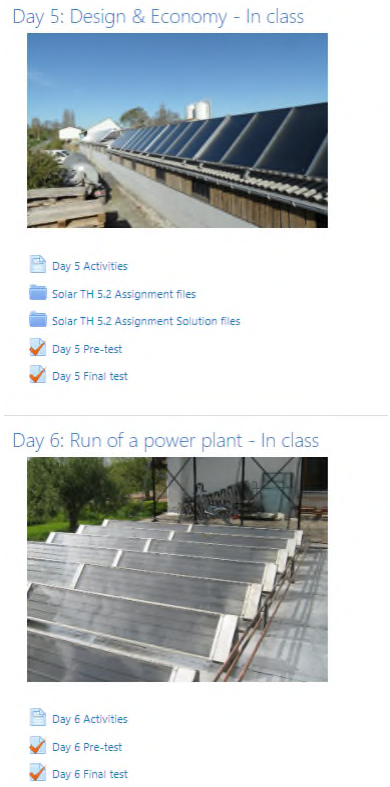


Figure 41 fifth and sixth day of solar thermal course

6 PLANET Biomass training course

The course is structured with a distribution of the program over 6 days (this varies depending on the course subject). The biomass training course covers the technical part of operational management, raw materials, design and economic feasibility, legal and safety aspects and the tour of a biomass plant. The content of the module provides the student with a comprehensive and practice-oriented knowledge of the construction and operation of local biomass heating plants, starting with the basics of biomass heating plants, suitable raw material ranges and their extraction, technical structure and their function, operational management, required contracts, safety and hazard information and compliance with legal regulations. With the

knowledge of the course the student obtains the ability to influence the design of a new biomass heating plant according to the current framework to enable sustainable economic operation of the plant.

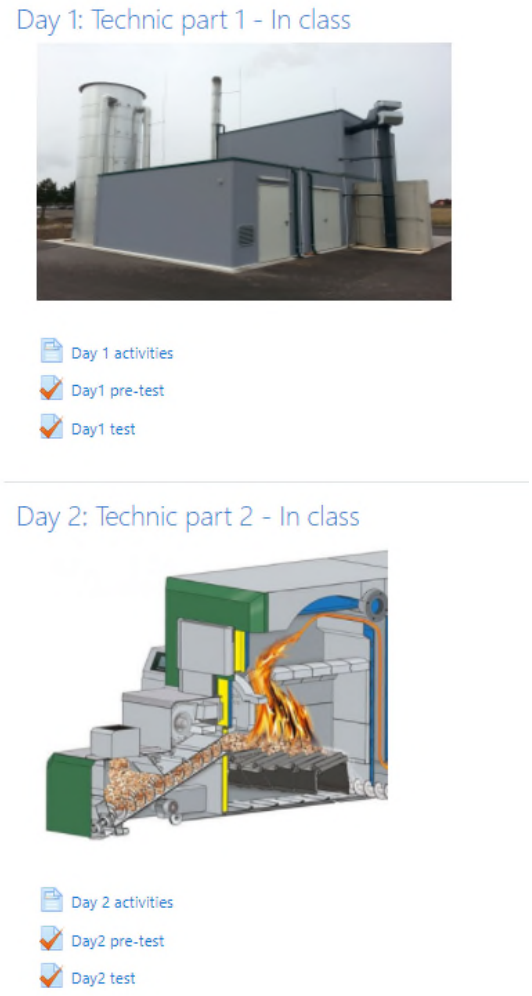


Figure 42 first and second day of biomass course

Figure 43 third and fourth day of biomass course

Figure 44 fifth and sixth day of biomass course

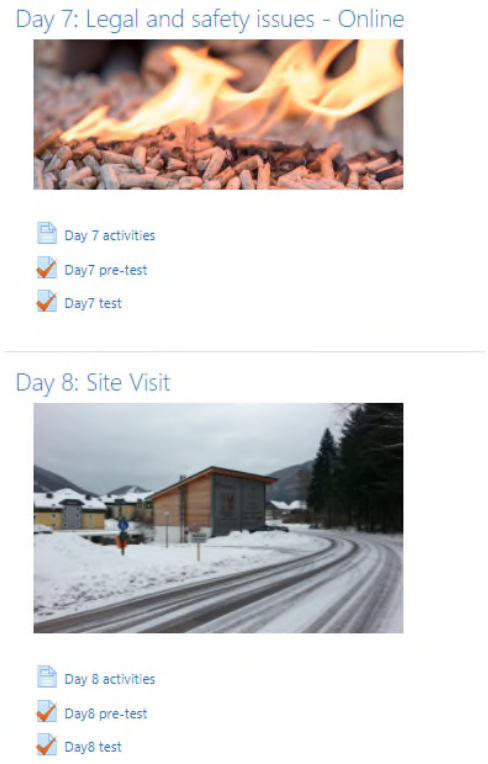


Figure 45 seventh and eight day of biomass course

7 PLANET Biogas training course

The course is structured with a program distribution over 11 days (this varies depending on the course subject). The biogas training course consists of digestion microbiology, technical plant layout, biogas plant (operational) management, business models, safety, environment and logistics. Site visits are combined with (group) assignments to apply the skills and knowledge learned. The training content provides the student with a working knowledge of basic plant design, operations management, safety and hazard information, and regulatory compliance. This module focuses on small-scale digesters, which are typically

found among agricultural premises throughout Europe. Small-scale digestion has many advantages. Basically it produces bioenergy from manure. The resulting revenue gives farmers more income. In addition to this manure digestion also reduces the emission of methane and nitrogen from manure pits. The harmfulness of methane as a greenhouse gas is a very large, yet under-appreciated side effect. With the knowledge of this course, the student obtains the ability to influence the design of a new biogas plant and is able to ensure the technical, biological, sustainable and economic operation of the plant.

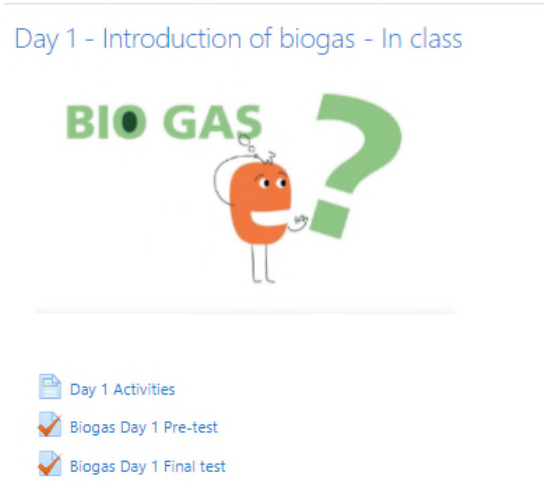


Figure 46 first day of biogas course

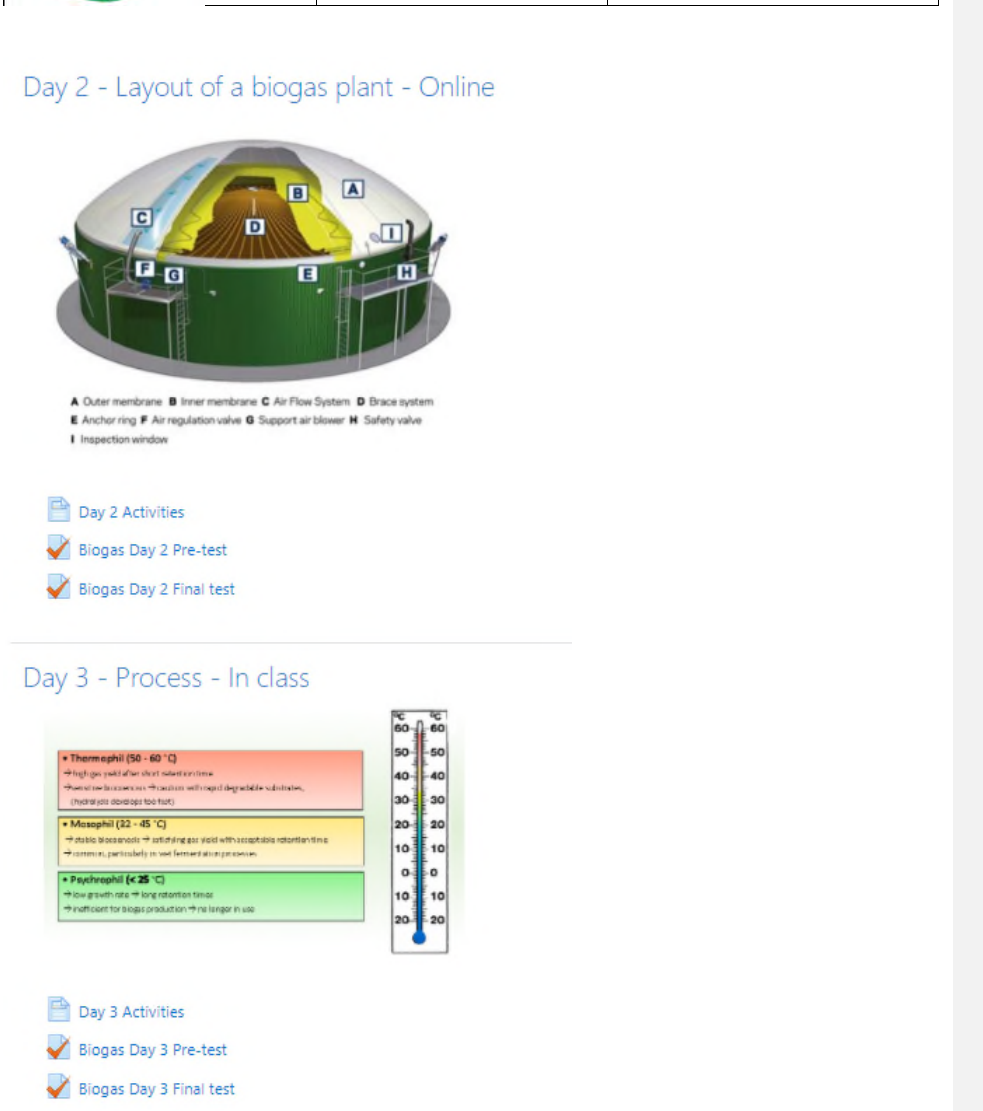


Figure 47 second and third day of biogas course

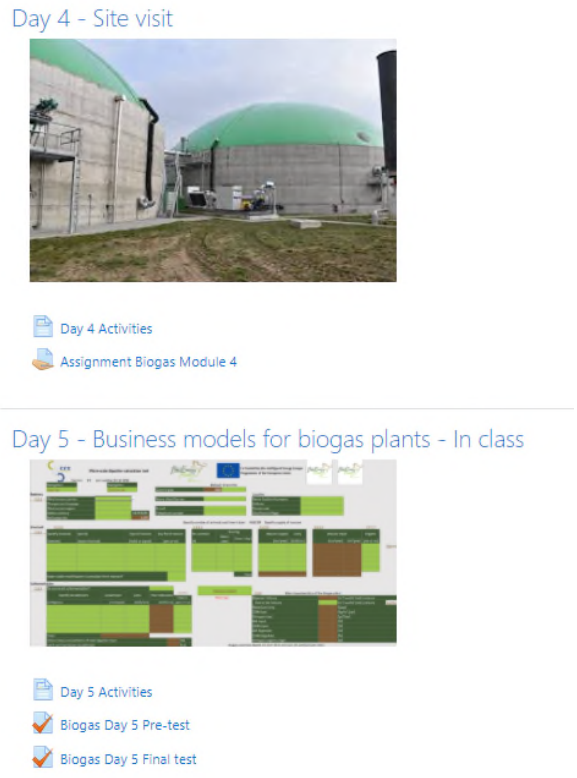


Figure 48 fourth and fifth day of biogas course

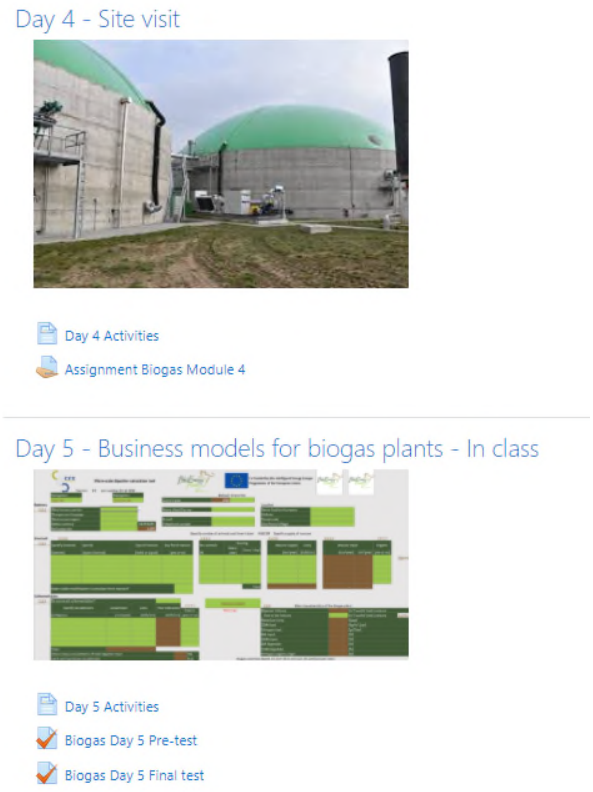


Figure 49 sixth and seventh day of biogas course

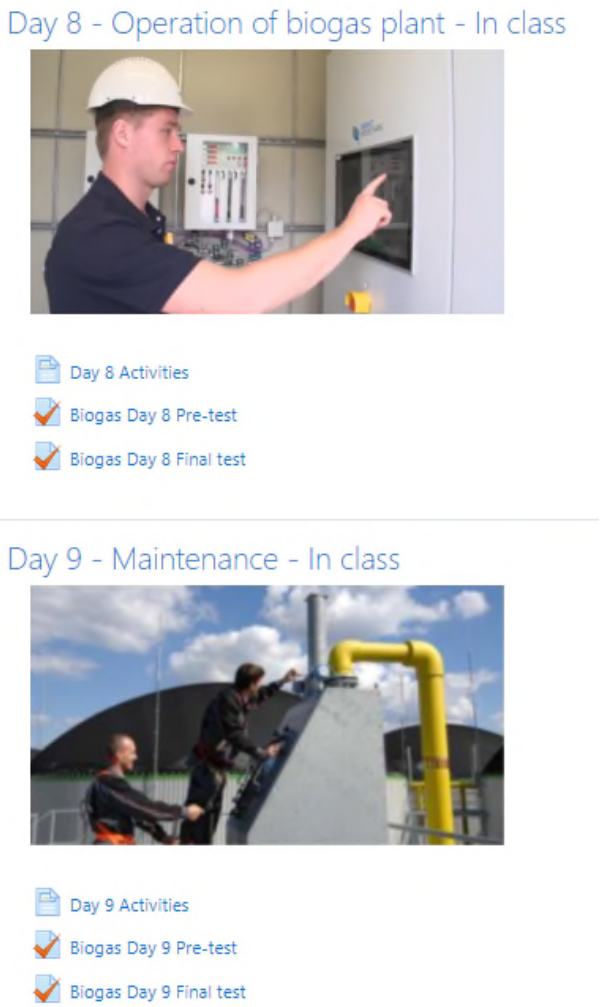


Figure 50 eighth and ninth day of biogas course

8 PLANET Training course Information and Communication Technology

The course is structured with a distribution of the program over 9 days (this varies depending on the course subject). The ICT module will provide students and professionals with the ability to use basic IT skills necessary to manage and monitor day-to-day renewable energy production facilities. This will be achieved through practical examples and tools related to the use of renewable energy sources.

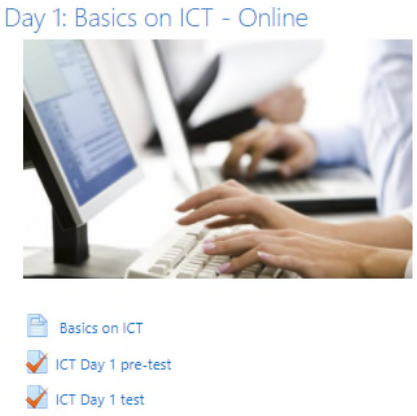


Figure 51 first day of ICT course

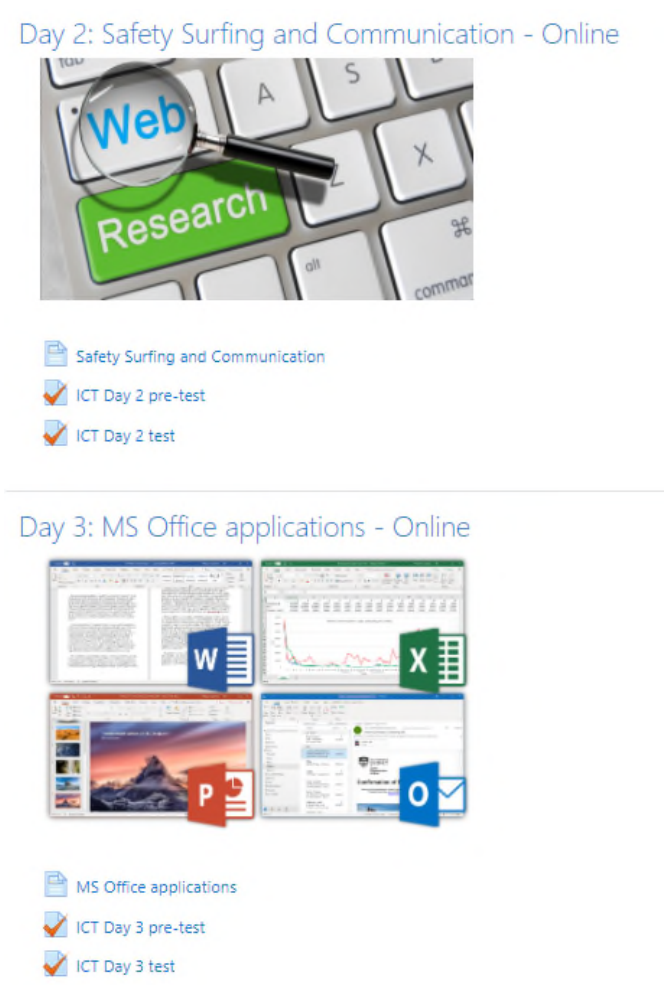


Figure 52 second and third day of the ICT course

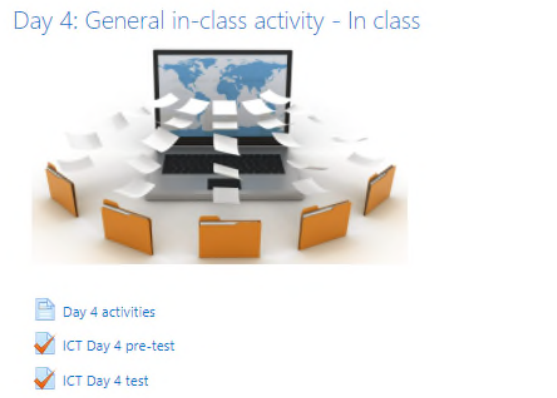


Figure 53 fourth and fifth day of ICT course

Figure 54 sixth, seventh day of ICT course

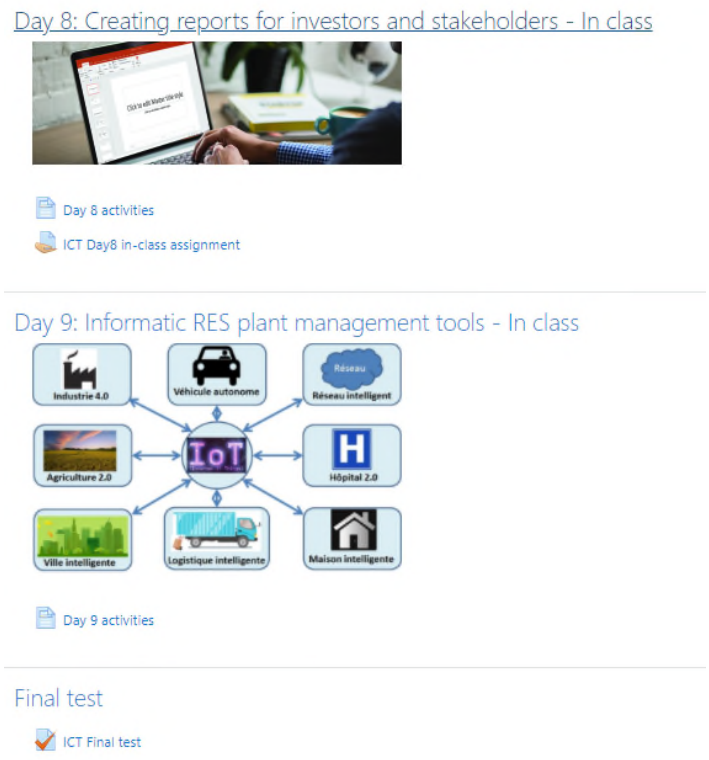


Figure 55 eight, ninth day of the ICT course

After the last day of the course, we can notice the final test.

9. Conclusion

Following the previous deliverables (4.1 and 4.3), with the indications regarding the realization and structure of the platforms, the complete and optimized version of all national e-learning platforms has been finalized.

The material is set up to implement a "Flipped Classroom", a learning methodology that involves individual moments and moments in the classroom, where you go to deepen what has been studied individually. To facilitate learning, the iconography is standardized and the structure is repeated in a very similar way for

each module. The modules are divided one per day, with an initial and a final test to verify the skills acquired during the study of the module. This model allows for an intuitive and user-friendly platform for both trainers and trainees.

Each language resides on a different platform as there are many aspects that take on regional/national significance and therefore are only present on the national platform of interest (e.g. contributions, installation constraints, specific standards).

An engaging learning model whose strength, especially since the advent of the Covid-19 pandemic, is the "flipped classroom" model that makes the entire learning experience possible online. A versatile methodology that anticipates trends and needs.

The entire course is available at the following link: **https://www.erasmus-planet.eu/course**